Berechnung der Schattenwurfdauer für die Errichtung

und den Betrieb von elf Windenergieanlagen

der Stadt Lübz

(Bebauungspläne Nr. 22)

und der Gemeinde Werder

(Bebauungspläne Nr. 3)

Bericht Nr.: I17-SCHATTEN-2019-10

I17-Wind GmbH & Co. KG --- Am Westersielzug 11 --- 25840 Friedrichstadt

Berechnung der Schattenwurfdauer für die Errichtung und den Betrieb von elf Windenergieanlagen am Standort Werder/Lübz

Bericht-Nr.	I17-SCHATTEN-2019-10
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Haftungsausschluss und Urheberrecht

Das vorliegende Schattenwurfimmissionsgutachten für die geplanten Windenergieanlagen (WEA) am Standort Werder/Lübz wurde von der Werder Wind & Wärme GmbH im November 2018 bei der I17-Wind GmbH & Co. KG in Auftrag gegeben Das Schattenwurfgutachten wurde nach bestem Wissen und Gewissen unparteiisch und nach dem gegenwärtigen Stand von Wissenschaft und Technik erstellt. Für die Daten die nicht von der I17-Wind GmbH & Co. KG gemessen, erhoben und verarbeitet wurden, kann keine Garantie übernommen werden. Eine auszugsweise Vervielfältigung dieses Berichtes ist nur mit ausdrücklicher Zustimmung der I17-Wind GmbH & Co. KG erlaubt.

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Revisionsnummer	Revisionsdatum	Änderung	Bearbeiter
0	01.02.2019	Erstellung des Gutachtens	Gefke

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1 Aufgabenstellung

In der Stadt Lübz wird aktuell der Bebauungsplan Nr. 22 und in der benachbarten Gemeinde Werder der Bebauungsplan Nr. 3 für einen gemeindeübergreifenden Windpark erstellt. Auftragnehmerin der Stadt Lübz und der Gemeinde Werder für dieses B-Planverfahren ist die Firma PLANUNG kompakt STADT aus Eutin. Diese bereitet auf Grundlage des BauGB aktuell alle erforderlichen Unterlagen für die Beteiligung der Öffentlichkeit und der Träger öffentlicher Belange vor. Unter Punkt 3 „Emissionen und Immissionen“ zu den Begründungen zum B-Plan der Stadt Lübz und der Gemeinde Werder sowie im jeweiligen Umweltbericht zum B-Plan der Stadt Lübz und der Gemeinde Werder unter Kapitel „Schutzgut Mensch“ soll eine Aussage zur Schattenwurfbelastung getroffen werden.

Da es sich um einen gemeindeübergreifenden Windpark handelt, werden alle Aussagen gemäß der Aufgabenstellung sowohl für die Baufenster (Baufenster = WEA-Standort) innerhalb des Geltungsbereiches jeweils des Bebauungsplanes Nr. 22 der Stadt Lübz und des Bebauungsplanes Nr. 3 der Gemeinde Werder dargestellt, als auch gesondert die betreffenden Wirkungen des gesamten Windparks, d.h. aller Baufenster aus beiden B-Plänen zusammen.

Die Rechenergebnisse und Beurteilung beziehen sich in diesem Gutachten auf die Zusammenfassung der Bebauungspläne Nr. 3 der Gemeinde Werder und Nr. 22 der Stadt Lübz.

Da die Bebauungspläne neben den üblichen Festsetzungen keine detaillierten Aussagen zum später durch einen Vorhabenträger eingesetzten Anlagentyp treffen, hat der Gutachter der Firma PLANUNG kompakt STADT empfohlen, für die betreffenden Baufenster im Rahmen der Gutachterlichen Zusammenfassung einen real existierenden WEA-Typ als Beispiel für die Berechnungen entsprechend den nachfolgenden Kriterien heranzuziehen:

- der einer künftig einzusetzenden Anlagenklasse nahe kommt,
- für den es bereits alle erforderlichen technischen Dokumentationen und Grundlagen für die notwendigen Berechnungen und Simulationen gibt und
- der sich ggf. hinsichtlich der Bauart an der bereits errichteten Nordex N117 orientiert.

Auf Grundlage der o.g. Kriterien wurde die Nordex N149/4.0-4.5 MW mit einer Nabenhöhe von 164 m ausgewählt. Dieser Anlagentyp wird beispielhaft für alle folgenden Berechnungen genutzt.
Aufgabe und Ziel des vorliegenden Gutachten ist es, den Nachweis zu führen, dass bei Umsetzung des neuen Windparks auf Basis der beiden B-Pläne die Vorgaben zum Schutz vor den durch Schattenwurf hervorgerufene Immission erfüllt werden und die Neu-WEA im Rahmen der rechtlich relevanten Grenzen betrieben werden können.
Für eine spätere Umsetzung von Windenergievorhaben im Geltungsbereich der B-Pläne ist im Rahmen des Genehmigungsverfahrens nach BImSchG [3] für die beantragten WEA ein standortspezifisches Gutachten zu erstellen.

Für das Genehmigungsverfahren nach dem BImSchG [2] ist der Nachweis der Einhaltung der Grenzwerte für die Schattenwurfimmissionen zu führen. Die Berechnungen sollen Auskunft darüber geben, ob schädliche Umwelteinwirkungen durch Schattenwurf von den geplanten Anlagen ausgehen können.

2 Örtliche Beschreibung

Der Geltungsbereich des Bebauungsplanes Nr. 22 der Stadt Lübz und der Geltungsbereich des Bebauungsplanes Nr. 3 der Gemeinde Werder beschreiben die potentiell künftige Windparkfläche des Windparks Werder/Lübz. Die Windparkfläche befindet sich ca. 43 km südwestlich von Schwerin, ca. 17 westlich von Plau am See und ca. 12 km nordöstlich von Parchim im Landkreis Ludwigslust-Parchim (Mecklenburg-Vorpommern).

Die Windparkfläche befindet sich ca. 2 km nördlich von Lübz auf einer freien Ackerfläche. Nördlich der Fläche liegt die Ortschaft Werder, östlich befindet sich die Ortschaft Ruthen und westlich das Dorf Greven. Die geplante Windparkfläche ist nahezu eben mit einer Geländehöhe von ca. 60 m über NN. Die geplante Windparkfläche weist nur in geringem Umfang Bewuchs durch Bäume oder Büsche auf. In der unmittelbaren Umgebung befindet sich eine Allee entlang der Kreisstraße zwischen Lübz und Werder. Die Allee schneidet die Windparkfläche in dessen nordöstlichen Bereich.

Die weitere Umgebung der Windparkfläche ist weitgehend durch ebenes Gelände mit ausgedehnten freien landwirtschaftlich genutzten Flächen, teilweise unterbrochen von linienhaften Grünstrukturen und kleineren Ortschaften, geprägt. Westlich der Windparkfläche schließt sich ein ca. 20 ha großes Waldgebiet an. Das Landschaftsbild wird partiell ab einer Entfernung von ca. 1 km durch Siedlungsbereiche bestimmt, in nördlicher Richtung durch die Gemeinde Werder, in östlicher Richtung durch Ruthen und südlich durch die Stadt Lübz.

Die Angaben zu den Koordinaten der geplanten Windenergieanlagen wurden von der Voss Energy GmbH zur Verfügung gestellt [4].

Für die Koordinatenangaben in diesem Gutachten findet das System UTM ETRS89 Zone 33 Anwendung. Die Windenergieanlagenpositionen sind in der nachfolgenden Abbildung 2.1 für beide B-Pläne der Stadt Lübz und Gemeinde Werder dargestellt.

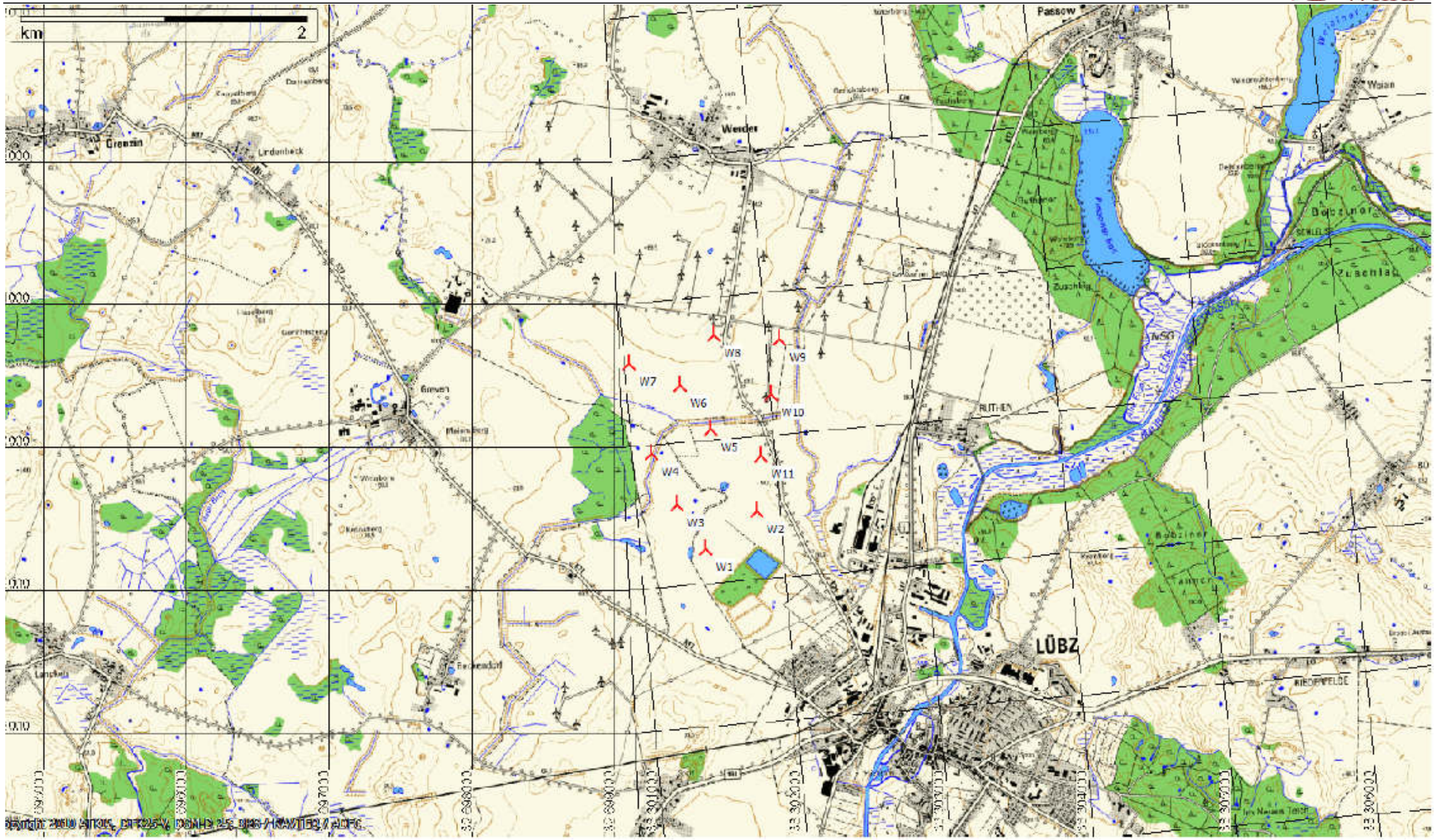


Abbildung 2.1: WEA Standorte für den Standort Werder/Lübz
Blaue Sterne: Bestandsanlagen; Rote(s) Kreuz(e): Neu geplante WEA; Kartenmaterial [3]

3 Beurteilungsgrundlagen

3.1 Berechnungs- und Beurteilungsverfahren

Die hier zu untersuchenden Immissionen durch direkten Schattenwurf des Rotors können bei drehendem Rotor störend wirken. Aus der Anzahl der Rotorblätter und der Drehzahl des Rotors ergibt sich die jeweilige Frequenz mit der wechselnde Lichtverhältnisse im Schattenbereich auftreten können. Bei den gegenwärtigen Anlagengrößen handelt es sich um niedrige Frequenzen im Bereich von ca. 0.5 bis 3 Hz. Die Bund-Länder-Arbeitsgemeinschaft für Immissionsschutz (LAI) [1] hat die federführend vom staatlichen Umweltamt Schleswig unter Mitarbeit von Fachleuten, Gutachtern, Gewerbeaufsichtsämtern und Weiteren erarbeiteten *Hinweise zur Ermittlung und Beurteilung der optischen Immissionen von Windenergieanlagen (WEA-Schattenwurf-Hinweise) [1]* im Jahr 2002 als Standard anerkannt. Die WEA-Schattenwurf-Hinweise enthalten folgende Grenzwerte:

- Die astronomisch maximal mögliche Beschattungsdauer darf maximal 30 Stunden im Jahr und maximal 30 Minuten am Tag betragen.
- Ein Schattenwurf bei Sonnenständen unter 3° ist nicht zu berücksichtigen.
- Wenn am Immissionsort aufgrund der Entfernung zur WEA die Sonne zu weniger als 20% durch das Rotorblatt verdeckt wird, können die dadurch entstehenden Helligkeitsschwankungen (Schatten) vernachlässigt werden.
- Um die Vergleichbarkeit der Ergebnisse zu ermöglichen, wird die Berechnung für einen punktförmigen Rezeptor von 0.1 m x 0.1 m in ca. 2m Höhe durchgeführt.

Die Beschattungsdauer an der umgebenden Bebauung kann für eine oder mehrere WEA in Abhängigkeit von Nabenhöhe und Rotordurchmesser ermittelt werden. Der Berechnung der astronomisch mögliche Beschattungsdauer - dem worst case - liegen folgende Annahmen zu Grunde:

- Es herrscht durchgehender Sonnenschein von Sonnenaufgang bis Sonnenuntergang.
- Die Sonnenstrahlung steht senkrecht zur Rotorkreisfläche.
- Die WEA befindet sich permanent in Betrieb.

Zyklische Lichtblitze / Discoeffekte sowie periodischer Schattenwurf sind Immissionen im Sinne des Bundes-Immissionsschutzgesetzes [2]. Durch Verwendung mittelreflektierender Farben (z.B. RAL 7035-HR) und matten Glanzgraden gemäß DIN 67530 / ISO 2813 kann Lichtblitzen vorgebeugt werden.

4 Beschreibung der geplanten Windenergieanlagen

4.1 Anlagenbeschreibung

Im Rahmen des vorliegenden Gutachten für die Bebauungspläne der Stadt Lübz und der Gemeinde Werder wird im Rahmen dieses Schattenwurfgutachten unterstellt, dass die vorstehend beispielhaft ausgewählte und benannte WEA (Nordex N149/4.0-4.5 MW) im Mittelpunkt der in den Entwürfen der B-Pläne dargestellten Baufenster platziert wird. Nachfolgend werden die Eckdaten und die Koordinaten der elf geplanten Windenergieanlagen zusammengefasst.

Hersteller:	Nordex
Anlagentyp:	N149/4.0-4.5 MW
Nabenhöhe:	164 m
Rotordurchmesser:	149 m
Nennleistung:	4.500 kW
Drehzahlbereich:	6.4 – 10.7 U/min
Maximale Blatttiefe:	4.15 m
Blatttiefe bei 90% Radius:	1.17 m

4.2 Positionen der geplanten Windenergieanlagen

Der nachfolgenden Tabelle 4.1 sind die Positionen [4] und der Anlagentyp mit Nabenhöhe der geplanten Windenergieanlagen für die Standorte in der Stadt Lübz und in der Gemeinde Werder gemeinsam zu entnehmen.

W-Nr.	Typ	Rotor-durch-messer [m]	Naben-höhe [m]	Koordinaten UTM ETRS 89 Zone 33 Ost	Koordinaten UTM ETRS 89 Zone 33 Nord	Höhe über NN [m]
1	N149/4.0-4.5 MW	149	164	301426	5929240	57
2	N149/4.0-4.5 MW	149	164	301807	5929470	57
3	N149/4.0-4.5 MW	149	164	301253	5929563	58
4	N149/4.0-4.5 MW	149	164	301097	5929936	57
5	N149/4.0-4.5 MW	149	164	301529	5930071	56
6	N149/4.0-4.5 MW	149	164	301334	5930397	59
7	N149/4.0-4.5 MW	149	164	300988	5930574	58
8	N149/4.0-4.5 MW	149	164	301599	5930726	61
9	N149/4.0-4.5 MW	149	164	302064	5930657	56
10	N149/4.0-4.5 MW	149	164	301977	5930276	56
11	N149/4.0-4.5 MW	149	164	301867	5929853	57

Tabelle 4.1: Positionen der geplanten WEA für den Standort Werder/Lübz [4]

4.3 Vorbelastung

Die neue Windparkfläche (Geltungsbereich der beiden Bebauungspläne) schließt sich südlich gelegen an eine bestehende Windparkfläche an. Diese bestehende Altfläche wurde im Zuge der Regionalplanung 1996 als Eignungsraum dargestellt und folgend bebaut. Heute sind hier 51 WEA der Leistungsklasse 500 – 900 kW in Betrieb. Im Jahr 2017 wurde in dieser „Altfläche“ eine 600 kW Anlage stillgelegt (2018 demontiert) und 2017 ebenfalls in dieser Altfläche eine neue Windenergieanlage vom Typ Nordex N117 / 3.600 kW errichtet und in Betrieb genommen. In südwestlicher Richtung von der vorstehend beschriebenen Altfläche in ca. 2 km Entfernung befindet sich eine weitere Altfläche, der Windpark Lutheran. Diese Fläche wurde ebenfalls im Zuge der Regionalplanung 1996 als Eignungsraum dargestellt und mit insgesamt 7 WEA der Leistungsklasse 600 kW bebaut. Ebenso im Jahre 2017 wurden hier 2 Altanlagen stillgelegt und zurückgebaut und eine neue WEA des Typs Vestas V126 errichtet und in Betrieb genommen.

Beide vorstehend beschriebenen Altgebiete sind in den aktuellen Entwürfen des Regionalen Planungsverbandes nicht mehr als Eignungsraum dargestellt. Das gilt ebenso für die beiden Entwürfe des sachlichen Teilflächennutzungsplanes der Stadt Lübz (Altfläche Lutheran) und des sachlichen Teilflächennutzungsplanes der Gemeinde Werder (Altfläche Werder/Lübz), welche aktuell ebenfalls in Aufstellung befindlich sind. Für die in den beiden oben benannten Altgebieten betriebenen Altanlagen gilt Bestandsschutz. Das heißt diese können auch ohne Widmung im Regionalplan oder Flächen-nutzungsplan weiter bis zur Nutzungsaufgabe betrieben werden. Die Nutzungsdauer dieser Altanlagen bestimmt sich weitestgehend über die Gültigkeit der Typenprüfung, welche nach dem Auslaufen zu verlängern wäre. Hinzu kommen wirtschaftliche Aspekte. Die wirtschaftlichen Rahmenbedingungen werden gekennzeichnet durch eine Zunahme der Reparaturanfälligkeit auf der einen Seite und dem Rückgang der Vergütung nach Auslaufen der EEG -Vergütung nach 20 Jahren. In Hinblick auf das EEG bedeutet dies, dass nach aktuellem Stand die WEA zwischen 2021 und 2023 stillgelegt werden müssten, Stand heute (Jan. 2019).

Die Betrachtung im Rahmen dieses Schattenwurfgutachtens stellt die Machbarkeit im Rahmen einer Umsetzung der B-Pläne in den beiden tangierten Kommunen dar. Auf Wunsch des Auftraggebers berücksichtigt diese nicht die Vorbelastung durch die bestehenden Altanlagen. Die Vorhaben bezogene Betrachtung geschieht im Schattenwurfgutachten im Rahmen der Antragsstellung nach dem Bundesimmissionsschutzgesetz (BImSchG [3]).

Das bedeutet, dass bei Antragstellung einer oder mehrerer Neu-WEA zur Genehmigung nach dem BImSchG [3] die bestehende Situation der Vorbelastung bei der Erstellung der betreffenden Gutachten zu berücksichtigen ist. Die Situation der Altanlagen beschreibt dabei, den Status Quo oder einen Zustand im Altbestand, welcher zum Zeitpunkt vor Inbetriebnahme genehmigter WEA erreicht sein soll oder geplant ist (Betrieb wie genehmigt!).

5 Einwirkungsbereiche der Windenergieanlagen und Immissionspunkte

Als Immissionsorte für die Schattenwurfprognose wurden die nächstgelegenen Gebäude berücksichtigt. Die Auswahl der Immissionsorte wurde anhand einer Standortbesichtigung eines Mitarbeiters der I17-Wind GmbH & Co. KG, sowie der vorliegenden Dokumentation vorgenommen. Bei der Standortbesichtigung wurde die bestehende Wohnbebauung mit Angaben aus dem Kartenmaterial abgeglichen und Abweichungen dokumentiert und korrigiert. Laut den WEA-Schattenwurf-Hinweisen des Länderausschusses für Immissionsschutz (LAI) [1] sind maßgebliche Immissionsorte u.a.:

- Wohnräume
- Schlafräume, einschließlich Übernachtungsräume in Beherbergungsstätten und Bettenräume in Krankenhäusern und Sanatorien
- Unterrichtsräume in Schulen, Hochschulen und ähnlichen Einrichtungen
- Büroräume, Praxisräume, Arbeitsräume, Schulungs- und ähnliche Arbeitsräume

Die nächstgelegene Bebauung, welche diese Kriterien erfüllt, ist die Bebauung der Ortschaft Werder im Norden des geplanten Windparks, die Ortschaft Ruthen im Osten und die südöstlich gelegene Stadt Lübz. Im Westen sind es hauptsächlich Bebauungen in Greven (Abbildung 5.1). Im Anschluss wurden nur die Immissionsorte berücksichtigt, die innerhalb oder nahe am Rande der Schattenwurf-Isolinie liegen (Siehe Tabelle 5.1).

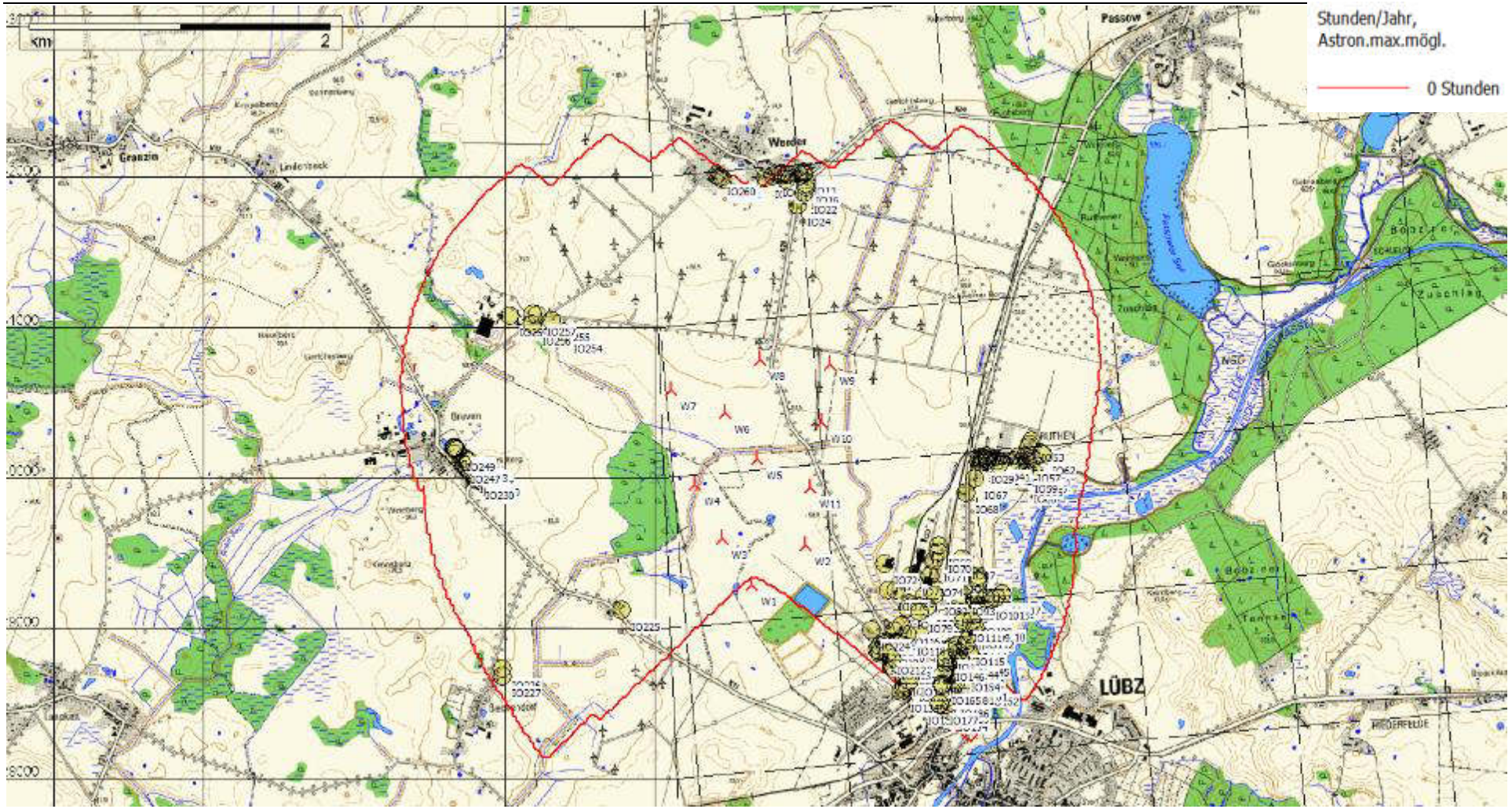


Abbildung 5.1: Einwirkbereich der geplanten WEA und Lage der Schattenrezeptoren am Standort Werder/Lübz

Die Lage und Bezeichnung der Immissionsorte in der Stadt Lübz und in der Gemeinde Werder im Einwirkbereich der geplanten WEA sind in Tabelle 5.1 zusammengefasst. Die Nummerierung der Immissionsorte beginnt im Norden und verläuft im Uhrzeigersinn.

Nr.	Immissionspunkte	Koordinaten UTM ETRS 89 Zone 33 Ost	Koordinaten UTM ETRS 89 Zone 33 Nord	Höhe über NN [m]
IO1	Dorfstraße 6, Werder	301727	5931928	62
IO2	Dorfstraße 5, Werder	301780	5931940	61
IO3	Dorfstraße 33, Werder	301812	5931957	60
IO4	Dorfstraße 34, Werder	301836	5931949	60
IO5	Dorfstraße 36, Werder	301853	5931944	61
IO6	Dorfstraße 37, Werder	301871	5931939	61
IO7	Dorfstraße 4, Werder	301867	5931907	61
IO8	Dorfstraße 38, Werder	301888	5931937	60
IO9	Dorfstraße 3, Werder	301890	5931903	61
IO10	Dorfstraße 39, Werder	301908	5931934	60
IO11	Dorfstraße 2, Werder	301951	5931899	61
IO12	Dorfstraße 39a, Werder	301958	5931929	60
IO13	Dorfstraße 39b, Werder	301988	5931931	60
IO14	Dorfstraße 39c, Werder	301992	5931949	60
IO15	Dorfstraße 40, Werder	302004	5931882	60
IO16	Dorfstraße 41, Werder	302000	5931867	60
IO17	Dorfstraße 42, Werder	301996	5931847	61
IO18	Dorfstraße 1d, Werder	301965	5931841	61
IO19	Dorfstraße 1c, Werder	301962	5931832	61
IO20	Dorfstraße 43, Werder	301990	5931829	61
IO21	Dorfstraße 1b, Werder	301963	5931812	62
IO22	Dorfstraße 44, Werder	301984	5931807	61
IO23	Dorfstraße 45, Werder	301981	5931792	62
IO24	Dorfstraße 1a, Werder	301932	5931730	63
IO25	Zum Weinberg 34, Ruthen	303007	5929927	56
IO26	Zum Weinberg 4, Ruthen	303016	5929953	57
IO27	Zum Weinberg 33, Ruthen	303026	5929921	55
IO28	Zum Weinberg 5, Ruthen	303044	5929952	57
IO29	Zum Weinberg 32, Ruthen	303043	5929922	56
IO30	Zum Weinberg 6, Ruthen	303064	5929937	56
IO31	Zum Weinberg 6a, Ruthen	303066	5929961	57
IO32	Zum Weinberg 7, Ruthen	303074	5929935	56
IO33	Zum Weinberg 31, Ruthen	303066	5929916	55
IO34	Zum Weinberg 30, Ruthen	303082	5929913	55
IO35	Zum Weinberg 8, Ruthen	303096	5929931	56
IO36	Zum Weinberg 29, Ruthen	303107	5929909	56
IO37	Zum Weinberg 9, Ruthen	303120	5929925	56
IO38	Zum Weinberg 28, Ruthen	303125	5929906	56
IO39	Zum Weinberg 10, Ruthen	303137	5929920	56
IO40	Zum Weinberg 27, Ruthen	303145	5929897	56
IO41	Zum Weinberg 11, Ruthen	303157	5929917	56

IO42	Zum Weinberg 12, Ruthen	303169	5929915	56
IO43	Zum Weinberg 26, Ruthen	303167	5929897	56
IO44	Zum Weinberg 12a, Ruthen	303208	5929912	56
IO45	Zum Weinberg 25, Ruthen	303228	5929890	56
IO46	Zum Weinberg 12b, Ruthen	303244	5929915	56
IO47	Zum Weinberg 24, Ruthen	303269	5929877	56
IO48	Zum Weinberg 13, Ruthen	303275	5929935	57
IO49	Zum Weinberg 13b, Ruthen	303286	5929899	57
IO50	Zum Weinberg 23, Ruthen	303292	5929878	56
IO51	Zum Weinberg 15, Ruthen	303371	5930034	58
IO52	Zum Weinberg 14b, Ruthen	303361	5930010	57
IO53	Zum Weinberg 14a, Ruthen	303353	5929993	57
IO54	Zum Weinberg 14, Ruthen	303331	5929938	57
IO55	Zum Weinberg 13a, Ruthen	303336	5929899	56
IO56	Zum Weinberg 22, Ruthen	303318	5929863	56
IO57	Zum Weinberg 21, Ruthen	303314	5929833	55
IO58	Zum Weinberg 20, Ruthen	303299	5929766	54
IO59	Zum Weinberg 16, Ruthen	303427	5929942	57
IO60	Zum Weinberg 17, Ruthen	303441	5929944	57
IO61	Zum Weinberg 18a, Ruthen	303371	5929917	57
IO62	Zum Weinberg 18, Ruthen	303399	5929865	56
IO63	Zum Weinberg 19, Ruthen	303379	5929827	56
IO64	Zum Weinberg 19a, Ruthen	303351	5929807	55
IO65	Zum Weinberg 2, Ruthen	302974	5929815	56
IO66	Zum Weinberg 1, Ruthen	302907	5929726	56
IO67	Industriestraße 13, Lübz	302696	5929393	59
IO68	Industriestraße 12a, Lübz	302698	5929347	58
IO69	Industriestraße 12, Lübz	302660	5929294	58
IO70	Gewerbering 1, Lübz	302329	5929301	58
IO71	Industriestraße 11, Lübz	302507	5929209	58
IO72	Industriestraße 10, Lübz	302628	5929195	58
IO73	Gewerbering 3, Lübz	302342	5929126	57
IO74	Gewerbering 4, Lübz	302388	5929117	58
IO75	Gewerbering 5, Lübz	302455	5928995	58
IO76	Gewerbering 6, Lübz	302471	5929027	58
IO77	Gewerbering 7, Lübz	302536	5928961	58
IO78	Gewerbering 8, Lübz	302539	5929002	58
IO79	Industriestraße 9, Lübz	302661	5929094	58
IO80	Industriestraße 8, Lübz	302646	5929064	58
IO81	Industriestraße 5a, Lübz	302580	5929066	58
IO82	Industriestraße 5, Lübz	302589	5928988	58
IO83	Industriestraße 6a, Lübz	302621	5928952	58
IO84	Am Hafen 10a, Lübz	302850	5929292	64
IO85	Am Hafen 10, Lübz	302827	5929205	64
IO86	Am Hafen 14, Lübz	302947	5929167	63
IO87	Am Hafen 13, Lübz	302946	5929154	63
IO88	Am Hafen 12, Lübz	302945	5929143	63

IO89	Am Hafen 11, Lübz	302943	5929129	63
IO90	Am Hafen 9, Lübz	302832	5929051	60
IO91	Am Hafen 8, Lübz	302820	5929002	59
IO92	Am Hafen 6a, Lübz	302909	5928984	59
IO93	Stadtrandsiedlung 1, Lübz	302908	5929009	60
IO94	Stadtrandsiedlung 2, Lübz	302917	5929006	60
IO95	Stadtrandsiedlung 3, Lübz	302942	5929010	60
IO96	Stadtrandsiedlung 4, Lübz	302950	5929009	60
IO97	Stadtrandsiedlung 5, Lübz	302977	5929011	61
IO98	Stadtrandsiedlung 6, Lübz	302987	5929011	60
IO99	Stadtrandsiedlung 7, Lübz	303012	5929014	59
IO100	Stadtrandsiedlung 8, Lübz	303022	5929013	59
IO101	Stadtrandsiedlung 9, Lübz	303047	5929016	58
IO102	Stadtrandsiedlung 10, Lübz	303057	5929015	57
IO103	Stadtrandsiedlung 11, Lübz	303076	5929020	57
IO104	Stadtrandsiedlung 12, Lübz	303095	5929034	55
IO105	Am Hafen 6, Lübz	302895	5928914	57
IO106	Am Hafen 5a, Lübz	302881	5928870	57
IO107	Am Hafen 5b, Lübz	302979	5928866	57
IO108	Am Hafen 7, Lübz	302823	5928874	56
IO109	Am Hafen 5, Lübz	302904	5928821	56
IO110	Am Hafen 3, Lübz	302858	5928808	55
IO111	Am Hafen 2, Lübz	302843	5928745	54
IO112	Am Hafen 1, Lübz	302833	5928713	55
IO113	Industriestraße 2a, Lübz	302411	5928883	58
IO114	Industriestraße 4, Lübz	302357	5928848	60
IO115	Industriestraße 2, Lübz	302440	5928817	59
IO116	Industriestraße 1, Lübz	302366	5928768	60
IO117	Industriestraße 4a, Lübz	302524	5928812	57
IO118	Industriestraße 3, Lübz	302478	5928737	58
IO119	Werderstraße 4, Lübz	302425	5928633	60
IO120	Werderstraße 3, Lübz	302449	5928544	59
IO121	Werderstraße 2, Lübz	302505	5928410	58
IO122	Werderstraße 1, Lübz	302502	5928365	58
IO123	Werderstraße 15, Lübz	302429	5928508	59
IO124	Werderstraße 16, Lübz	302429	5928494	59
IO125	Werderstraße 17, Lübz	302446	5928456	59
IO126	Werderstraße 18, Lübz	302444	5928425	59
IO127	Werderstraße 19, Lübz	302476	5928352	58
IO128	Am Hohen Feld 1, Lübz	302418	5928475	59
IO129	Am Hohen Feld 2, Lübz	302396	5928466	59
IO130	Am Hohen Feld 3, Lübz	302388	5928457	60
IO131	Am Hohen Feld 4, Lübz	302370	5928444	60
IO132	Molkereistraße 33, Lübz	302690	5928698	57
IO133	Molkereistraße 32, Lübz	302707	5928690	57
IO134	Molkereistraße 31, Lübz	302724	5928692	57
IO135	Molkereistraße 30, Lübz	302737	5928710	56

IO136	Molkereistraße 29, Lübz	302775	5928721	55
IO137	Molkereistraße 27, Lübz	302702	5928664	57
IO138	Molkereistraße 28, Lübz	302724	5928664	57
IO139	Marienstraße 31, Lübz	302773	5928672	56
IO140	Molkereistraße 26, Lübz	302689	5928639	58
IO141	Marienstraße 30, Lübz	302784	5928634	56
IO142	Marienstraße 32, Lübz	302857	5928644	56
IO143	Molkereistraße 25, Lübz	302686	5928625	58
IO144	Marienstraße 29, Lübz	302786	5928620	56
IO145	Molkereistraße 24, Lübz	302681	5928606	58
IO146	Marienstraße 28, Lübz	302784	5928607	56
IO147	Marienstraße 27, Lübz	302788	5928592	57
IO148	Marienstraße 26, Lübz	302786	5928577	57
IO149	Marienstraße 32a, Lübz	302822	5928570	57
IO150	Marienstraße 25, Lübz	302787	5928562	57
IO151	Marienstraße 24, Lübz	302786	5928552	57
IO152	Marienstraße 33, Lübz	302813	5928534	57
IO153	Marienstraße 23, Lübz	302782	5928536	57
IO154	Marienstraße 22, Lübz	302779	5928528	57
IO155	Marienstraße 21, Lübz	302776	5928521	57
IO156	Marienstraße 20, Lübz	302768	5928507	58
IO157	Marienstraße 19, Lübz	302769	5928499	58
IO158	Marienstraße 34, Lübz	302834	5928484	55
IO159	Marienstraße 34a, Lübz	302908	5928446	55
IO160	Marienstraße 15, Lübz	302714	5928500	59
IO161	Molkereistraße 20, Lübz	302664	5928535	59
IO162	Molkereistraße 19, 19386 Lübz	302650	5928470	59
IO163	Molkereistraße 18, 19386 Lübz	302648	5928459	59
IO164	Molkereistraße 17, 19386 Lübz	302647	5928452	59
IO165	Molkereistraße 16, 19386 Lübz	302645	5928441	59
IO166	Molkereistraße 15, 19386 Lübz	302643	5928431	59
IO167	Molkereistraße 14, 19386 Lübz	302640	5928420	59
IO168	Molkereistraße 13, 19386 Lübz	302639	5928410	59
IO169	Molkereistraße 12, 19386 Lübz	302635	5928395	59
IO170	Molkereistraße 11, 19386 Lübz	302634	5928388	59
IO171	Molkereistraße 10, 19386 Lübz	302632	5928376	59
IO172	Molkereistraße 9, 19386 Lübz	302630	5928365	59
IO173	Molkereistraße 8, 19386 Lübz	302626	5928351	60
IO174	Molkereistraße 7, 19386 Lübz	302624	5928343	60
IO175	Molkereistraße 6, 19386 Lübz	302622	5928334	59
IO176	Molkereistraße 5, 19386 Lübz	302620	5928323	59
IO177	Molkereistraße 34, 19386 Lübz	302592	5928377	59
IO178	Marienstraße 14, 19386 Lübz	302741	5928466	60
IO179	Marienstraße 13, 19386 Lübz	302711	5928422	61
IO180	Marienstraße 12, 19386 Lübz	302717	5928407	61
IO181	Marienstraße 11, 19386 Lübz	302712	5928395	61
IO182	Marienstraße 10, 19386 Lübz	302701	5928396	60

IO183	Marienstraße 9, 19386 Lübz	302704	5928379	61
IO184	Marienstraße 8, 19386 Lübz	302701	5928366	61
IO185	Marienstraße 7, 19386 Lübz	302696	5928357	61
IO186	Marienstraße 6, 19386 Lübz	302698	5928341	61
IO187	Marienstraße 5, 19386 Lübz	302691	5928338	61
IO188	Marienstraße 4, 19386 Lübz	302685	5928325	62
IO189	Marienstraße 3, 19386 Lübz	302691	5928313	62
IO190	Marienstraße 2, 19386 Lübz	302681	5928305	62
IO191	Marienstraße 1b, 19386 Lübz	302680	5928292	62
IO192	Werderstraße 7 (Schrebergarten) 1, 19386 Lübz	302414	5928569	60
IO193	Werderstraße 7 (Schrebergarten) 5, 19386 Lübz	302393	5928543	60
IO194	Werderstraße 7 (Schrebergarten) 6, 19386 Lübz	302402	5928595	59
IO195	Werderstraße 7 (Schrebergarten) 7, 19386 Lübz	302360	5928575	59
IO196	Werderstraße 7 (Schrebergarten) 8, 19386 Lübz	302398	5928607	59
IO197	Werderstraße 7 (Schrebergarten) 9, 19386 Lübz	302388	5928610	59
IO198	Werderstraße 7 (Schrebergarten) 10, 19386 Lübz	302356	5928580	59
IO199	Werderstraße 7 (Schrebergarten) 12, 19386 Lübz	302344	5928588	59
IO200	Werderstraße 7 (Schrebergarten) 13, 19386 Lübz	302375	5928624	59
IO201	Werderstraße 7 (Schrebergarten) 14, 19386 Lübz	302369	5928626	59
IO202	Werderstraße 7 (Schrebergarten) 15, 19386 Lübz	302326	5928607	59
IO203	Werderstraße 7 (Schrebergarten) 16, 19386 Lübz	302351	5928635	59
IO204	Werderstraße 7 (Schrebergarten) 17, 19386 Lübz	302322	5928616	59
IO205	Werderstraße 7 (Schrebergarten) 20, 19386 Lübz	302309	5928613	59
IO206	Werderstraße 7 (Schrebergarten) 21, 19386 Lübz	302325	5928595	59
IO207	Werderstraße 7 (Schrebergarten) 22, 19386 Lübz	302335	5928587	59
IO208	Werderstraße 7 (Schrebergarten) 23, 19386 Lübz	302353	5928572	59
IO209	Werderstraße 7 (Schrebergarten) 25, 19386 Lübz	302393	5928534	60
IO210	Werderstraße 7 (Schrebergarten) 26, 19386 Lübz	302396	5928524	60
IO211	Werderstraße 7 (Schrebergarten) 28-30, 19386 Lübz	302275	5928665	60
IO212	Werderstraße 7 (Schrebergarten) 31, 19386 Lübz	302329	5928662	60
IO213	Werderstraße 7 (Schrebergarten) 32-34, 19386 Lübz	302349	5928677	60
IO214	Werderstraße 13a (Schrebergarten) 1, 19386 Lübz	302300	5928787	61
IO215	Werderstraße 13a (Schrebergarten) 2, 19386 Lübz	302285	5928767	60
IO216	Werderstraße 13a (Schrebergarten) 3, 19386 Lübz	302230	5928738	59
IO217	Werderstraße 13a (Schrebergarten) 4, 19386 Lübz	302243	5928727	59
IO218	Werderstraße 13a (Schrebergarten) 5, 19386 Lübz	302247	5928718	60

IO219	Werderstraße 13a (Schrebergarten) 6, 19386 Lübz	302251	5928711	60
IO220	Werderstraße 13a (Schrebergarten) 7, 19386 Lübz	302202	5928821	61
IO221	Werderstraße 13a, 19386 Lübz	302205	5928869	62
IO222	Grevener Chaussee 7, 19386 Lutheran	300543	5929141	60
IO223	Dorfstraße 1, 19386 Beckendorf	299712	5928817	61
IO224	Dorfstraße 2, 19386 Beckendorf	299711	5928768	60
IO225	Hauptstraße 1, 19386 Greven	299645	5930078	63
IO226	Hauptstraße 21, 19386 Greven	299671	5930109	63
IO227	Hauptstraße 2, 19386 Greven	299631	5930098	63
IO228	Hauptstraße 2a, 19386 Greven	299627	5930103	63
IO229	Hauptstraße 21a, 19386 Greven	299658	5930125	63
IO230	Hauptstraße 3, 19386 Greven	299616	5930118	63
IO231	Hauptstraße 3a, 19386 Greven	299613	5930125	63
IO232	Hauptstraße 4, 19386 Greven	299603	5930136	63
IO233	Hauptstraße 4a, 19386 Greven	299599	5930141	63
IO234	Hauptstraße 20, 19386 Greven	299632	5930168	63
IO235	Hauptstraße 20a, 19386 Greven	299620	5930181	62
IO236	Hauptstraße 5, 19386 Greven	299587	5930157	63
IO237	Hauptstraße 5a, 19386 Greven	299581	5930165	62
IO238	Hauptstraße 5b, 19386 Greven	299570	5930181	62
IO239	Hauptstraße 5c, 19386 Greven	299564	5930188	62
IO240	Hauptstraße 19a, 19386 Greven	299596	5930211	62
IO241	Hauptstraße 19, 19386 Greven	299593	5930217	61
IO242	Hauptstraße 18a, 19386 Greven	299573	5930228	61
IO243	Hauptstraße 18, 19386 Greven	299569	5930237	60
IO244	Hauptstraße 6, 19386 Greven	299549	5930210	61
IO245	Hauptstraße 10, 19386 Greven	299502	5930271	61
IO246	Hauptstraße 17d, 19386 Greven	299522	5930292	60
IO247	Hauptstraße 17c, 19386 Greven	299516	5930300	60
IO248	Hauptstraße 17b, 19386 Greven	299512	5930305	60
IO249	Hauptstraße 17a, 19386 Greven	299507	5930311	60
IO250	Hauptstraße 17, 19386 Greven	299502	5930314	60
IO251	Grevener Straße 2, 19386 Werder	300301	5931019	62
IO252	Grevener Straße 1, 19386 Werder	300223	5931101	66
IO253	Grevener Straße 3, 19386 Werder	300093	5931088	66
IO254	Grevener Straße 5, 19386 Werder	300133	5931146	66
IO255	Grevener Straße 6, 19386 Werder	300098	5931156	67
IO256	Grevener Straße 4, 19386 Werder	299945	5931153	62
IO257	Grevener Straße 50, 19386 Werder	301409	5931972	64
IO258	Grevener Straße 51, 19386 Werder	301420	5931964	64
IO259	Grevener Straße 52, 19386 Werder	301431	5931954	64
IO260	Grevener Straße 53, 19386 Werder	301446	5931941	64

Tabelle 5.1: Immissionsorte für den Standort Werder/Lübz

6 Rechenergebnisse und Beurteilungen

In der nachfolgenden Tabelle 6.1 sind die Ergebnisse der Analysen für die Zusatz- bzw. Gesamtbelastung der im Einwirkbereich befindlichen Immissionsorte dargestellt. Aufgrund fehlender Vorbelastung stellt die Zusatzbelastung gleichzeitig die Gesamtbelastung dar.
Überschreitungen der Grenzwerte sind **fett** gekennzeichnet. Im Anhang befinden sich die Ausdrucke der Berechnung der Zusatz- bzw. Gesamtbelastung. Die Angabe zu der meteorologisch wahrscheinlichen Beschattungsdauer ist für die Genehmigung eines Vorhabens nicht relevant, kann jedoch Betreibern, Betroffenen und Behörden einen Eindruck über die zu erwartende tatsächliche Schattenwurfbelastung an den Immissionsorten geben. Hierzu wurde die Sonnenscheinwahrscheinlichkeit der Wetterstation Heiligendamm [5] und die Windstatistik der nächstgelegenen Wetterstation vom Deutschen Wetterdienst [6] herangezogen.

Gesamtbelastung					
Nr.	Immissionspunkte	Astron. max. mögl. Beschattungsdauer			Meteorologisch wahrscheinliche Beschattungs-dauer
		Gesamt-dauer in Std/ Jahr	Anzahl der Tage mit Schatten pro Jahr	Max. Schatten-dauer, in Std/ Tag	Std. / Jahr
IO1	Dorfstraße 6, Werder	0:00	0	0:00	0:00
IO2	Dorfstraße 5, Werder	0:00	0	0:00	0:00
IO3	Dorfstraße 33, Werder	0:00	0	0:00	0:00
IO4	Dorfstraße 34, Werder	1:05	12	0:07	0:05
IO5	Dorfstraße 36, Werder	2:29	18	0:11	0:11
IO6	Dorfstraße 37, Werder	3:48	22	0:13	0:18
IO7	Dorfstraße 4, Werder	6:19	28	0:17	0:30
IO8	Dorfstraße 38, Werder	4:59	25	0:15	0:24
IO9	Dorfstraße 3, Werder	7:53	32	0:19	0:38
IO10	Dorfstraße 39, Werder	6:23	28	0:17	0:31
IO11	Dorfstraße 2, Werder	11:06	40	0:21	0:55
IO12	Dorfstraße 39a, Werder	9:17	36	0:19	0:46
IO13	Dorfstraße 39b, Werder	10:26	38	0:20	0:52
IO14	Dorfstraße 39c, Werder	9:22	36	0:20	0:46
IO15	Dorfstraße 40, Werder	14:27	46	0:22	1:14
IO16	Dorfstraße 41, Werder	15:20	48	0:23	1:19
IO17	Dorfstraße 42, Werder	16:26	50	0:23	1:26
IO18	Dorfstraße 1d, Werder	15:44	48	0:23	1:21
IO19	Dorfstraße 1c, Werder	16:13	50	0:24	1:24
IO20	Dorfstraße 43, Werder	17:43	52	0:28	1:33
IO21	Dorfstraße 1b, Werder	18:21	52	0:30	1:36
IO22	Dorfstraße 44, Werder	21:07	54	**0:36**	1:50
IO23	Dorfstraße 45, Werder	23:29	56	**0:39**	2:02
IO24	Dorfstraße 1a, Werder	**30:46**	60	**0:47**	2:40
IO25	Zum Weinberg 34, Ruthen	**96:01**	249	**0:42**	**24:24**
IO26	Zum Weinberg 4, Ruthen	**91:24**	240	**0:41**	**23:23**
IO27	Zum Weinberg 33, Ruthen	**88:52**	236	**0:42**	**22:52**
IO28	Zum Weinberg 5, Ruthen	**90:34**	238	**0:39**	**23:09**
IO29	Zum Weinberg 32, Ruthen	**88:24**	236	**0:40**	**22:43**

IO30	Zum Weinberg 6, Ruthen	**89:16**	238	**0:40**	**22:51**
IO31	Zum Weinberg 6a, Ruthen	**90:50**	239	**0:37**	**23:11**
IO32	Zum Weinberg 7, Ruthen	**88:39**	237	**0:39**	**22:42**
IO33	Zum Weinberg 31, Ruthen	**87:21**	236	**0:40**	**22:27**
IO34	Zum Weinberg 30, Ruthen	**82:28**	218	**0:40**	**21:08**
IO35	Zum Weinberg 8, Ruthen	**80:16**	210	**0:38**	**20:49**
IO36	Zum Weinberg 29, Ruthen	**78:01**	206	**0:38**	**20:19**
IO37	Zum Weinberg 9, Ruthen	**79:36**	208	**0:38**	**20:40**
IO38	Zum Weinberg 28, Ruthen	**77:19**	205	**0:39**	**20:08**
IO39	Zum Weinberg 10, Ruthen	**78:38**	208	**0:38**	**20:26**
IO40	Zum Weinberg 27, Ruthen	**76:12**	204	**0:39**	**19:53**
IO41	Zum Weinberg 11, Ruthen	**78:07**	207	**0:36**	**20:19**
IO42	Zum Weinberg 12, Ruthen	**77:45**	208	**0:37**	**20:14**
IO43	Zum Weinberg 26, Ruthen	**75:57**	204	**0:38**	**19:49**
IO44	Zum Weinberg 12a, Ruthen	**76:41**	207	**0:36**	**19:59**
IO45	Zum Weinberg 25, Ruthen	**64:13**	180	**0:35**	**16:29**
IO46	Zum Weinberg 12b, Ruthen	**65:54**	186	**0:34**	**16:53**
IO47	Zum Weinberg 24, Ruthen	**62:37**	181	**0:34**	**16:08**
IO48	Zum Weinberg 13, Ruthen	**65:36**	188	**0:32**	**16:48**
IO49	Zum Weinberg 13b, Ruthen	**63:45**	183	**0:33**	**16:23**
IO50	Zum Weinberg 23, Ruthen	**62:28**	180	**0:34**	**16:06**
IO51	Zum Weinberg 15, Ruthen	**42:53**	143	0:25	**11:01**
IO52	Zum Weinberg 14b, Ruthen	**44:50**	146	0:25	**11:33**
IO53	Zum Weinberg 14a, Ruthen	**46:20**	150	0:25	**11:56**
IO54	Zum Weinberg 14, Ruthen	**54:57**	174	0:25	**14:09**
IO55	Zum Weinberg 13a, Ruthen	**55:13**	171	0:25	**14:15**
IO56	Zum Weinberg 22, Ruthen	**60:47**	179	**0:33**	**15:42**
IO57	Zum Weinberg 21, Ruthen	**59:03**	174	**0:34**	**15:20**
IO58	Zum Weinberg 20, Ruthen	**53:28**	162	**0:37**	**14:04**
IO59	Zum Weinberg 16, Ruthen	**41:23**	141	0:24	**10:41**
IO60	Zum Weinberg 17, Ruthen	**40:02**	140	0:24	**10:21**
IO61	Zum Weinberg 18a, Ruthen	**51:18**	173	0:24	**13:14**
IO62	Zum Weinberg 18, Ruthen	**50:53**	167	0:24	**13:11**
IO63	Zum Weinberg 19, Ruthen	**51:43**	164	0:24	**13:28**
IO64	Zum Weinberg 19a, Ruthen	**50:58**	158	0:24	**13:18**
IO65	Zum Weinberg 2, Ruthen	**119:14**	233	**0:50**	**31:04**
IO66	Zum Weinberg 1, Ruthen	**113:14**	217	**0:54**	**29:21**
IO67	Industriestraße 13, Lübz	**114:38**	181	**1:04**	**30:53**
IO68	Industriestraße 12a, Lübz	**100:31**	174	**0:59**	**27:06**
IO69	Industriestraße 12, Lübz	**80:55**	162	**0:58**	**22:11**
IO70	Gewerbering 1, Lübz	**158:09**	184	**1:28**	**44:00**
IO71	Industriestraße 11, Lübz	**113:57**	174	**1:10**	**32:00**
IO72	Industriestraße 10, Lübz	**80:03**	167	**1:02**	**22:35**
IO73	Gewerbering 3, Lübz	**79:41**	154	**0:46**	**22:15**
IO74	Gewerbering 4, Lübz	**87:21**	154	**0:53**	**24:15**
IO75	Gewerbering 5, Lübz	**60:51**	136	**0:37**	**17:05**
IO76	Gewerbering 6, Lübz	**68:23**	142	**0:39**	**19:04**

IO77	Gewerbering 7, Lübz	**59:10**	135	**0:35**	**16:30**
IO78	Gewerbering 8, Lübz	**69:33**	142	**0:41**	**19:20**
IO79	Industriestraße 9, Lübz	**87:06**	160	**0:56**	**24:34**
IO80	Industriestraße 8, Lübz	**86:31**	156	**0:53**	**24:18**
IO81	Industriestraße 5a, Lübz	**88:48**	154	**0:52**	**24:49**
IO82	Industriestraße 5, Lübz	**70:45**	142	**0:41**	**19:39**
IO83	Industriestraße 6a, Lübz	**55:29**	135	**0:35**	**15:25**
IO84	Am Hafen 10a, Lübz	**72:19**	161	**0:36**	**19:31**
IO85	Am Hafen 10, Lübz	**62:19**	157	**0:33**	**16:52**
IO86	Am Hafen 14, Lübz	**58:49**	156	0:30	**15:56**
IO87	Am Hafen 13, Lübz	**57:41**	155	0:30	**15:39**
IO88	Am Hafen 12, Lübz	**56:47**	154	0:30	**15:26**
IO89	Am Hafen 11, Lübz	**55:25**	153	0:30	**15:05**
IO90	Am Hafen 9, Lübz	**53:02**	155	**0:32**	**14:53**
IO91	Am Hafen 8, Lübz	**57:30**	152	**0:32**	**16:13**
IO92	Am Hafen 6a, Lübz	**48:00**	149	0:30	**13:30**
IO93	Stadtrandsiedlung 1, Lübz	**48:56**	150	0:30	**13:42**
IO94	Stadtrandsiedlung 2, Lübz	**48:39**	150	0:30	**13:36**
IO95	Stadtrandsiedlung 3, Lübz	**47:47**	149	0:29	**13:18**
IO96	Stadtrandsiedlung 4, Lübz	**47:29**	149	0:29	**13:12**
IO97	Stadtrandsiedlung 5, Lübz	**41:40**	133	0:29	**11:34**
IO98	Stadtrandsiedlung 6, Lübz	**41:46**	132	0:28	**11:35**
IO99	Stadtrandsiedlung 7, Lübz	**39:11**	120	0:28	**10:50**
IO100	Stadtrandsiedlung 8, Lübz	**39:24**	120	0:27	**10:53**
IO101	Stadtrandsiedlung 9, Lübz	**40:32**	123	0:27	**11:10**
IO102	Stadtrandsiedlung 10, Lübz	**40:46**	124	0:27	**11:13**
IO103	Stadtrandsiedlung 11, Lübz	**41:43**	126	0:27	**11:28**
IO104	Stadtrandsiedlung 12, Lübz	**43:10**	130	0:26	**11:50**
IO105	Am Hafen 6, Lübz	**52:45**	144	0:30	**14:52**
IO106	Am Hafen 5a, Lübz	**53:17**	138	0:30	**14:53**
IO107	Am Hafen 5b, Lübz	**36:30**	121	0:28	**10:14**
IO108	Am Hafen 7, Lübz	**54:06**	136	**0:31**	**15:03**
IO109	Am Hafen 5, Lübz	**40:52**	105	0:29	**11:12**
IO110	Am Hafen 3, Lübz	**47:41**	130	0:30	**13:14**
IO111	Am Hafen 2, Lübz	**38:47**	115	0:29	**10:48**
IO112	Am Hafen 1, Lübz	**33:53**	108	0:30	**9:32**
IO113	Industriestraße 2a, Lübz	**62:57**	114	**0:47**	**17:44**
IO114	Industriestraße 4, Lübz	**65:56**	102	**0:53**	**18:31**
IO115	Industriestraße 2, Lübz	**56:26**	104	**0:48**	**15:55**
IO116	Industriestraße 1, Lübz	**60:02**	88	**0:54**	**16:33**
IO117	Industriestraße 4a, Lübz	**48:41**	110	**0:43**	**13:49**
IO118	Industriestraße 3, Lübz	**55:39**	94	**0:47**	**15:28**
IO119	Werderstraße 4, Lübz	**36:22**	68	**0:46**	**9:51**
IO120	Werderstraße 3, Lübz	20:56	53	0:29	5:34
IO121	Werderstraße 2, Lübz	6:50	29	0:18	1:46
IO122	Werderstraße 1, Lübz	0:00	0	0:00	0:00
IO123	Werderstraße 15, Lübz	12:45	40	0:24	3:20

IO124	Werderstraße 16, Lübz	10:20	35	0:22	2:42
IO125	Werderstraße 17, Lübz	6:16	27	0:17	1:38
IO126	Werderstraße 18, Lübz	0:41	9	0:06	0:10
IO127	Werderstraße 19, Lübz	0:00	0	0:00	0:00
IO128	Am Hohen Feld 1, Lübz	5:13	25	0:16	1:21
IO129	Am Hohen Feld 2, Lübz	0:04	2	0:02	0:01
IO130	Am Hohen Feld 3, Lübz	0:00	0	0:00	0:00
IO131	Am Hohen Feld 4, Lübz	0:00	0	0:00	0:00
IO132	Molkereistraße 33, Lübz	**37:29**	106	**0:38**	**10:39**
IO133	Molkereistraße 32, Lübz	**35:59**	106	**0:37**	**10:14**
IO134	Molkereistraße 31, Lübz	**32:55**	99	**0:36**	**9:25**
IO135	Molkereistraße 30, Lübz	**30:06**	87	**0:35**	**8:40**
IO136	Molkereistraße 29, Lübz	29:33	96	**0:33**	**8:29**
IO137	Molkereistraße 27, Lübz	**38:02**	102	**0:38**	**10:45**
IO138	Molkereistraße 28, Lübz	**35:55**	104	**0:37**	**10:11**
IO139	Marienstraße 31, Lübz	28:58	87	**0:34**	**8:20**
IO140	Molkereistraße 26, Lübz	**39:02**	97	**0:38**	**10:57**
IO141	Marienstraße 30, Lübz	**31:05**	100	**0:35**	**8:52**
IO142	Marienstraße 32, Lübz	14:46	58	0:23	4:16
IO143	Molkereistraße 25, Lübz	**39:28**	95	**0:40**	**11:02**
IO144	Marienstraße 29, Lübz	**32:46**	102	**0:35**	**9:17**
IO145	Molkereistraße 24, Lübz	**39:58**	92	**0:40**	**11:07**
IO146	Marienstraße 28, Lübz	**33:40**	100	**0:35**	**9:30**
IO147	Marienstraße 27, Lübz	14:54	48	0:24	4:21
IO148	Marienstraße 26, Lübz	15:19	50	0:24	4:27
IO149	Marienstraße 32a, Lübz	14:03	47	0:23	4:06
IO150	Marienstraße 25, Lübz	15:32	51	0:24	4:30
IO151	Marienstraße 24, Lübz	15:55	53	0:24	4:36
IO152	Marienstraße 33, Lübz	15:12	51	0:24	4:24
IO153	Marienstraße 23, Lübz	16:40	55	0:24	4:47
IO154	Marienstraße 22, Lübz	17:04	57	0:24	4:53
IO155	Marienstraße 21, Lübz	17:37	59	0:24	5:01
IO156	Marienstraße 20, Lübz	18:50	64	0:24	5:19
IO157	Marienstraße 19, Lübz	19:19	65	0:24	5:26
IO158	Marienstraße 34, Lübz	15:53	55	0:23	4:32
IO159	Marienstraße 34a, Lübz	13:37	49	0:22	3:54
IO160	Marienstraße 15, Lübz	25:32	80	0:25	7:04
IO161	Molkereistraße 20, Lübz	**42:24**	80	**0:41**	**11:32**
IO162	Molkereistraße 19, 19386 Lübz	**33:49**	68	**0:42**	**9:06**
IO163	Molkereistraße 18, 19386 Lübz	**31:43**	66	**0:41**	**8:31**
IO164	Molkereistraße 17, 19386 Lübz	**30:21**	65	**0:40**	**8:08**
IO165	Molkereistraße 16, 19386 Lübz	28:06	63	**0:39**	7:31
IO166	Molkereistraße 15, 19386 Lübz	26:03	61	**0:36**	6:58
IO167	Molkereistraße 14, 19386 Lübz	23:53	59	**0:35**	6:22
IO168	Molkereistraße 13, 19386 Lübz	21:59	57	**0:32**	5:51
IO169	Molkereistraße 12, 19386 Lübz	18:47	54	0:25	4:59
IO170	Molkereistraße 11, 19386 Lübz	17:58	52	0:25	4:45

IO171	Molkereistraße 10, 19386 Lübz	16:33	49	0:24	4:22
IO172	Molkereistraße 9, 19386 Lübz	15:11	47	0:24	3:59
IO173	Molkereistraße 8, 19386 Lübz	13:14	43	0:23	3:27
IO174	Molkereistraße 7, 19386 Lübz	12:04	41	0:22	3:09
IO175	Molkereistraße 6, 19386 Lübz	10:54	39	0:21	2:50
IO176	Molkereistraße 5, 19386 Lübz	9:14	35	0:20	2:24
IO177	Molkereistraße 34, 19386 Lübz	12:54	42	0:23	3:22
IO178	Marienstraße 14, 19386 Lübz	25:00	78	0:24	6:54
IO179	Marienstraße 13, 19386 Lübz	24:27	68	0:25	6:38
IO180	Marienstraße 12, 19386 Lübz	23:47	67	0:24	6:26
IO181	Marienstraße 11, 19386 Lübz	22:56	64	0:24	6:11
IO182	Marienstraße 10, 19386 Lübz	22:34	63	0:24	6:05
IO183	Marienstraße 9, 19386 Lübz	21:29	61	0:24	5:46
IO184	Marienstraße 8, 19386 Lübz	20:19	58	0:24	5:25
IO185	Marienstraße 7, 19386 Lübz	19:22	56	0:24	5:09
IO186	Marienstraße 6, 19386 Lübz	18:02	54	0:24	4:47
IO187	Marienstraße 5, 19386 Lübz	17:23	52	0:24	4:36
IO188	Marienstraße 4, 19386 Lübz	15:46	49	0:23	4:09
IO189	Marienstraße 3, 19386 Lübz	15:02	48	0:23	3:57
IO190	Marienstraße 2, 19386 Lübz	13:28	45	0:22	3:31
IO191	Marienstraße 1b, 19386 Lübz	11:56	42	0:21	3:06
IO192	Werderstraße 7 (Schrebergarten) 1, 19386 Lübz	20:54	52	0:29	5:34
IO193	Werderstraße 7 (Schrebergarten) 5, 19386 Lübz	13:57	41	0:26	3:39
IO194	Werderstraße 7 (Schrebergarten) 6, 19386 Lübz	23:39	56	**0:31**	6:20
IO195	Werderstraße 7 (Schrebergarten) 7, 19386 Lübz	14:41	42	0:26	3:51
IO196	Werderstraße 7 (Schrebergarten) 8, 19386 Lübz	25:14	58	**0:31**	6:47
IO197	Werderstraße 7 (Schrebergarten) 9, 19386 Lübz	24:36	57	**0:31**	6:36
IO198	Werderstraße 7 (Schrebergarten) 10, 19386 Lübz	15:04	42	0:27	3:58
IO199	Werderstraße 7 (Schrebergarten) 12, 19386 Lübz	14:26	41	0:26	3:47
IO200	Werderstraße 7 (Schrebergarten) 13, 19386 Lübz	25:34	58	**0:32**	6:52
IO201	Werderstraße 7 (Schrebergarten) 14, 19386 Lübz	25:09	57	**0:32**	6:45
IO202	Werderstraße 7 (Schrebergarten) 15, 19386 Lübz	15:43	43	0:28	4:08
IO203	Werderstraße 7 (Schrebergarten) 16, 19386 Lübz	24:43	56	**0:32**	6:38
IO204	Werderstraße 7 (Schrebergarten) 17, 19386 Lübz	16:41	44	0:28	4:24
IO205	Werderstraße 7 (Schrebergarten) 20, 19386 Lübz	13:49	40	0:26	3:38
IO206	Werderstraße 7 (Schrebergarten) 21, 19386 Lübz	12:41	38	0:25	3:20
IO207	Werderstraße 7 (Schrebergarten) 22, 19386 Lübz	12:54	39	0:25	3:23
IO208	Werderstraße 7 (Schrebergarten) 23, 19386 Lübz	12:57	39	0:25	3:24

IO209	Werderstraße 7 (Schrebergarten) 25, 19386 Lübz	12:12	38	0:24	3:12
IO210	Werderstraße 7 (Schrebergarten) 26, 19386 Lübz	10:47	36	0:23	2:49
IO211	Werderstraße 7 (Schrebergarten) 28-30, 19386 Lübz	19:21	47	0:30	5:08
IO212	Werderstraße 7 (Schrebergarten) 31, 19386 Lübz	27:03	59	**0:33**	7:17
IO213	Werderstraße 7 (Schrebergarten) 32-34, 19386 Lübz	**33:14**	66	**0:42**	**9:01**
IO214	Werderstraße 13a (Schrebergarten) 1, 19386 Lübz	**57:30**	83	**0:58**	**15:48**
IO215	Werderstraße 13a (Schrebergarten) 2, 19386 Lübz	**47:59**	76	**0:54**	**13:09**
IO216	Werderstraße 13a (Schrebergarten) 3, 19386 Lübz	28:46	58	**0:37**	7:46
IO217	Werderstraße 13a (Schrebergarten) 4, 19386 Lübz	28:28	58	**0:36**	7:41
IO218	Werderstraße 13a (Schrebergarten) 5, 19386 Lübz	26:55	56	**0:35**	7:14
IO219	Werderstraße 13a (Schrebergarten) 6, 19386 Lübz	25:55	55	**0:35**	6:57
IO220	Werderstraße 13a (Schrebergarten) 7, 19386 Lübz	**47:53**	76	**0:53**	**13:11**
IO221	Werderstraße 13a, 19386 Lübz	**67:24**	88	**1:04**	**18:40**
IO222	Grevener Chaussee 7, 19386 Lutheran	**69:30**	131	**1:03**	**20:20**
IO223	Dorfstraße 1, 19386 Beckendorf	24:36	96	0:22	7:11
IO224	Dorfstraße 2, 19386 Beckendorf	28:26	103	0:21	**8:16**
IO225	Hauptstraße 1, 19386 Greven	**39:58**	137	0:25	**10:38**
IO226	Hauptstraße 21, 19386 Greven	**40:33**	135	0:26	**10:43**
IO227	Hauptstraße 2, 19386 Greven	**38:13**	131	0:25	**10:08**
IO228	Hauptstraße 2a, 19386 Greven	**37:40**	130	0:25	**9:58**
IO229	Hauptstraße 21a, 19386 Greven	**39:24**	133	0:26	**10:23**
IO230	Hauptstraße 3, 19386 Greven	**36:46**	130	0:25	**9:41**
IO231	Hauptstraße 3a, 19386 Greven	**36:33**	126	0:25	**9:37**
IO232	Hauptstraße 4, 19386 Greven	**35:29**	124	0:25	**9:18**
IO233	Hauptstraße 4a, 19386 Greven	**35:19**	126	0:25	**9:15**
IO234	Hauptstraße 20, 19386 Greven	**36:47**	127	0:25	**9:35**
IO235	Hauptstraße 20a, 19386 Greven	**35:51**	126	0:25	**9:18**
IO236	Hauptstraße 5, 19386 Greven	**34:16**	122	0:25	**8:56**
IO237	Hauptstraße 5a, 19386 Greven	**33:40**	121	0:24	**8:45**
IO238	Hauptstraße 5b, 19386 Greven	**33:12**	120	0:24	**8:35**
IO239	Hauptstraße 5c, 19386 Greven	**32:40**	120	0:24	**8:25**
IO240	Hauptstraße 19a, 19386 Greven	**33:57**	119	0:25	**8:41**
IO241	Hauptstraße 19, 19386 Greven	**33:50**	122	0:25	**8:38**
IO242	Hauptstraße 18a, 19386 Greven	26:43	93	0:24	7:11
IO243	Hauptstraße 18, 19386 Greven	26:11	92	0:24	7:00
IO244	Hauptstraße 6, 19386 Greven	25:57	92	0:24	7:00
IO245	Hauptstraße 10, 19386 Greven	17:37	61	0:23	4:34
IO246	Hauptstraße 17d, 19386 Greven	18:00	63	0:24	4:37
IO247	Hauptstraße 17c, 19386 Greven	17:43	60	0:24	4:31
IO248	Hauptstraße 17b, 19386 Greven	17:40	62	0:23	4:30
IO249	Hauptstraße 17a, 19386 Greven	17:33	60	0:23	4:27

IO250	Hauptstraße 17, 19386 Greven	17:17	59	0:23	4:23
IO251	Grevener Straße 2, 19386 Werder	**90:14**	188	**0:48**	**13:02**
IO252	Grevener Straße 1, 19386 Werder	**71:15**	172	**0:45**	**9:59**
IO253	Grevener Straße 3, 19386 Werder	**55:45**	162	**0:36**	**8:22**
IO254	Grevener Straße 5, 19386 Werder	**61:57**	166	**0:40**	**8:32**
IO255	Grevener Straße 6, 19386 Werder	**58:49**	168	**0:38**	**8:07**
IO256	Grevener Straße 4, 19386 Werder	**35:48**	114	**0:31**	5:32
IO257	Grevener Straße 50, 19386 Werder	4:59	24	0:16	0:22
IO258	Grevener Straße 51, 19386 Werder	4:56	24	0:16	0:22
IO259	Grevener Straße 52, 19386 Werder	5:07	24	0:16	0:22
IO260	Grevener Straße 53, 19386 Werder	5:16	24	0:16	0:23

Tabelle 6.1: Analyseergebnisse Zusatz- bzw. Gesamtbelastung für den Standort Werder/Lübz

Der Grenzwert für die astronomisch maximal mögliche Schattenwurfdauer von 30 Stunden pro Jahr und/oder 30 Minuten pro Tag der Gesamtbelastung wird an den Immissionsorten **IO22 bis IO119, IO132 bis IO141, IO143 bis IO146, IO161 bis IO168, IO194, IO196, IO197, IO200, IO201, IO203, IO212 bis IO222, IO225 bis IO241, IO251 bis IO256** überschritten.

Die meteorologisch wahrscheinliche Beschattungsdauer in Stunden / Jahr wird an **142** Immissionsorten überschritten.

7 Zusammenfassung für den Standort Werder/Lübz

Für das Genehmigungsverfahren nach dem BImSchG [2] ist der Nachweis der Einhaltung der gesetzlichen Grenzwerte für die Schattenwurfimmissionen zu führen.

Die durchgeführten Berechnungen kommen zu dem Ergebnis, dass bei der Gesamtbelastung der Grenzwert für die astronomisch maximal mögliche Schattenwurfdauer von 30 Stunden pro Jahr und/oder 30 Minuten pro Tag an den Immissionspunkten **IO22 bis IO119, IO132 bis IO141, IO143 bis IO146, IO161 bis IO168, IO194, IO196, IO197, IO200, IO201, IO203, IO212 bis IO222, IO225 bis IO241, IO251 bis IO256** überschritten wird.

An den o.g. Immissionspunkten **IO22 bis IO119, IO132 bis IO141, IO143 bis IO146, IO161 bis IO168, IO194, IO196, IO197, IO200, IO201, IO203, IO212 bis IO222, IO225 bis IO241, IO251 bis IO256** sollte die Rotorschattenwurfdauer durch den Einsatz eines Schattenwurfabschaltmoduls entsprechend der vorgenannten Empfehlungen begrenzt werden. Dieses Modul schaltet die WEA ab, wenn an den relevanten Immissionsorten die vorgegebenen Grenzwerte erreicht sind. Da der Grenzwert von 30 Stunden pro Kalenderjahr auf Grundlage der astronomisch möglichen Beschattung entwickelt wurde, ist für die Schattenwurfabschaltautomatik der Wert für die tatsächliche, meteorologische Schattendauer von 8 Stunden pro Kalenderjahr zu berücksichtigen. Ferner ist der Tatsache Rechnung zu tragen, dass sich die Zeitpunkte für den Schattenwurf jedes Jahr leicht verschieben. Hier muss die Abschaltung auf dem realen Sonnenstand basieren.

Die Genehmigung sollte mit der Auflage eines Einsatzes eines Schattenwurfabschaltmoduls erteilt werden.

8 Abkürzungs- und Symbolverzeichnis

Abb.	Abbildung
Astron.	Astronomisch
Bez.	Bezeichnung
GK	Gauß – Krüger
GPS	Global Positioning System
Hz	Hertz
IO	Immissionsort
Max.	Maximal
Met.	Meteorologisch
NN	Normalnull
Nr.	Nummer
Std.	Stunden
UTM	Universal Transverse Mercator
WEA	Windenergieanlage

9 Literaturverzeichnis

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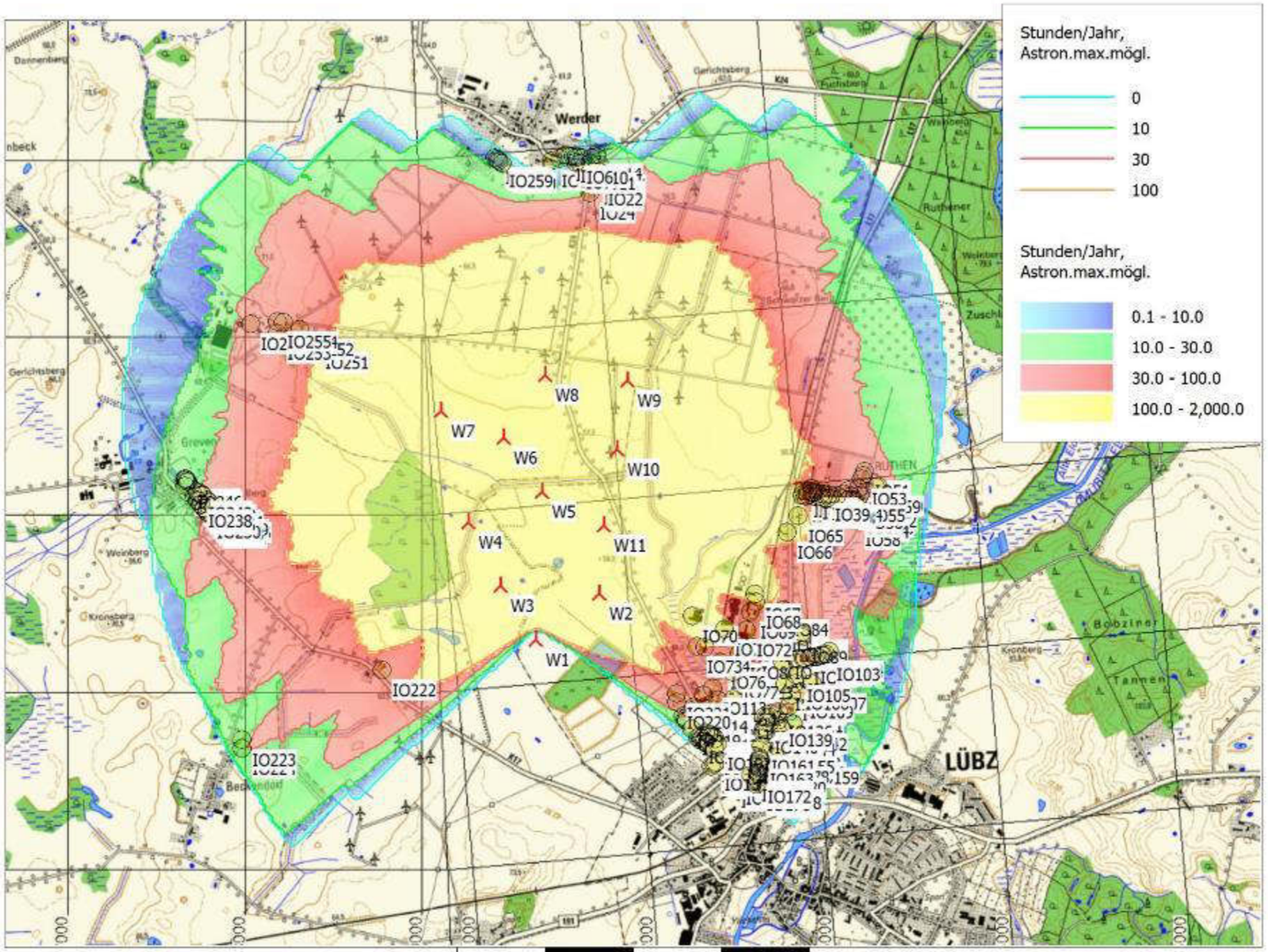
[2] *BImSchG Bundes-Immissionsschutzgesetz*

[3] *MagicMaps Tour Explorer, TOP25 Karten*

[4] *Voss Energy GmbH E-Mail vom 19.03.2018, Betreff: Angebotsanfrage BImSch-Gutachten / Werder II, Anhang: 2018-03-08_CVO_P120_Übersichtsplan Werder II.pdf*

[5] *Sonnenwahrscheinlichkeit Wetterstation Heiligendamm, WindPRO-Datenbank*

[6] *Windstatistik Wetterstation Goldberg, WindPRO-Datenbank*



Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

SHADOW - Karte
Berechnung:
GB_Werder/Lübz

Lizenzierter Anwender:
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28.01.2019 15:06/3.2.737

windPRO 3.2.737 / EMD International A/S, Tel. +45 96 35 44 44, www.emd.dk, windpro@emd.dk

29.01.2019 09:26 / 477 windPRO

Projekt:
180926_Werder-Lübz_II

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DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Hauptergebnis

Berechnung: GB_Werder/Lübz

Voraussetzungen für Berechnung des Schattenwurfs

Beschattungsbereich der WEA
Schatten nur relevant, wo Rotorblatt mind. 20% der Sonne verdeckt
Siehe WEA-Tabelle

Minimale relevante Sonnenhöhe über Horizont	3 °
Tage zwischen Berechnungen	1 Tag(e)
Berechnungszeitsprung	1 Minuten

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsstunden ermittelt aus WEA in Berechnung und Windverteilung:
DWD-Wind

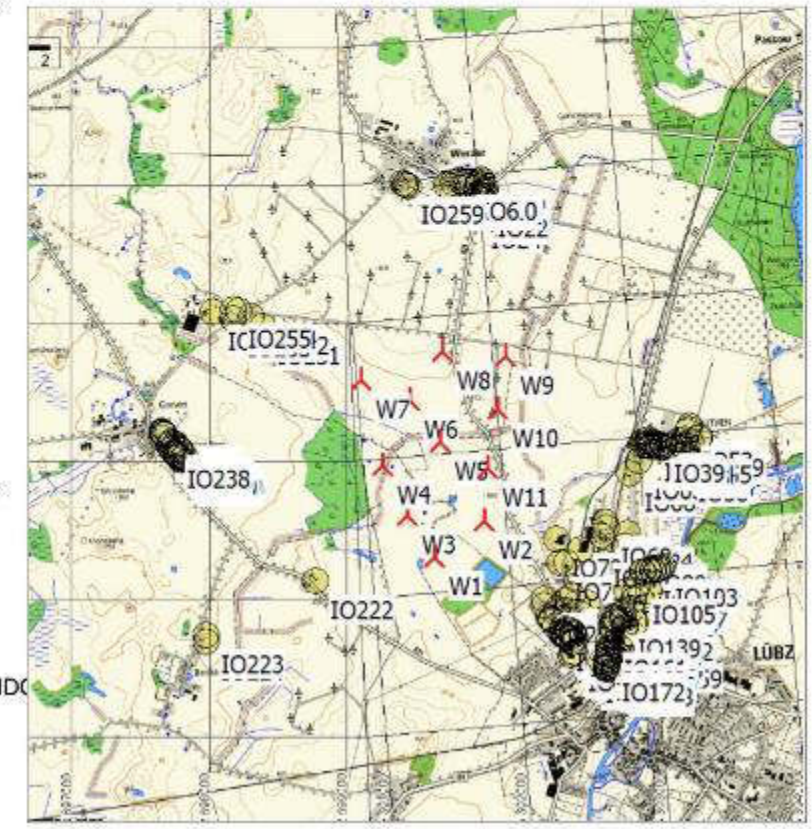
Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Eine WEA wird nicht berücksichtigt, wenn sie von keinem Teil der Rezeptorfläche aus sichtbar ist. Die Sichtbarkeitsberechnung basiert auf den folgenden Annahmen:
Verwendete Höhenlinien: Höhenraster-Objekt: 180926_Werder-Lübz_II_EMD
Hindernisse in Berechnung verwendet
Berechnungshöhe ü.Gr. für Karte: 1.5 m
Rasterauflösung: 1.0 m

Alle Koordinatenangaben in:
UTM (north)-ETRS89 Zone: 33



Maßstab 1:65,000
Neue WEA
Schattenrezeptor

WEA

	Ost	Nord	Z	Beschreibung	WEA-Typ Aktuell	Hersteller	Typ	Nenn-leistung	Rotordurch-messer	Nabenhöhe	Schattendaten Beschatt.-Bereich	U/min
			[m]					[kW]	[m]	[m]	[m]	[U/min]
1	301,426	5,929,240	57.4	W1	Ja	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	164.0	1,805	10.7
2	301,807	5,929,470	57.3	W2	Ja	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	164.0	1,805	10.7
3	301,253	5,929,563	58.1	W3	Ja	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	164.0	1,805	10.7
4	301,097	5,929,936	57.1	W4	Ja	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	164.0	1,805	10.7
5	301,529	5,930,071	56.2	W5	Ja	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	164.0	1,805	10.7
6	301,867	5,929,853	56.9	W11	Ja	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	164.0	1,805	10.7
7	301,334	5,930,397	58.5	W6	Ja	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	164.0	1,805	10.7
8	300,988	5,930,574	58.4	W7	Ja	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	164.0	1,805	10.7
9	301,599	5,930,726	60.7	W8	Ja	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	164.0	1,805	10.7
10	302,064	5,930,657	56.4	W9	Ja	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	164.0	1,805	10.7
11	301,977	5,930,276	55.7	W10	Ja	NORDEX	N149/4.0-4.5-4,500	4,500	149.0	164.0	1,805	10.7

Schattenrezeptor-Eingabe

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
				[m]	[m]	[m]	[m]	[°]		[m]
A	IO1	301,727	5,931,928	61.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
B	IO2	301,780	5,931,940	60.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
C	IO3	301,812	5,931,957	60.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
D	IO4	301,836	5,931,949	60.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
E	IO5	301,853	5,931,944	60.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
F	IO6	301,871	5,931,939	60.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
G	IO7	301,867	5,931,907	60.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
H	IO8	301,888	5,931,937	60.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
I	IO9	301,890	5,931,903	60.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
J	IO10	301,908	5,931,934	60.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
K	IO11	301,951	5,931,899	60.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
L	IO12	301,958	5,931,929	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
M	IO13	301,988	5,931,931	60.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
N	IO14	301,992	5,931,949	60.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
O	IO15	302,004	5,931,882	60.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0

(Fortsetzung nächste Seite)...

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Hauptergebnis

Berechnung: GB_Werder/Lübz

...(Fortsetzung von letzter Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
				[m]	[m]	[m]	[m]	[°]		[m]
P	IO16	302,000	5,931,867	60.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
Q	IO17	301,996	5,931,847	60.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
R	IO18	301,965	5,931,841	61.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
S	IO19	301,962	5,931,832	61.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
T	IO20	301,990	5,931,829	61.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
U	IO21	301,963	5,931,812	61.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
V	IO22	301,984	5,931,807	61.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
W	IO23	301,981	5,931,792	61.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
X	IO24	301,932	5,931,730	63.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
Y	IO25	303,007	5,929,927	56.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
Z	IO26	303,016	5,929,953	56.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AA	IO27	303,026	5,929,921	55.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AB	IO28	303,044	5,929,952	56.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AC	IO29	303,043	5,929,922	55.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AD	IO30	303,064	5,929,937	56.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AE	IO31	303,066	5,929,961	57.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AF	IO32	303,074	5,929,935	56.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AG	IO33	303,066	5,929,916	55.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AH	IO34	303,082	5,929,913	55.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AI	IO35	303,096	5,929,931	56.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AJ	IO36	303,107	5,929,909	55.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AK	IO37	303,120	5,929,925	56.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AL	IO38	303,125	5,929,906	55.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AM	IO39	303,137	5,929,920	56.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AN	IO40	303,145	5,929,897	55.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AO	IO41	303,157	5,929,917	55.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AP	IO42	303,169	5,929,915	55.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AQ	IO43	303,167	5,929,897	55.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AR	IO44	303,208	5,929,912	55.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AS	IO45	303,228	5,929,890	55.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AT	IO46	303,244	5,929,915	56.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AU	IO47	303,269	5,929,877	56.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AV	IO48	303,275	5,929,935	56.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AW	IO49	303,286	5,929,899	56.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AX	IO50	303,292	5,929,878	56.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AY	IO51	303,371	5,930,034	57.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AZ	IO52	303,361	5,930,010	57.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BA	IO53	303,353	5,929,993	57.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BB	IO54	303,331	5,929,938	56.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BC	IO55	303,336	5,929,899	56.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BD	IO56	303,318	5,929,863	55.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BE	IO57	303,314	5,929,833	55.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BF	IO58	303,299	5,929,766	53.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BG	IO59	303,427	5,929,942	57.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BH	IO60	303,441	5,929,944	57.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BI	IO61	303,371	5,929,917	57.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BJ	IO62	303,399	5,929,865	56.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BK	IO63	303,379	5,929,827	55.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BL	IO64	303,351	5,929,807	55.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BM	IO65	302,974	5,929,815	55.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BN	IO66	302,907	5,929,726	56.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BO	IO67	302,696	5,929,393	59.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BP	IO68	302,698	5,929,347	58.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BQ	IO69	302,660	5,929,294	58.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BR	IO70	302,329	5,929,301	57.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BS	IO71	302,507	5,929,209	57.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BT	IO72	302,628	5,929,195	58.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BU	IO73	302,342	5,929,126	57.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BV	IO74	302,388	5,929,117	57.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BW	IO75	302,455	5,928,995	57.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BX	IO76	302,471	5,929,027	57.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BY	IO77	302,536	5,928,961	57.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BZ	IO78	302,539	5,929,002	57.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CA	IO79	302,661	5,929,094	58.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0

(Fortsetzung nächste Seite)...

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Hauptergebnis

Berechnung: GB_Werder/Lübz

...(Fortsetzung von letzter Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
				[m]	[m]	[m]	[m]	[°]		[m]
CB	IO80	302,646	5,929,064	57.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CC	IO81	302,580	5,929,066	57.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CD	IO82	302,589	5,928,988	57.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CE	IO83	302,621	5,928,952	57.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CF	IO84	302,850	5,929,292	64.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CG	IO85	302,827	5,929,205	63.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CH	IO86	302,947	5,929,167	63.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CI	IO87	302,946	5,929,154	63.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CJ	IO88	302,945	5,929,143	63.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CK	IO89	302,943	5,929,129	63.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CL	IO90	302,832	5,929,051	59.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CM	IO91	302,820	5,929,002	58.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CN	IO92	302,909	5,928,984	58.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CO	IO93	302,908	5,929,009	59.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CP	IO94	302,917	5,929,006	59.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CQ	IO95	302,942	5,929,010	60.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CR	IO96	302,950	5,929,009	60.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CS	IO97	302,977	5,929,011	60.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CT	IO98	302,987	5,929,011	60.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CU	IO99	303,012	5,929,014	59.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CV	IO100	303,022	5,929,013	58.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CW	IO101	303,047	5,929,016	57.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CX	IO102	303,057	5,929,015	57.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CY	IO103	303,076	5,929,020	56.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CZ	IO104	303,095	5,929,034	54.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DA	IO105	302,895	5,928,914	57.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DB	IO106	302,881	5,928,870	56.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DC	IO107	302,979	5,928,866	57.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DD	IO108	302,823	5,928,874	56.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DE	IO109	302,904	5,928,821	55.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DF	IO110	302,858	5,928,808	55.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DG	IO111	302,843	5,928,745	54.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DH	IO112	302,833	5,928,713	55.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DI	IO113	302,411	5,928,883	57.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DJ	IO114	302,357	5,928,848	59.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DK	IO115	302,440	5,928,817	59.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DL	IO116	302,366	5,928,768	60.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DM	IO117	302,524	5,928,812	57.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DN	IO118	302,478	5,928,737	57.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DO	IO119	302,425	5,928,633	59.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DP	IO120	302,449	5,928,544	59.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DQ	IO121	302,505	5,928,410	57.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DR	IO122	302,502	5,928,365	58.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DS	IO123	302,429	5,928,508	59.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DT	IO124	302,429	5,928,494	59.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DU	IO125	302,446	5,928,456	58.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DV	IO126	302,444	5,928,425	58.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DW	IO127	302,476	5,928,352	58.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DX	IO128	302,418	5,928,475	58.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DY	IO129	302,396	5,928,466	59.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DZ	IO130	302,388	5,928,457	59.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EA	IO131	302,370	5,928,444	60.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EB	IO132	302,690	5,928,698	56.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EC	IO133	302,707	5,928,690	56.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
ED	IO134	302,724	5,928,692	56.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EE	IO135	302,737	5,928,710	56.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EF	IO136	302,775	5,928,721	55.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EG	IO137	302,702	5,928,664	57.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EH	IO138	302,724	5,928,664	57.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EI	IO139	302,773	5,928,672	56.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EJ	IO140	302,689	5,928,639	57.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EK	IO141	302,784	5,928,634	56.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EL	IO142	302,857	5,928,644	55.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EM	IO143	302,686	5,928,625	58.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0

(Fortsetzung nächste Seite)...

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Hauptergebnis

Berechnung: GB_Werder/Lübz

...(Fortsetzung von letzter Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
				[m]	[m]	[m]	[m]	[°]		[m]
EN	IO144	302,786	5,928,620	56.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EO	IO145	302,681	5,928,606	58.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EP	IO146	302,784	5,928,607	56.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EQ	IO147	302,788	5,928,592	56.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
ER	IO148	302,786	5,928,577	56.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
ES	IO149	302,822	5,928,570	56.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
ET	IO150	302,787	5,928,562	56.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EU	IO151	302,786	5,928,552	56.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EV	IO152	302,813	5,928,534	56.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EW	IO153	302,782	5,928,536	56.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EX	IO154	302,779	5,928,528	57.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EY	IO155	302,776	5,928,521	57.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EZ	IO156	302,768	5,928,507	57.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FA	IO157	302,769	5,928,499	57.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FB	IO158	302,834	5,928,484	55.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FC	IO159	302,908	5,928,446	54.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FD	IO160	302,714	5,928,500	59.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FE	IO161	302,664	5,928,535	59.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FF	IO162	302,650	5,928,470	58.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FG	IO163	302,648	5,928,459	58.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FH	IO164	302,647	5,928,452	58.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FI	IO165	302,645	5,928,441	58.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FJ	IO166	302,643	5,928,431	58.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FK	IO167	302,640	5,928,420	59.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FL	IO168	302,639	5,928,410	59.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FM	IO169	302,635	5,928,395	59.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FN	IO170	302,634	5,928,388	59.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FO	IO171	302,632	5,928,376	59.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FP	IO172	302,630	5,928,365	59.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FQ	IO173	302,626	5,928,351	59.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FR	IO174	302,624	5,928,343	59.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FS	IO175	302,622	5,928,334	59.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FT	IO176	302,620	5,928,323	59.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FU	IO177	302,592	5,928,377	59.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FV	IO178	302,741	5,928,466	59.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FW	IO179	302,711	5,928,422	60.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FX	IO180	302,717	5,928,407	60.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FY	IO181	302,712	5,928,395	60.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FZ	IO182	302,701	5,928,396	60.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GA	IO183	302,704	5,928,379	60.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GB	IO184	302,701	5,928,366	60.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GC	IO185	302,696	5,928,357	60.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GD	IO186	302,698	5,928,341	61.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GE	IO187	302,691	5,928,338	61.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GF	IO188	302,685	5,928,325	61.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GG	IO189	302,691	5,928,313	61.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GH	IO190	302,681	5,928,305	62.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GI	IO191	302,680	5,928,292	61.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GJ	IO192	302,414	5,928,569	59.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GK	IO193	302,393	5,928,543	59.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GL	IO194	302,402	5,928,595	59.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GM	IO195	302,360	5,928,575	59.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GN	IO196	302,398	5,928,607	59.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GO	IO197	302,388	5,928,610	59.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GP	IO198	302,356	5,928,580	59.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GQ	IO199	302,344	5,928,588	59.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GR	IO200	302,375	5,928,624	59.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GS	IO201	302,369	5,928,626	59.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GT	IO202	302,326	5,928,607	59.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GU	IO203	302,351	5,928,635	59.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GV	IO204	302,322	5,928,616	59.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GW	IO205	302,309	5,928,613	59.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GX	IO206	302,325	5,928,595	59.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
GY	IO207	302,335	5,928,587	59.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0

(Fortsetzung nächste Seite)...

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Hauptergebnis

Berechnung: GB_Werder/Lübz

...(Fortsetzung von letzter Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
				[m]	[m]	[m]	[m]	[°]		[m]
GZ	IO208	302,353	5,928,572	59.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HA	IO209	302,393	5,928,534	59.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HB	IO210	302,396	5,928,524	59.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HC	IO211	302,275	5,928,665	59.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HD	IO212	302,329	5,928,662	59.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HE	IO213	302,349	5,928,677	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HF	IO214	302,300	5,928,787	61.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HG	IO215	302,285	5,928,767	60.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HH	IO216	302,230	5,928,738	59.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HI	IO217	302,243	5,928,727	59.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HJ	IO218	302,247	5,928,718	59.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HK	IO219	302,251	5,928,711	59.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HL	IO220	302,202	5,928,821	60.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HM	IO221	302,205	5,928,869	61.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HN	IO222	300,543	5,929,141	59.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HO	IO223	299,712	5,928,817	60.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HP	IO224	299,711	5,928,768	60.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HQ	IO225	299,645	5,930,078	62.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HR	IO226	299,671	5,930,109	62.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HS	IO227	299,631	5,930,098	63.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HT	IO228	299,627	5,930,103	63.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HU	IO229	299,658	5,930,125	62.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HV	IO230	299,616	5,930,118	63.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HW	IO231	299,613	5,930,125	63.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HX	IO232	299,603	5,930,136	63.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HY	IO233	299,599	5,930,141	63.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
HZ	IO234	299,632	5,930,168	62.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IA	IO235	299,620	5,930,181	62.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IB	IO236	299,587	5,930,157	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IC	IO237	299,581	5,930,165	62.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
ID	IO238	299,570	5,930,181	61.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IE	IO239	299,564	5,930,188	61.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IF	IO240	299,596	5,930,211	61.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IG	IO241	299,593	5,930,217	61.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IH	IO242	299,573	5,930,228	60.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
II	IO243	299,569	5,930,237	60.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IJ	IO244	299,549	5,930,210	61.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IK	IO245	299,502	5,930,271	60.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IL	IO246	299,522	5,930,292	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IM	IO247	299,516	5,930,300	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IN	IO248	299,512	5,930,305	59.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IO	IO249	299,507	5,930,311	59.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IP	IO250	299,502	5,930,314	59.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IQ	IO251	300,301	5,931,019	61.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IR	IO252	300,223	5,931,101	65.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IS	IO253	300,093	5,931,088	65.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IT	IO254	300,133	5,931,146	66.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IU	IO255	300,098	5,931,156	66.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IV	IO256	299,945	5,931,153	62.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IW	IO257	301,409	5,931,972	63.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IX	IO258	301,420	5,931,964	63.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IY	IO259	301,431	5,931,954	63.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
IZ	IO260	301,446	5,931,941	63.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0

Berechnungsergebnisse

Schattenrezeptor

Nr.	Name	astron. max. mögl. Beschattungsdauer Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag	met. wahrsch. Beschattungsdauer Stunden/Jahr
		[h/a]	[d/a]	[h/d]	[h/a]
A	IO1	0:00	0	0:00	0:00
B	IO2	0:00	0	0:00	0:00
C	IO3	0:00	0	0:00	0:00
D	IO4	1:05	12	0:07	0:05

(Fortsetzung nächste Seite)...

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Hauptergebnis

Berechnung: GB_Werder/Lübz

...(Fortsetzung von letzter Seite)

		astron. max. mögl. Beschattungsdauer			met. wahrsch. Beschattungsdauer
Nr.	Name	Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag	Stunden/Jahr
		[h/a]	[d/a]	[h/d]	[h/a]
E	IO5	2:29	18	0:11	0:11
F	IO6	3:48	22	0:13	0:18
G	IO7	6:19	28	0:17	0:30
H	IO8	4:59	25	0:15	0:24
I	IO9	7:53	32	0:19	0:38
J	IO10	6:23	28	0:17	0:31
K	IO11	11:06	40	0:21	0:55
L	IO12	9:17	36	0:19	0:46
M	IO13	10:26	38	0:20	0:52
N	IO14	9:22	36	0:20	0:46
O	IO15	14:27	46	0:22	1:14
P	IO16	15:20	48	0:23	1:19
Q	IO17	16:26	50	0:23	1:26
R	IO18	15:44	48	0:23	1:21
S	IO19	16:13	50	0:24	1:24
T	IO20	17:43	52	0:28	1:33
U	IO21	18:21	52	0:30	1:36
V	IO22	21:07	54	0:36	1:50
W	IO23	23:29	56	0:39	2:02
X	IO24	30:46	60	0:47	2:40
Y	IO25	96:01	249	0:42	24:24
Z	IO26	91:24	240	0:41	23:23
AA	IO27	88:52	236	0:42	22:52
AB	IO28	90:34	238	0:39	23:09
AC	IO29	88:24	236	0:40	22:43
AD	IO30	89:16	238	0:40	22:51
AE	IO31	90:50	239	0:37	23:11
AF	IO32	88:39	237	0:39	22:42
AG	IO33	87:21	236	0:40	22:27
AH	IO34	82:28	218	0:40	21:08
AI	IO35	80:16	210	0:38	20:49
AJ	IO36	78:01	206	0:38	20:19
AK	IO37	79:36	208	0:38	20:40
AL	IO38	77:19	205	0:39	20:08
AM	IO39	78:38	208	0:38	20:26
AN	IO40	76:12	204	0:39	19:53
AO	IO41	78:07	207	0:36	20:19
AP	IO42	77:45	208	0:37	20:14
AQ	IO43	75:57	204	0:38	19:49
AR	IO44	76:41	207	0:36	19:59
AS	IO45	64:13	180	0:35	16:29
AT	IO46	65:54	186	0:34	16:53
AU	IO47	62:37	181	0:34	16:08
AV	IO48	65:36	188	0:32	16:48
AW	IO49	63:45	183	0:33	16:23
AX	IO50	62:28	180	0:34	16:06
AY	IO51	42:53	143	0:25	11:01
AZ	IO52	44:50	146	0:25	11:33
BA	IO53	46:20	150	0:25	11:56
BB	IO54	54:57	174	0:25	14:09
BC	IO55	55:13	171	0:25	14:15
BD	IO56	60:47	179	0:33	15:42
BE	IO57	59:03	174	0:34	15:20
BF	IO58	53:28	162	0:37	14:04
BG	IO59	41:23	141	0:24	10:41
BH	IO60	40:02	140	0:24	10:21
BI	IO61	51:18	173	0:24	13:14
BJ	IO62	50:53	167	0:24	13:11
BK	IO63	51:43	164	0:24	13:28
BL	IO64	50:58	158	0:24	13:18
BM	IO65	119:14	233	0:50	31:04
BN	IO66	113:14	217	0:54	29:21
BO	IO67	114:38	181	1:04	30:53
BP	IO68	100:31	174	0:59	27:06

(Fortsetzung nächste Seite)...

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Hauptergebnis

Berechnung: GB_Werder/Lübz

...(Fortsetzung von letzter Seite)

		astron. max. mögl. Beschattungsdauer			met. wahrsch. Beschattungsdauer
Nr.	Name	Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag	Stunden/Jahr
		[h/a]	[d/a]	[h/d]	[h/a]
BQ	IO69	80:55	162	0:58	22:11
BR	IO70	158:09	184	1:28	44:00
BS	IO71	113:57	174	1:10	32:00
BT	IO72	80:03	167	1:02	22:35
BU	IO73	79:41	154	0:46	22:15
BV	IO74	87:21	154	0:53	24:15
BW	IO75	60:51	136	0:37	17:05
BX	IO76	68:23	142	0:39	19:04
BY	IO77	59:10	135	0:35	16:30
BZ	IO78	69:33	142	0:41	19:20
CA	IO79	87:06	160	0:56	24:34
CB	IO80	86:31	156	0:53	24:18
CC	IO81	88:48	154	0:52	24:49
CD	IO82	70:45	142	0:41	19:39
CE	IO83	55:29	135	0:35	15:25
CF	IO84	72:19	161	0:36	19:31
CG	IO85	62:19	157	0:33	16:52
CH	IO86	58:49	156	0:30	15:56
CI	IO87	57:41	155	0:30	15:39
CJ	IO88	56:47	154	0:30	15:26
CK	IO89	55:25	153	0:30	15:05
CL	IO90	53:02	155	0:32	14:53
CM	IO91	57:30	152	0:32	16:13
CN	IO92	48:00	149	0:30	13:30
CO	IO93	48:56	150	0:30	13:42
CP	IO94	48:39	150	0:30	13:36
CQ	IO95	47:47	149	0:29	13:18
CR	IO96	47:29	149	0:29	13:12
CS	IO97	41:40	133	0:29	11:34
CT	IO98	41:46	132	0:28	11:35
CU	IO99	39:11	120	0:28	10:50
CV	IO100	39:24	120	0:27	10:53
CW	IO101	40:32	123	0:27	11:10
CX	IO102	40:46	124	0:27	11:13
CY	IO103	41:43	126	0:27	11:28
CZ	IO104	43:10	130	0:26	11:50
DA	IO105	52:45	144	0:30	14:52
DB	IO106	53:17	138	0:30	14:53
DC	IO107	36:30	121	0:28	10:14
DD	IO108	54:06	136	0:31	15:03
DE	IO109	40:52	105	0:29	11:12
DF	IO110	47:41	130	0:30	13:14
DG	IO111	38:47	115	0:29	10:48
DH	IO112	33:53	108	0:30	9:32
DI	IO113	62:57	114	0:47	17:44
DJ	IO114	65:56	102	0:53	18:31
DK	IO115	56:26	104	0:48	15:55
DL	IO116	60:02	88	0:54	16:33
DM	IO117	48:41	110	0:43	13:49
DN	IO118	55:39	94	0:47	15:28
DO	IO119	36:22	68	0:46	9:51
DP	IO120	20:56	53	0:29	5:34
DQ	IO121	6:50	29	0:18	1:46
DR	IO122	0:00	0	0:00	0:00
DS	IO123	12:45	40	0:24	3:20
DT	IO124	10:20	35	0:22	2:42
DU	IO125	6:16	27	0:17	1:38
DV	IO126	0:41	9	0:06	0:10
DW	IO127	0:00	0	0:00	0:00
DX	IO128	5:13	25	0:16	1:21
DY	IO129	0:04	2	0:02	0:01
DZ	IO130	0:00	0	0:00	0:00
EA	IO131	0:00	0	0:00	0:00
EB	IO132	37:29	106	0:38	10:39

(Fortsetzung nächste Seite)...

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Hauptergebnis

Berechnung: GB_Werder/Lübz

...(Fortsetzung von letzter Seite)

		astron. max. mögl. Beschattungsdauer			met. wahrsch. Beschattungsdauer
Nr.	Name	Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag	Stunden/Jahr
		[h/a]	[d/a]	[h/d]	[h/a]
EC	IO133	35:59	106	0:37	10:14
ED	IO134	32:55	99	0:36	9:25
EE	IO135	30:06	87	0:35	8:40
EF	IO136	29:33	96	0:33	8:29
EG	IO137	38:02	102	0:38	10:45
EH	IO138	35:55	104	0:37	10:11
EI	IO139	28:58	87	0:34	8:20
EJ	IO140	39:02	97	0:38	10:57
EK	IO141	31:05	100	0:35	8:52
EL	IO142	14:46	58	0:23	4:16
EM	IO143	39:28	95	0:40	11:02
EN	IO144	32:46	102	0:35	9:17
EO	IO145	39:58	92	0:40	11:07
EP	IO146	33:40	100	0:35	9:30
EQ	IO147	14:54	48	0:24	4:21
ER	IO148	15:19	50	0:24	4:27
ES	IO149	14:03	47	0:23	4:06
ET	IO150	15:32	51	0:24	4:30
EU	IO151	15:55	53	0:24	4:36
EV	IO152	15:12	51	0:24	4:24
EW	IO153	16:40	55	0:24	4:47
EX	IO154	17:04	57	0:24	4:53
EY	IO155	17:37	59	0:24	5:01
EZ	IO156	18:50	64	0:24	5:19
FA	IO157	19:19	65	0:24	5:26
FB	IO158	15:53	55	0:23	4:32
FC	IO159	13:37	49	0:22	3:54
FD	IO160	25:32	80	0:25	7:04
FE	IO161	42:24	80	0:41	11:32
FF	IO162	33:49	68	0:42	9:06
FG	IO163	31:43	66	0:41	8:31
FH	IO164	30:21	65	0:40	8:08
FI	IO165	28:06	63	0:39	7:31
FJ	IO166	26:03	61	0:36	6:58
FK	IO167	23:53	59	0:35	6:22
FL	IO168	21:59	57	0:32	5:51
FM	IO169	18:47	54	0:25	4:59
FN	IO170	17:58	52	0:25	4:45
FO	IO171	16:33	49	0:24	4:22
FP	IO172	15:11	47	0:24	3:59
FQ	IO173	13:14	43	0:23	3:27
FR	IO174	12:04	41	0:22	3:09
FS	IO175	10:54	39	0:21	2:50
FT	IO176	9:14	35	0:20	2:24
FU	IO177	12:54	42	0:23	3:22
FV	IO178	25:00	78	0:24	6:54
FW	IO179	24:27	68	0:25	6:38
FX	IO180	23:47	67	0:24	6:26
FY	IO181	22:56	64	0:24	6:11
FZ	IO182	22:34	63	0:24	6:05
GA	IO183	21:29	61	0:24	5:46
GB	IO184	20:19	58	0:24	5:25
GC	IO185	19:22	56	0:24	5:09
GD	IO186	18:02	54	0:24	4:47
GE	IO187	17:23	52	0:24	4:36
GF	IO188	15:46	49	0:23	4:09
GG	IO189	15:02	48	0:23	3:57
GH	IO190	13:28	45	0:22	3:31
GI	IO191	11:56	42	0:21	3:06
GJ	IO192	20:54	52	0:29	5:34
GK	IO193	13:57	41	0:26	3:39
GL	IO194	23:39	56	0:31	6:20
GM	IO195	14:41	42	0:26	3:51
GN	IO196	25:14	58	0:31	6:47

(Fortsetzung nächste Seite)...

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Hauptergebnis

Berechnung: GB_Werder/Lübz

...(Fortsetzung von letzter Seite)

		astron. max. mögl. Beschattungsdauer			met. wahrsch. Beschattungsdauer
Nr.	Name	Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag	Stunden/Jahr
		[h/a]	[d/a]	[h/d]	[h/a]
GO	IO197	24:36	57	0:31	6:36
GP	IO198	15:04	42	0:27	3:58
GQ	IO199	14:26	41	0:26	3:47
GR	IO200	25:34	58	0:32	6:52
GS	IO201	25:09	57	0:32	6:45
GT	IO202	15:43	43	0:28	4:08
GU	IO203	24:43	56	0:32	6:38
GV	IO204	16:41	44	0:28	4:24
GW	IO205	13:49	40	0:26	3:38
GX	IO206	12:41	38	0:25	3:20
GY	IO207	12:54	39	0:25	3:23
GZ	IO208	12:57	39	0:25	3:24
HA	IO209	12:12	38	0:24	3:12
HB	IO210	10:47	36	0:23	2:49
HC	IO211	19:21	47	0:30	5:08
HD	IO212	27:03	59	0:33	7:17
HE	IO213	33:14	66	0:42	9:01
HF	IO214	57:30	83	0:58	15:48
HG	IO215	47:59	76	0:54	13:09
HH	IO216	28:46	58	0:37	7:46
HI	IO217	28:28	58	0:36	7:41
HJ	IO218	26:55	56	0:35	7:14
HK	IO219	25:55	55	0:35	6:57
HL	IO220	47:53	76	0:53	13:11
HM	IO221	67:24	88	1:04	18:40
HN	IO222	69:30	131	1:03	20:20
HO	IO223	24:36	96	0:22	7:11
HP	IO224	28:26	103	0:21	8:16
HQ	IO225	39:58	137	0:25	10:38
HR	IO226	40:33	135	0:26	10:43
HS	IO227	38:13	131	0:25	10:08
HT	IO228	37:40	130	0:25	9:58
HU	IO229	39:24	133	0:26	10:23
HV	IO230	36:46	130	0:25	9:41
HW	IO231	36:33	126	0:25	9:37
HX	IO232	35:29	124	0:25	9:18
HY	IO233	35:19	126	0:25	9:15
HZ	IO234	36:47	127	0:25	9:35
IA	IO235	35:51	126	0:25	9:18
IB	IO236	34:16	122	0:25	8:56
IC	IO237	33:40	121	0:24	8:45
ID	IO238	33:12	120	0:24	8:35
IE	IO239	32:40	120	0:24	8:25
IF	IO240	33:57	119	0:25	8:41
IG	IO241	33:50	122	0:25	8:38
IH	IO242	26:43	93	0:24	7:11
II	IO243	26:11	92	0:24	7:00
IJ	IO244	25:57	92	0:24	7:00
IK	IO245	17:37	61	0:23	4:34
IL	IO246	18:00	63	0:24	4:37
IM	IO247	17:43	60	0:24	4:31
IN	IO248	17:40	62	0:23	4:30
IO	IO249	17:33	60	0:23	4:27
IP	IO250	17:17	59	0:23	4:23
IQ	IO251	90:14	188	0:48	13:02
IR	IO252	71:15	172	0:45	9:59
IS	IO253	55:45	162	0:36	8:22
IT	IO254	61:57	166	0:40	8:32
IU	IO255	58:49	168	0:38	8:07
IV	IO256	35:48	114	0:31	5:32
IW	IO257	4:59	24	0:16	0:22
IX	IO258	4:56	24	0:16	0:22
IY	IO259	5:07	24	0:16	0:22
IZ	IO260	5:16	24	0:16	0:23

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Hauptergebnis

Berechnung: GB_Werder/Lübz

Gesamtmenge der max. mögl. Beschattung an Rezeptoren pro WEA

Nr.	Name	Maximal [h/a]	Erwartet [h/a]
1	W1	280:39	75:45
2	W2	296:47	80:37
3	W3	199:16	51:31
4	W4	155:11	31:54
5	W5	99:46	24:58
6	W11	145:38	38:55
7	W6	80:55	19:57
8	W7	119:54	23:33
9	W8	77:09	18:17
10	W9	74:27	18:50
11	W10	110:34	31:03

Summen in Rezeptortabelle und WEA-Tabelle können sich unterscheiden, da eine WEA gleichzeitig an zwei oder mehr Rezeptoren Beschattung verursachen kann und/oder ein Rezeptor gleichzeitig von zwei oder mehr WEA beschattet werden kann.

Projekt:
180926_Werder-Lübz_II

Beschreibung:
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Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** A - IO1

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58
2	08:29	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:06
	16:04	16:56	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07
	16:05	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38	15:57
4	08:28	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16	08:09
	16:06	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18	08:10
	16:08	17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34	15:55
6	08:28	07:51	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21	08:13
	16:10	17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30	15:54
8	08:27	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31	08:19
	16:18	17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33	08:20
	16:19	17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35	08:21
	16:21	17:19	18:13	20:10	21:04	21:42	21:36	20:45	19:33	18:21	16:18	15:53
15	08:22	07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36	08:22
	16:22	17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17	15:53
16	08:21	07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15	15:53
17	08:20	07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	21:32	20:39	19:26	18:14	16:14	15:53
18	08:19	07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42	08:24
	16:27	17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11	15:54
20	08:16	07:23	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49	08:27
	16:35	17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:03	16:07	15:55
23	08:13	07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53	08:28
	16:38	17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05	15:56
25	08:10	07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	15:56
26	08:08	07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:34	21:24	21:46	21:19	20:16	19:01	16:52	16:02	15:58
28	08:06	07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:29
	16:46	17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03	08:29
	16:50		19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		05:25	06:18		07:08		08:29
	16:52		19:44		21:29		21:12	20:07		16:44		16:02
Sonnenscheinstunden	251	274	367	419	492	508	510	459	382	329	260	235
astr.max.mögl.Beschattung												
Red.Sonnenscheinwahrsch.												
Reduktion Betriebsdauer												
Reduktion Windrichtung												
Gesamte Reduktion												
Met.wahrsch.Beschattung												

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** B - IO2
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58
2	08:29	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:06
	16:04	16:56	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07
	16:05	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38	15:57
4	08:28	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16	08:09
	16:06	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18	08:10
	16:08	17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34	15:55
6	08:28	07:51	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21	08:13
	16:10	17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30	15:54
8	08:27	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54
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	16:19	17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35	08:21
	16:21	17:19	18:13	20:10	21:04	21:42	21:36	20:45	19:33	18:21	16:18	15:53
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16	08:21	07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15	15:53
17	08:20	07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	21:32	20:39	19:26	18:14	16:14	15:53
18	08:19	07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42	08:24
	16:27	17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11	15:54
20	08:16	07:23	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47	08:26
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22	08:14	07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49	08:27
	16:35	17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:03	16:07	15:55
23	08:13	07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53	08:28
	16:38	17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05	15:56
25	08:10	07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	15:56
26	08:08	07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:34	21:24	21:46	21:19	20:16	19:01	16:52	16:02	15:58
28	08:06	07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:29
	16:46	17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03	08:29
	16:50		19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		05:25	06:18		07:08		08:29
	16:52		19:44		21:29		21:12	20:07		16:44		16:02
Sonnenscheinstunden	251	274	367	419	492	508	510	459	382	329	260	235
astr.max.mögl.Beschattung												
Red.Sonnenscheinwahrsch.												
Reduktion Betriebsdauer												
Reduktion Windrichtung												
Gesamte Reduktion												
Met.wahrsch.Beschattung												

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

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	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** C - IO3

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58
2	08:29	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:06
	16:04	16:56	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07
	16:05	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38	15:57
4	08:28	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16	08:09
	16:06	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18	08:10
	16:08	17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34	15:55
6	08:28	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21	08:13
	16:10	17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30	15:54
8	08:27	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31	08:19
	16:18	17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33	08:20
	16:19	17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35	08:21
	16:21	17:19	18:13	20:10	21:04	21:42	21:36	20:45	19:33	18:21	16:18	15:53
15	08:22	07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36	08:22
	16:22	17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17	15:53
16	08:21	07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15	15:53
17	08:20	07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	21:32	20:39	19:26	18:14	16:14	15:53
18	08:19	07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42	08:24
	16:27	17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11	15:54
20	08:16	07:23	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49	08:27
	16:35	17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:03	16:07	15:55
23	08:13	07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53	08:28
	16:38	17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05	15:56
25	08:10	07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	15:56
26	08:08	07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:34	21:24	21:46	21:19	20:16	19:01	16:52	16:02	15:58
28	08:06	07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:29
	16:46	17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03	08:29
	16:50		19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		05:25	06:18		07:08		08:29
	16:52		19:44		21:29		21:12	20:07		16:44		16:02
Sonnenscheinstunden	251	274	367	419	492	508	510	459	382	329	260	235
astr.max.mögl.Beschattung												
Red.Sonnenscheinwahrsch.												
Reduktion Betriebsdauer												
Reduktion Windrichtung												
Gesamte Reduktion												
Met.wahrsch.Beschattung												

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** D - IO4

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:29	07:59	07:02	06:48	05:48	04:51	04:47	05:26	06:20	07:12	07:10	08:04		
	16:03	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58		
2	08:29	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:06		
	16:04	16:56	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40	15:57		
3	08:28	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07		
	16:05	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38	15:57		
4	08:28	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16	08:09		
	16:06	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36	15:56		
5	08:28	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18	08:10		
	16:08	17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34	15:55		
6	08:28	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11		
	16:09	17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32	15:55		
7	08:27	07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21	08:13		
	16:10	17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30	15:54		
8	08:27	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14		
	16:12	17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28	15:54		
9	08:26	07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15		
	16:13	17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54		
10	08:25	07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27	08:16		
	16:15	17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25	15:53		
11	08:25	07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29	08:17		
	16:16	17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23	15:53		
12	08:24	07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31	08:19		
	16:18	17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22	15:53		
13	08:23	07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33	08:20		
	16:19	17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20	15:53		
14	08:22	07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35	08:21		
	16:21	17:19	18:13	20:10	21:04	21:42	21:36	20:45	19:33	18:21	16:18	15:53		
15	08:22	07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36	08:22		
	16:22	17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17	15:53		
16	08:21	07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38	08:22		14:18 (8)
	16:24	17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15	15:53	1	14:19 (8)
17	08:20	07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40	08:23		14:16 (8)
	16:26	17:25	18:19	20:15	21:08	21:44	21:32	20:39	19:26	18:14	16:14	15:53	4	14:20 (8)
18	08:19	07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42	08:24		14:16 (8)
	16:27	17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53	5	14:21 (8)
19	08:17	07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44	08:25		14:16 (8)
	16:29	17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11	15:54	7	14:23 (8)
20	08:16	07:23	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46	08:25		14:17 (8)
	16:31	17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10	15:54	7	14:24 (8)
21	08:15	07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47	08:26		14:17 (8)
	16:33	17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08	15:54	7	14:24 (8)
22	08:14	07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49	08:27		14:18 (8)
	16:35	17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:03	16:07	15:55	7	14:25 (8)
23	08:13	07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51	08:27		14:18 (8)
	16:36	17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06	15:55	7	14:25 (8)
24	08:11	07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53	08:28		14:18 (8)
	16:38	17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05	15:56	7	14:25 (8)
25	08:10	07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54	08:28		14:20 (8)
	16:40	17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	15:56	5	14:25 (8)
26	08:08	07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	08:28		14:20 (8)
	16:42	17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	15:57	5	14:25 (8)
27	08:07	07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:28		14:22 (8)
	16:44	17:45	18:37	20:34	21:24	21:46	21:19	20:16	19:01	16:52	16:02	15:58	3	14:25 (8)
28	08:06	07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:29		
	16:46	17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	15:59		
29	08:04		06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29		
	16:48		19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00		
30	08:02		06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03	08:29		
	16:50		19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	16:01		
31	08:01		06:51		04:52		05:25	06:18		07:08		08:29		
	16:52		19:44		21:29		21:12	20:07		16:44		16:02		
Sonnenscheinstunden	251	274	367	419	492	508	510	459	382	329	260	235		
astr.max.mögl.Beschattung													65	
Red.Sonnenscheinwahrsch.													0.14	
Reduktion Betriebsdauer													0.91	
Reduktion Windrichtung													0.64	
Gesamte Reduktion													0.08	
Met.wahrsch.Beschattung													5	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** E - IO5

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:29	07:59	07:02	06:48	05:48	04:51	04:47	05:26	06:20	07:12	07:10	08:04		
	16:03	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58		
2	08:29	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:06		
	16:04	16:56	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40	15:57		
3	08:28	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07		
	16:05	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38	15:57		
4	08:28	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16	08:09		
	16:06	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36	15:56		
5	08:28	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18	08:10		
	16:08	17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34	15:55		
6	08:28	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11		
	16:09	17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32	15:55		
7	08:27	07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21	08:13		
	16:10	17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30	15:54		
8	08:27	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14		
	16:12	17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28	15:54		
9	08:26	07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15		
	16:13	17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54		
10	08:25	07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27	08:16		
	16:15	17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25	15:53		
11	08:25	07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29	08:17		
	16:16	17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23	15:53		
12	08:24	07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31	08:19		
	16:18	17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22	15:53		
13	08:23	07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33	08:20		14:19 (8)
	16:19	17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20	15:53	1	14:20 (8)
14	08:22	07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35	08:21		14:17 (8)
	16:21	17:19	18:13	20:10	21:04	21:42	21:36	20:45	19:33	18:21	16:18	15:53	5	14:22 (8)
15	08:22	07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36	08:22		14:17 (8)
	16:22	17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17	15:53	7	14:24 (8)
16	08:21	07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38	08:22		14:17 (8)
	16:24	17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15	15:53	8	14:25 (8)
17	08:20	07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40	08:23		14:16 (8)
	16:26	17:25	18:19	20:15	21:08	21:44	21:32	20:39	19:26	18:14	16:14	15:53	9	14:25 (8)
18	08:19	07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42	08:24		14:16 (8)
	16:27	17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53	10	14:26 (8)
19	08:17	07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44	08:25		14:17 (8)
	16:29	17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11	15:54	10	14:27 (8)
20	08:16	07:22	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46	08:25		14:18 (8)
	16:31	17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10	15:54	10	14:28 (8)
21	08:15	07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47	08:26		14:17 (8)
	16:33	17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08	15:54	11	14:28 (8)
22	08:14	07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49	08:27		14:18 (8)
	16:35	17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:03	16:07	15:55	11	14:29 (8)
23	08:13	07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51	08:27		14:18 (8)
	16:36	17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06	15:55	11	14:29 (8)
24	08:11	07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53	08:28		14:19 (8)
	16:38	17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05	15:56	10	14:29 (8)
25	08:10	07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54	08:28		14:20 (8)
	16:40	17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	15:56	10	14:30 (8)
26	08:08	07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	08:28		14:21 (8)
	16:42	17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	15:57	9	14:30 (8)
27	08:07	07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:28		14:21 (8)
	16:44	17:45	18:37	20:34	21:24	21:46	21:19	20:16	19:01	16:52	16:02	15:58	9	14:30 (8)
28	08:06	07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:29		14:22 (8)
	16:46	17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	15:59	8	14:30 (8)
29	08:04		06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29		14:24 (8)
	16:48		19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00	6	14:30 (8)
30	08:02		06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03	08:29		14:25 (8)
	16:50		19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	16:01	4	14:29 (8)
31	08:01		06:51		04:52		05:25	06:18		07:08		08:29		
	16:52		19:44		21:29		21:12	20:07		16:44		16:02		
Sonnenscheinstunden	251	274	367	419	492	508	510	459	382	329	260	235		
astr.max.mögl.Beschattung													149	
Red.Sonnenscheinwahrsch.													0.14	
Reduktion Betriebsdauer													0.91	
Reduktion Windrichtung													0.64	
Gesamte Reduktion													0.08	
Met.wahrsch.Beschattung													12	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** F - IO6

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:29	14:28 (8)	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10	08:04		
	16:03	4 14:32 (8)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58		
2	08:29		07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:06		
	16:04		16:56	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40	15:57		
3	08:28		07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07		
	16:05		16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38	15:57		
4	08:28		07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16	08:09		
	16:06		16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36	15:56		
5	08:28		07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18	08:10		
	16:08		17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34	15:55		
6	08:28		07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11		
	16:09		17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32	15:55		
7	08:27		07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21	08:13		
	16:10		17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30	15:54		
8	08:27		07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14		
	16:12		17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28	15:54		
9	08:26		07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15		
	16:13		17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54		
10	08:25		07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27	08:16		
	16:15		17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25	15:53		
11	08:25		07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29	08:17		14:20 (8)
	16:16		17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23	15:53	3	14:23 (8)
12	08:24		07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31	08:19		14:18 (8)
	16:18		17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22	15:53	7	14:25 (8)
13	08:23		07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33	08:20		14:18 (8)
	16:19		17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20	15:53	8	14:26 (8)
14	08:22		07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35	08:21		14:18 (8)
	16:21		17:19	18:13	20:10	21:04	21:42	21:36	20:45	19:33	18:21	16:18	15:53	9	14:27 (8)
15	08:22		07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36	08:22		14:18 (8)
	16:22		17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17	15:53	10	14:28 (8)
16	08:21		07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38	08:22		14:18 (8)
	16:24		17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15	15:53	11	14:29 (8)
17	08:20		07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40	08:23		14:17 (8)
	16:26		17:25	18:19	20:15	21:08	21:44	21:32	20:39	19:26	18:14	16:14	15:53	12	14:29 (8)
18	08:19		07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42	08:24		14:18 (8)
	16:27		17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53	12	14:30 (8)
19	08:17		07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44	08:25		14:18 (8)
	16:29		17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11	15:54	13	14:31 (8)
20	08:16		07:22	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46	08:25		14:19 (8)
	16:31		17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10	15:54	13	14:32 (8)
21	08:15		07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47	08:26		14:19 (8)
	16:33		17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08	15:54	13	14:32 (8)
22	08:14		07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49	08:27		14:20 (8)
	16:35		17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:03	16:07	15:55	13	14:33 (8)
23	08:13		07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51	08:27		14:20 (8)
	16:36		17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06	15:55	13	14:33 (8)
24	08:11		07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53	08:28		14:20 (8)
	16:38		17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05	15:56	13	14:33 (8)
25	08:10		07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54	08:28		14:21 (8)
	16:40		17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	15:56	13	14:34 (8)
26	08:08		07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	08:28		14:22 (8)
	16:42		17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	15:57	12	14:34 (8)
27	08:07		07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:28		14:22 (8)
	16:44		17:45	18:37	20:34	21:24	21:46	21:19	20:16	19:01	16:52	16:02	15:58	12	14:34 (8)
28	08:06		07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:29		14:23 (8)
	16:46		17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	15:59	11	14:34 (8)
29	08:04			06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29		14:24 (8)
	16:48			19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00	10	14:34 (8)
30	08:02			06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03	08:29		14:25 (8)
	16:50			19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	16:01	9	14:34 (8)
31	08:01			06:51		04:52		05:25	06:18		07:08		08:29		14:27 (8)
	16:52			19:44		21:29		21:12	20:07		16:44		16:02	7	14:34 (8)
Sonnenscheinstunden	251		274	367	419	492	508	510	459	382	329	260	235		
astr.max.mögl.Beschattung		4												224	
Red.Sonnenscheinwahrsch.		0.17												0.14	
Reduktion Betriebsdauer		0.91												0.91	
Reduktion Windrichtung		0.64												0.64	
Gesamte Reduktion		0.10												0.08	
Met.wahrsch.Beschattung		0												18	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** G - IO7

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar			Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:29		14:26 (8)	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10	08:04		
	16:03	12	14:38 (8)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58		
2	08:29		14:28 (8)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:06		
	16:04	10	14:38 (8)	16:56	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40	15:57		
3	08:28		14:30 (8)	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07		
	16:05	8	14:38 (8)	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38	15:57		
4	08:28		14:31 (8)	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16	08:09		
	16:06	5	14:36 (8)	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36	15:56		
5	08:28			07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18	08:10		
	16:08			17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34	15:55		
6	08:28			07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11		
	16:09			17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32	15:55		
7	08:27			07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21	08:13		
	16:10			17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30	15:54		
8	08:27			07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14		14:19 (8)
	16:12			17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28	15:54	5	14:24 (8)
9	08:26			07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15		14:18 (8)
	16:13			17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54	8	14:26 (8)
10	08:25			07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27	08:16		14:17 (8)
	16:15			17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25	15:53	10	14:27 (8)
11	08:25			07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29	08:17		14:18 (8)
	16:16			17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23	15:53	11	14:29 (8)
12	08:24			07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31	08:19		14:17 (8)
	16:18			17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22	15:53	13	14:30 (8)
13	08:23			07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33	08:20		14:17 (8)
	16:19			17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20	15:53	14	14:31 (8)
14	08:22			07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35	08:21		14:17 (8)
	16:21			17:19	18:13	20:10	21:04	21:42	21:36	20:45	19:33	18:21	16:18	15:53	14	14:31 (8)
15	08:22			07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36	08:22		14:17 (8)
	16:22			17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17	15:53	15	14:32 (8)
16	08:21			07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38	08:22		14:18 (8)
	16:24			17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15	15:53	15	14:33 (8)
17	08:20			07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40	08:23		14:17 (8)
	16:26			17:25	18:19	20:15	21:08	21:44	21:32	20:39	19:26	18:14	16:14	15:53	16	14:33 (8)
18	08:19			07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42	08:24		14:18 (8)
	16:27			17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53	16	14:34 (8)
19	08:17			07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44	08:25		14:18 (8)
	16:29			17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11	15:54	17	14:35 (8)
20	08:16			07:22	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46	08:25		14:19 (8)
	16:31			17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10	15:54	17	14:36 (8)
21	08:15			07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47	08:26		14:19 (8)
	16:33			17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08	15:54	17	14:36 (8)
22	08:14			07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49	08:27		14:20 (8)
	16:35			17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:03	16:07	15:55	17	14:37 (8)
23	08:13			07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51	08:27		14:20 (8)
	16:36			17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06	15:55	17	14:37 (8)
24	08:11			07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53	08:28		14:20 (8)
	16:38			17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05	15:56	17	14:37 (8)
25	08:10			07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54	08:28		14:21 (8)
	16:40			17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	15:56	17	14:38 (8)
26	08:08			07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	08:28		14:22 (8)
	16:42			17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	15:57	16	14:38 (8)
27	08:07			07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:28		14:22 (8)
	16:44			17:45	18:37	20:34	21:24	21:46	21:19	20:16	19:01	16:52	16:02	15:58	16	14:38 (8)
28	08:06			07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:29		14:23 (8)
	16:46			17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	15:59	15	14:38 (8)
29	08:04				06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29		14:24 (8)
	16:48				19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00	14	14:38 (8)
30	08:02				06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03	08:29		14:25 (8)
	16:50				19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	16:01	14	14:39 (8)
31	08:01				06:51		04:52		05:25	06:18		07:08		08:29		14:26 (8)
	16:52				19:44		21:29		21:12	20:07		16:44		16:02	13	14:39 (8)
Sonnenscheinstunden	251			274	367	419	492	508	510	459	382	329	260	235		
astr.max.mögl.Beschattung		35													344	
Red.Sonnenscheinwahrsch.		0.17													0.14	
Reduktion Betriebsdauer		0.91													0.91	
Reduktion Windrichtung		0.64													0.64	
Gesamte Reduktion		0.10													0.08	
Met.wahrsch.Beschattung		4													27	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)	
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)	

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** H - IO8
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar			Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:29		14:28 (8)	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10	08:04		
	16:03	9	14:37 (8)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58		
2	08:29		14:30 (8)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:06		
	16:04	6	14:36 (8)	16:56	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40	15:57		
3	08:28		14:33 (8)	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07		
	16:05	2	14:35 (8)	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38	15:57		
4	08:28			07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16	08:09		
	16:06			16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36	15:56		
5	08:28			07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18	08:10		
	16:08			17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34	15:55		
6	08:28			07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11		
	16:09			17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32	15:55		
7	08:27			07:49	06:48	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21	08:13		
	16:10			17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30	15:54		
8	08:27			07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14		
	16:12			17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28	15:54		
9	08:26			07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15		
	16:13			17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54		
10	08:25			07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27	08:16		14:19 (8)
	16:15			17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25	15:53	6	14:25 (8)
11	08:25			07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29	08:17		14:19 (8)
	16:16			17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23	15:53	9	14:28 (8)
12	08:24			07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31	08:19		14:19 (8)
	16:18			17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22	15:53	10	14:29 (8)
13	08:23			07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33	08:20		14:19 (8)
	16:19			17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20	15:53	11	14:30 (8)
14	08:22			07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35	08:21		14:19 (8)
	16:21			17:19	18:13	20:10	21:04	21:42	21:36	20:45	19:33	18:21	16:18	15:53	12	14:31 (8)
15	08:22			07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36	08:22		14:19 (8)
	16:22			17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17	15:53	13	14:32 (8)
16	08:21			07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38	08:22		14:19 (8)
	16:24			17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15	15:53	13	14:32 (8)
17	08:20			07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40	08:23		14:18 (8)
	16:26			17:25	18:19	20:15	21:08	21:44	21:32	20:39	19:26	18:14	16:14	15:53	14	14:32 (8)
18	08:19			07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42	08:24		14:19 (8)
	16:27			17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53	14	14:33 (8)
19	08:17			07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44	08:25		14:20 (8)
	16:29			17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11	15:54	14	14:34 (8)
20	08:16			07:22	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46	08:25		14:20 (8)
	16:31			17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10	15:54	15	14:35 (8)
21	08:15			07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47	08:26		14:20 (8)
	16:33			17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08	15:54	15	14:35 (8)
22	08:14			07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49	08:27		14:21 (8)
	16:35			17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:02	16:07	15:55	15	14:36 (8)
23	08:13			07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51	08:27		14:21 (8)
	16:36			17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06	15:55	15	14:36 (8)
24	08:11			07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53	08:28		14:21 (8)
	16:38			17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05	15:56	15	14:36 (8)
25	08:10			07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54	08:28		14:23 (8)
	16:40			17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	15:56	14	14:37 (8)
26	08:08			07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	08:28		14:23 (8)
	16:42			17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	15:57	14	14:37 (8)
27	08:07			07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:28		14:24 (8)
	16:44			17:45	18:37	20:34	21:24	21:46	21:19	20:16	19:01	16:52	16:02	15:58	13	14:37 (8)
28	08:06			07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:29		14:24 (8)
	16:46			17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	15:59	14	14:38 (8)
29	08:04				06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29		14:25 (8)
	16:48				19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00	13	14:38 (8)
30	08:02				06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03	08:29		14:26 (8)
	16:50				19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	16:01	12	14:38 (8)
31	08:01				06:51		04:52		05:25	06:18		07:08		08:29		14:27 (8)
	16:52				19:44		21:29		21:12	20:07		16:44		16:02	11	14:38 (8)
Sonnenscheinstunden	251			274	367	419	492	508	510	459	382	329	260	235		
astr.max.mögl.Beschattung		17													282	
Red.Sonnenscheinwahrsch.		0.17													0.14	
Reduktion Betriebsdauer		0.91													0.91	
Reduktion Windrichtung		0.64													0.64	
Gesamte Reduktion		0.10													0.08	
Met.wahrsch.Beschattung		2													22	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** I - IO9
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:29		14:28 (8)	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10	08:04		
	16:03	15	14:43 (8)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58		
2	08:29		14:29 (8)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:06		
	16:04	14	14:43 (8)	16:56	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40	15:57		
3	08:28		14:31 (8)	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07		
	16:05	12	14:43 (8)	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38	15:57		
4	08:28		14:32 (8)	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16	08:09		
	16:06	10	14:42 (8)	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36	15:56		
5	08:28		14:34 (8)	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18	08:10		
	16:08	8	14:42 (8)	17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34	15:55		
6	08:28		14:35 (8)	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11		14:22 (8)
	16:09	5	14:40 (8)	17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32	15:55	4	14:26 (8)
7	08:27			07:49	06:48	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21	08:13		14:21 (8)
	16:10			17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30	15:54	8	14:29 (8)
8	08:27			07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14		14:20 (8)
	16:12			17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28	15:54	10	14:30 (8)
9	08:26			07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15		14:19 (8)
	16:13			17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54	12	14:31 (8)
10	08:25			07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27	08:16		14:19 (8)
	16:15			17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25	15:53	13	14:32 (8)
11	08:25			07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29	08:17		14:19 (8)
	16:16			17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23	15:53	15	14:34 (8)
12	08:24			07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31	08:19		14:19 (8)
	16:18			17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22	15:53	15	14:34 (8)
13	08:23			07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33	08:20		14:19 (8)
	16:19			17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20	15:53	16	14:35 (8)
14	08:22			07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35	08:21		14:19 (8)
	16:21			17:19	18:13	20:10	21:04	21:42	21:36	20:45	19:33	18:21	16:18	15:53	17	14:36 (8)
15	08:21			07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36	08:22		14:20 (8)
	16:22			17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17	15:53	16	14:36 (8)
16	08:21			07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38	08:22		14:20 (8)
	16:24			17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15	15:53	17	14:37 (8)
17	08:20			07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40	08:23		14:19 (8)
	16:26			17:25	18:19	20:15	21:08	21:44	21:32	20:39	19:26	18:14	16:14	15:53	18	14:37 (8)
18	08:19			07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42	08:24		14:20 (8)
	16:27			17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53	18	14:38 (8)
19	08:17			07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44	08:25		14:21 (8)
	16:29			17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11	15:54	18	14:39 (8)
20	08:16			07:22	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46	08:25		14:21 (8)
	16:31			17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10	15:54	19	14:40 (8)
21	08:15			07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47	08:26		14:21 (8)
	16:33			17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08	15:54	19	14:40 (8)
22	08:14			07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49	08:27		14:22 (8)
	16:35			17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:02	16:07	15:55	19	14:41 (8)
23	08:13			07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51	08:27		14:22 (8)
	16:36			17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06	15:55	19	14:41 (8)
24	08:11			07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53	08:28		14:23 (8)
	16:38			17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05	15:56	18	14:41 (8)
25	08:10			07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54	08:28		14:24 (8)
	16:40			17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	15:56	18	14:42 (8)
26	08:08			07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	08:28		14:24 (8)
	16:42			17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	15:57	18	14:42 (8)
27	08:07			07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:28		14:25 (8)
	16:44			17:45	18:37	20:34	21:24	21:46	21:19	20:16	19:01	16:52	16:02	15:58	17	14:42 (8)
28	08:06			07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:29		14:25 (8)
	16:46			17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	15:59	17	14:42 (8)
29	08:04				06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29		14:26 (8)
	16:48				19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00	17	14:43 (8)
30	08:02				06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03	08:29		14:27 (8)
	16:50				19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	16:01	16	14:43 (8)
31	08:01				06:51		04:52		05:25	06:18		07:08		08:29		14:28 (8)
	16:52				19:44		21:29		21:12	20:07		16:44		16:02	15	14:43 (8)
Sonnenscheinstunden	251		274	367	419	492	508	510	459	382	329	260	235			
astr.max.mögl.Beschattung		64												409		
Red.Sonnenscheinwahrsch.		0.17												0.14		
Reduktion Betriebsdauer		0.91												0.91		
Reduktion Windrichtung		0.64												0.64		
Gesamte Reduktion		0.10												0.08		
Met.wahrsch.Beschattung		6												33		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** J - IO10

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:29	14:29 (8)	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10	08:04		
	16:03 12	14:41 (8)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58		
2	08:29	14:31 (8)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:06		
	16:04 10	14:41 (8)	16:55	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40	15:57		
3	08:28	14:32 (8)	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07		
	16:05 9	14:41 (8)	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38	15:57		
4	08:28	14:34 (8)	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16	08:09		
	16:06 6	14:40 (8)	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36	15:56		
5	08:28		07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18	08:10		
	16:08		17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34	15:55		
6	08:28		07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11		
	16:09		17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32	15:55		
7	08:27		07:49	06:48	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21	08:13		
	16:10		17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30	15:54		
8	08:27		07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14		14:22 (8)
	16:12		17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28	15:54	6	14:28 (8)
9	08:26		07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15		14:21 (8)
	16:13		17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54	8	14:29 (8)
10	08:25		07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27	08:16		14:20 (8)
	16:15		17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25	15:53	10	14:30 (8)
11	08:25		07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29	08:17		14:20 (8)
	16:16		17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23	15:53	12	14:32 (8)
12	08:24		07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31	08:19		14:20 (8)
	16:18		17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22	15:53	13	14:33 (8)
13	08:23		07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33	08:20		14:20 (8)
	16:19		17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20	15:53	14	14:34 (8)
14	08:22		07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35	08:21		14:20 (8)
	16:21		17:19	18:13	20:10	21:04	21:42	21:36	20:45	19:33	18:21	16:18	15:53	15	14:35 (8)
15	08:22		07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36	08:22		14:20 (8)
	16:22		17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17	15:53	15	14:35 (8)
16	08:21		07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38	08:22		14:21 (8)
	16:24		17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15	15:53	15	14:36 (8)
17	08:20		07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40	08:23		14:20 (8)
	16:26		17:25	18:19	20:15	21:08	21:44	21:32	20:39	19:26	18:14	16:14	15:53	16	14:36 (8)
18	08:19		07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42	08:24		14:21 (8)
	16:27		17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53	16	14:37 (8)
19	08:17		07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44	08:25		14:21 (8)
	16:29		17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11	15:54	17	14:38 (8)
20	08:16		07:22	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46	08:25		14:22 (8)
	16:31		17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10	15:54	17	14:39 (8)
21	08:15		07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47	08:26		14:22 (8)
	16:33		17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08	15:54	17	14:39 (8)
22	08:14		07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49	08:27		14:23 (8)
	16:35		17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:02	16:07	15:55	17	14:40 (8)
23	08:13		07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51	08:27		14:23 (8)
	16:36		17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06	15:55	17	14:40 (8)
24	08:11		07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53	08:28		14:23 (8)
	16:38		17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05	15:56	17	14:40 (8)
25	08:10		07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54	08:28		14:25 (8)
	16:40		17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	15:56	16	14:41 (8)
26	08:08		07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	08:28		14:25 (8)
	16:42		17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	15:57	16	14:41 (8)
27	08:07		07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:28		14:25 (8)
	16:44		17:45	18:37	20:34	21:24	21:46	21:19	20:16	19:01	16:52	16:02	15:58	16	14:41 (8)
28	08:06		07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:29		14:26 (8)
	16:46		17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	15:59	15	14:41 (8)
29	08:04			06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29		14:27 (8)
	16:48			19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00	14	14:41 (8)
30	08:02			06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03	08:29		14:28 (8)
	16:50			19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	16:01	14	14:42 (8)
31	08:01			06:51		04:52		05:25	06:18		07:08		08:29		14:29 (8)
	16:52			19:44		21:29		21:12	20:07		16:44		16:02	13	14:42 (8)
Sonnenscheinstunden	251		274	367	419	492	508	510	459	382	329	260	235		
astr.max.mögl.Beschattung		37												346	
Red.Sonnenscheinwahrsch.		0.17												0.14	
Reduktion Betriebsdauer		0.91												0.91	
Reduktion Windrichtung		0.64												0.64	
Gesamte Reduktion		0.10												0.08	
Met.wahrsch.Beschattung		4												28	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** K - IO11

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember	
1	08:29	14:34 (8)	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10	08:04	
	16:03 18	14:52 (8)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58	
2	08:29	14:35 (8)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:06	14:30 (8)
	16:04 18	14:53 (8)	16:55	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40	15:57 1	14:31 (8)
3	08:28	14:36 (8)	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07	14:27 (8)
	16:05 17	14:53 (8)	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38	15:57 8	14:35 (8)
4	08:28	14:36 (8)	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16	08:09	14:26 (8)
	16:06 17	14:53 (8)	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36	15:56 10	14:36 (8)
5	08:28	14:38 (8)	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18	08:10	14:25 (8)
	16:08 15	14:53 (8)	17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34	15:55 13	14:38 (8)
6	08:28	14:38 (8)	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11	14:25 (8)
	16:09 15	14:53 (8)	17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32	15:55 14	14:39 (8)
7	08:27	14:40 (8)	07:49	06:48	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21	08:13	14:25 (8)
	16:10 13	14:53 (8)	17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30	15:54 15	14:40 (8)
8	08:27	14:41 (8)	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14	14:25 (8)
	16:12 11	14:52 (8)	17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28	15:54 16	14:41 (8)
9	08:26	14:43 (8)	07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15	14:24 (8)
	16:13 8	14:51 (8)	17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54 17	14:41 (8)
10	08:25	14:46 (8)	07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27	08:16	14:24 (8)
	16:15 2	14:48 (8)	17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25	15:53 18	14:42 (8)
11	08:25		07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29	08:17	14:25 (8)
	16:16		17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23	15:53 18	14:43 (8)
12	08:24		07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31	08:19	14:25 (8)
	16:18		17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22	15:53 19	14:44 (8)
13	08:23		07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33	08:20	14:25 (8)
	16:19		17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20	15:53 19	14:44 (8)
14	08:22		07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35	08:21	14:25 (8)
	16:21		17:19	18:13	20:10	21:03	21:42	21:36	20:45	19:33	18:21	16:18	15:53 20	14:45 (8)
15	08:21		07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36	08:22	14:26 (8)
	16:22		17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17	15:53 20	14:46 (8)
16	08:21		07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38	08:22	14:26 (8)
	16:24		17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15	15:53 20	14:46 (8)
17	08:20		07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40	08:23	14:26 (8)
	16:26		17:25	18:19	20:15	21:08	21:44	21:32	20:38	19:26	18:14	16:14	15:53 20	14:46 (8)
18	08:19		07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42	08:24	14:26 (8)
	16:27		17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53 21	14:47 (8)
19	08:17		07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44	08:25	14:27 (8)
	16:29		17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11	15:54 21	14:48 (8)
20	08:16		07:22	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46	08:25	14:28 (8)
	16:31		17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10	15:54 21	14:49 (8)
21	08:15		07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47	08:26	14:28 (8)
	16:33		17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08	15:54 20	14:48 (8)
22	08:14		07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49	08:27	14:29 (8)
	16:35		17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:02	16:07	15:55 20	14:49 (8)
23	08:13		07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51	08:27	14:29 (8)
	16:36		17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06	15:55 21	14:50 (8)
24	08:11		07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53	08:28	14:29 (8)
	16:38		17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05	15:56 21	14:50 (8)
25	08:10		07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54	08:28	14:30 (8)
	16:40		17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	15:56 21	14:51 (8)
26	08:08		07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	08:28	14:31 (8)
	16:42		17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	15:57 20	14:51 (8)
27	08:07		07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:28	14:31 (8)
	16:44		17:45	18:37	20:34	21:24	21:46	21:19	20:16	19:01	16:52	16:02	15:58 20	14:51 (8)
28	08:06		07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:29	14:32 (8)
	16:46		17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	15:59 20	14:52 (8)
29	08:04			06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29	14:32 (8)
	16:48			19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00 20	14:52 (8)
30	08:02			06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03	08:29	14:33 (8)
	16:50			19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	16:01 19	14:52 (8)
31	08:01			06:51		04:52		05:25	06:18		07:08		08:29	14:34 (8)
	16:52			19:44		21:29		21:12	20:07		16:44		16:02 19	14:53 (8)
Sonnenscheinstunden	251		274	367	419	492	508	510	459	382	329	260	235	
astr.max.mögl.Beschattung		134												532
Red.Sonnenscheinwahrsch.		0.17												0.14
Reduktion Betriebsdauer		0.91												0.91
Reduktion Windrichtung		0.64												0.64
Gesamte Reduktion		0.10												0.08
Met.wahrsch.Beschattung		13												42

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** L - IO12

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar			Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:29		14:33 (8)	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10	08:04		
	16:03	17	14:50 (8)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58		
2	08:29		14:34 (8)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:06		
	16:04	16	14:50 (8)	16:55	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40	15:57		
3	08:28		14:36 (8)	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07		
	16:05	14	14:50 (8)	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38	15:57		
4	08:28		14:36 (8)	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16	08:09		14:28 (8)
	16:06	14	14:50 (8)	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36	15:56	3	14:31 (8)
5	08:28		14:38 (8)	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18	08:10		14:26 (8)
	16:08	12	14:50 (8)	17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34	15:55	8	14:34 (8)
6	08:28		14:39 (8)	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11		14:25 (8)
	16:09	10	14:49 (8)	17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32	15:55	10	14:35 (8)
7	08:27		14:41 (8)	07:49	06:48	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21	08:13		14:25 (8)
	16:10	8	14:49 (8)	17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30	15:54	12	14:37 (8)
8	08:27		14:43 (8)	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14		14:24 (8)
	16:12	4	14:47 (8)	17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28	15:54	14	14:38 (8)
9	08:26			07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15		14:24 (8)
	16:13			17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54	14	14:38 (8)
10	08:25			07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27	08:16		14:24 (8)
	16:15			17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25	15:53	15	14:39 (8)
11	08:25			07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29	08:17		14:24 (8)
	16:16			17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23	15:53	17	14:41 (8)
12	08:24			07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31	08:19		14:24 (8)
	16:18			17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22	15:53	17	14:41 (8)
13	08:23			07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33	08:20		14:25 (8)
	16:19			17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20	15:53	17	14:42 (8)
14	08:22			07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35	08:21		14:25 (8)
	16:21			17:19	18:13	20:10	21:04	21:42	21:36	20:45	19:33	18:21	16:18	15:53	18	14:43 (8)
15	08:21			07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36	08:22		14:25 (8)
	16:22			17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17	15:53	18	14:43 (8)
16	08:21			07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38	08:22		14:25 (8)
	16:24			17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15	15:53	19	14:44 (8)
17	08:20			07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40	08:23		14:25 (8)
	16:26			17:25	18:19	20:15	21:08	21:44	21:32	20:38	19:26	18:14	16:14	15:53	19	14:44 (8)
18	08:19			07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42	08:24		14:26 (8)
	16:27			17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53	19	14:45 (8)
19	08:17			07:25	06:20	06:06	05:07	04:43	05:06	05:57	06:51	07:45	07:44	08:25		14:26 (8)
	16:29			17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11	15:54	19	14:45 (8)
20	08:16			07:22	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46	08:25		14:27 (8)
	16:31			17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10	15:54	19	14:46 (8)
21	08:15			07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47	08:26		14:27 (8)
	16:33			17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08	15:54	19	14:46 (8)
22	08:14			07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49	08:27		14:28 (8)
	16:35			17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:02	16:07	15:55	19	14:47 (8)
23	08:13			07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51	08:27		14:28 (8)
	16:36			17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06	15:55	19	14:47 (8)
24	08:11			07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53	08:28		14:28 (8)
	16:38			17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05	15:56	19	14:47 (8)
25	08:10			07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54	08:28		14:29 (8)
	16:40			17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	15:56	19	14:48 (8)
26	08:08			07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	08:28		14:30 (8)
	16:42			17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	15:57	19	14:49 (8)
27	08:07			07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:28		14:30 (8)
	16:44			17:45	18:37	20:34	21:24	21:46	21:19	20:16	19:01	16:52	16:02	15:58	19	14:49 (8)
28	08:06			07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:29		14:31 (8)
	16:46			17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	15:59	18	14:49 (8)
29	08:04				06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29		14:31 (8)
	16:48				19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00	18	14:49 (8)
30	08:02				06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03	08:29		14:32 (8)
	16:50				19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	16:01	18	14:50 (8)
31	08:01				06:51		04:52		05:25	06:18		07:08		08:29		14:33 (8)
	16:52				19:44		21:29		21:12	20:07		16:44		16:02	17	14:50 (8)
Sonnenscheinstunden	251			274	367	419	492	508	510	459	382	329	260	235		
astr.max.mögl.Beschattung		95													462	
Red.Sonnenscheinwahrsch.		0.17													0.14	
Reduktion Betriebsdauer		0.91													0.91	
Reduktion Windrichtung		0.64													0.64	
Gesamte Reduktion		0.10													0.08	
Met.wahrsch.Beschattung		10													37	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** M - IO13

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar			Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:29		14:36 (8)	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10	08:04		
	16:03	18	14:54 (8)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58		
2	08:29		14:37 (8)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:06		
	16:04	17	14:54 (8)	16:55	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40	15:57		
3	08:28		14:38 (8)	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07		14:30 (8)
	16:05	17	14:55 (8)	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38	15:57	6	14:36 (8)
4	08:28		14:39 (8)	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16	08:09		14:28 (8)
	16:06	15	14:54 (8)	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36	15:56	9	14:37 (8)
5	08:28		14:40 (8)	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18	08:10		14:28 (8)
	16:08	14	14:54 (8)	17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34	15:55	11	14:39 (8)
6	08:28		14:41 (8)	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11		14:27 (8)
	16:09	13	14:54 (8)	17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32	15:55	13	14:40 (8)
7	08:27		14:43 (8)	07:49	06:48	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21	08:13		14:27 (8)
	16:10	11	14:54 (8)	17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30	15:54	14	14:41 (8)
8	08:27		14:44 (8)	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14		14:27 (8)
	16:12	9	14:53 (8)	17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28	15:54	15	14:42 (8)
9	08:26		14:46 (8)	07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15		14:26 (8)
	16:13	6	14:52 (8)	17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54	17	14:43 (8)
10	08:25			07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27	08:16		14:26 (8)
	16:15			17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25	15:53	17	14:43 (8)
11	08:25			07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29	08:17		14:27 (8)
	16:16			17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23	15:53	18	14:45 (8)
12	08:24			07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31	08:19		14:27 (8)
	16:18			17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22	15:53	18	14:45 (8)
13	08:23			07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33	08:20		14:27 (8)
	16:19			17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20	15:53	19	14:46 (8)
14	08:22			07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35	08:21		14:28 (8)
	16:21			17:19	18:13	20:10	21:03	21:42	21:36	20:45	19:33	18:21	16:18	15:53	18	14:46 (8)
15	08:21			07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36	08:22		14:28 (8)
	16:22			17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17	15:53	19	14:47 (8)
16	08:21			07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38	08:22		14:28 (8)
	16:24			17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15	15:53	20	14:48 (8)
17	08:20			07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40	08:23		14:28 (8)
	16:26			17:25	18:19	20:15	21:08	21:44	21:32	20:38	19:26	18:14	16:14	15:53	19	14:47 (8)
18	08:19			07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42	08:24		14:29 (8)
	16:27			17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53	19	14:48 (8)
19	08:17			07:25	06:20	06:06	05:07	04:43	05:06	05:57	06:51	07:45	07:44	08:25		14:29 (8)
	16:29			17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11	15:54	20	14:49 (8)
20	08:16			07:22	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46	08:25		14:30 (8)
	16:31			17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10	15:54	20	14:50 (8)
21	08:15			07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47	08:26		14:30 (8)
	16:33			17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08	15:54	20	14:50 (8)
22	08:14			07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49	08:27		14:31 (8)
	16:35			17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:02	16:07	15:55	20	14:51 (8)
23	08:13			07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51	08:27		14:31 (8)
	16:36			17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06	15:55	20	14:51 (8)
24	08:11			07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53	08:28		14:31 (8)
	16:38			17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05	15:56	20	14:51 (8)
25	08:10			07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54	08:28		14:32 (8)
	16:40			17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	15:56	20	14:52 (8)
26	08:08			07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	08:28		14:33 (8)
	16:42			17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	15:57	19	14:52 (8)
27	08:07			07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:28		14:33 (8)
	16:44			17:45	18:37	20:34	21:24	21:46	21:19	20:16	19:01	16:52	16:02	15:58	20	14:53 (8)
28	08:06			07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:29		14:34 (8)
	16:46			17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	15:59	19	14:53 (8)
29	08:04				06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29		14:34 (8)
	16:48				19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00	19	14:53 (8)
30	08:02				06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03	08:29		14:35 (8)
	16:50				19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	16:01	19	14:54 (8)
31	08:01				06:51		04:52		05:25	06:18		07:08		08:29		14:36 (8)
	16:52				19:44		21:29		21:12	20:07		16:44		16:02	18	14:54 (8)
Sonnenscheinstunden	251			274	367	419	492	508	510	459	382	329	260	235		
astr.max.mögl.Beschattung		120													506	
Red.Sonnenscheinwahrsch.		0.17													0.14	
Reduktion Betriebsdauer		0.91													0.91	
Reduktion Windrichtung		0.64													0.64	
Gesamte Reduktion		0.10													0.08	
Met.wahrsch.Beschattung		12													40	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** N - IO14

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar			Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:29		14:36 (8)	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10	08:04		
	16:03	16	14:52 (8)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58		
2	08:29		14:37 (8)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:06		
	16:04	15	14:52 (8)	16:55	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40	15:57		
3	08:28		14:38 (8)	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07		
	16:05	13	14:53 (8)	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38	15:57		
4	08:28		14:39 (8)	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16	08:09		14:29 (8)
	16:06	13	14:52 (8)	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36	15:56	5	14:34 (8)
5	08:28		14:40 (8)	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18	08:10		14:28 (8)
	16:08	12	14:52 (8)	17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34	15:55	9	14:37 (8)
6	08:28		14:41 (8)	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11		14:27 (8)
	16:09	11	14:52 (8)	17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32	15:55	11	14:38 (8)
7	08:27		14:43 (8)	07:49	06:48	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21	08:13		14:27 (8)
	16:10	9	14:52 (8)	17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30	15:54	13	14:40 (8)
8	08:27		14:45 (8)	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14		14:27 (8)
	16:12	5	14:50 (8)	17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28	15:54	13	14:40 (8)
9	08:26			07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15		14:26 (8)
	16:13			17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54	15	14:41 (8)
10	08:25			07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27	08:16		14:26 (8)
	16:15			17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25	15:53	15	14:41 (8)
11	08:25			07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29	08:17		14:27 (8)
	16:16			17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23	15:53	16	14:43 (8)
12	08:24			07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31	08:19		14:27 (8)
	16:18			17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22	15:53	17	14:44 (8)
13	08:23			07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33	08:20		14:27 (8)
	16:19			17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20	15:53	17	14:44 (8)
14	08:22			07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35	08:21		14:27 (8)
	16:21			17:19	18:13	20:10	21:03	21:42	21:36	20:45	19:33	18:21	16:18	15:53	18	14:45 (8)
15	08:21			07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36	08:22		14:28 (8)
	16:22			17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17	15:53	18	14:46 (8)
16	08:21			07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38	08:22		14:28 (8)
	16:24			17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15	15:53	18	14:46 (8)
17	08:20			07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40	08:23		14:27 (8)
	16:26			17:25	18:19	20:15	21:08	21:44	21:32	20:38	19:26	18:14	16:14	15:53	19	14:46 (8)
18	08:19			07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42	08:24		14:28 (8)
	16:27			17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53	19	14:47 (8)
19	08:17			07:25	06:20	06:06	05:07	04:43	05:06	05:57	06:51	07:45	07:44	08:25		14:29 (8)
	16:29			17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11	15:54	19	14:48 (8)
20	08:16			07:22	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46	08:25		14:30 (8)
	16:31			17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10	15:54	19	14:49 (8)
21	08:15			07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47	08:26		14:29 (8)
	16:33			17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08	15:54	20	14:49 (8)
22	08:14			07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49	08:27		14:30 (8)
	16:35			17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:02	16:07	15:55	20	14:50 (8)
23	08:13			07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51	08:27		14:31 (8)
	16:36			17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06	15:55	19	14:50 (8)
24	08:11			07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53	08:28		14:31 (8)
	16:38			17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05	15:56	19	14:50 (8)
25	08:10			07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54	08:28		14:32 (8)
	16:40			17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	15:56	19	14:51 (8)
26	08:08			07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	08:28		14:32 (8)
	16:42			17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	15:57	19	14:51 (8)
27	08:07			07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:28		14:33 (8)
	16:44			17:45	18:37	20:34	21:24	21:46	21:19	20:16	19:01	16:52	16:02	15:58	18	14:51 (8)
28	08:06			07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:29		14:33 (8)
	16:46			17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	15:59	19	14:52 (8)
29	08:04				06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29		14:34 (8)
	16:48				19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00	18	14:52 (8)
30	08:02				06:53	05:42	04:53	04:46	05:23	06:16	07:11	07:06	08:03	08:29		14:35 (8)
	16:50				19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	16:01	17	14:52 (8)
31	08:01				06:51		04:52		05:25	06:18		07:08		08:29		14:36 (8)
	16:52				19:44		21:29		21:12	20:07		16:44		16:02	17	14:53 (8)
Sonnenscheinstunden	251			274	367	419	492	508	510	459	382	329	260	235		
astr.max.mögl.Beschattung		96													466	
Red.Sonnenscheinwahrsch.		0.17													0.14	
Reduktion Betriebsdauer		0.91													0.91	
Reduktion Windrichtung		0.64													0.64	
Gesamte Reduktion		0.10													0.08	
Met.wahrsch.Beschattung		10													37	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** O - IO15

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar			Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November			Dezember		
1	08:29		14:40 (E)	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10			08:04		14:31 (E)
	16:03	21	15:01 (E)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42		12	15:58	12	14:43 (E)
2	08:29		14:41 (E)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12			08:06		14:30 (E)
	16:04	21	15:02 (E)	16:55	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40		15	15:57	15	14:45 (E)
3	08:28		14:42 (E)	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14			08:07		14:31 (E)
	16:05	20	15:02 (E)	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38		15	15:57	15	14:46 (E)
4	08:28		14:42 (E)	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16			08:09		14:30 (E)
	16:06	20	15:02 (E)	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36		17	15:56	17	14:47 (E)
5	08:28		14:43 (E)	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18			08:10		14:30 (E)
	16:08	20	15:03 (E)	17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34		18	15:55	18	14:48 (E)
6	08:28		14:44 (E)	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19			08:11		14:30 (E)
	16:09	18	15:02 (E)	17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32		18	15:55	18	14:48 (E)
7	08:27		14:45 (E)	07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21			08:13		14:30 (E)
	16:10	18	15:03 (E)	17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30		20	15:54	20	14:50 (E)
8	08:27		14:46 (E)	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23			08:14		14:30 (E)
	16:12	17	15:03 (E)	17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28		20	15:54	20	14:50 (E)
9	08:26		14:46 (E)	07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25			08:15		14:30 (E)
	16:13	16	15:02 (E)	17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27		20	15:54	20	14:50 (E)
10	08:25		14:47 (E)	07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27			08:16		14:30 (E)
	16:15	15	15:02 (E)	17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25		21	15:53	21	14:51 (E)
11	08:25		14:48 (E)	07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29			08:17		14:31 (E)
	16:18	13	15:01 (E)	17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23		21	15:53	21	14:52 (E)
12	08:24		14:50 (E)	07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31			08:19		14:31 (E)
	16:18	10	15:00 (E)	17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22		22	15:53	22	14:53 (E)
13	08:23		14:52 (E)	07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33			08:20		14:32 (E)
	16:19	7	14:59 (E)	17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20		21	15:51	21	14:53 (E)
14	08:22			07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35			08:21		14:32 (E)
	16:21			17:19	18:13	20:10	21:03	21:42	21:36	20:45	19:33	18:21	16:18		22	15:51	22	14:54 (E)
15	08:21			07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36			08:22		14:32 (E)
	16:22			17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17		22	15:53	22	14:54 (E)
16	08:21			07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38			08:22		14:33 (E)
	16:24			17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15		22	15:53	22	14:55 (E)
17	08:20			07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40			08:23		14:32 (E)
	16:26			17:25	18:19	20:15	21:08	21:44	21:32	20:38	19:26	18:14	16:14		22	15:53	22	14:54 (E)
18	08:19			07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42			08:24		14:33 (E)
	16:27			17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12		22	15:51	22	14:55 (E)
19	08:17			07:25	06:20	06:06	05:07	04:43	05:06	05:57	06:51	07:45	07:44			08:25		14:34 (E)
	16:29			17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11		22	15:54	22	14:56 (E)
20	08:16			07:22	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46			08:25		14:35 (E)
	16:31			17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10		22	15:54	22	14:57 (E)
21	08:15			07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47			08:26		14:35 (E)
	16:33			17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08		22	15:54	22	14:57 (E)
22	08:14			07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49			08:27		14:36 (E)
	16:35			17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:02	16:07		22	15:55	22	14:58 (E)
23	08:13			07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51			08:27		14:36 (E)
	16:36			17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06		22	15:55	22	14:58 (E)
24	08:11			07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53			08:28		14:36 (E)
	16:38			17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05		22	15:56	22	14:59 (E)
25	08:10			07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54			08:28		14:37 (E)
	16:40			17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04		22	15:56	22	14:59 (E)
26	08:08			07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56			08:28		14:37 (E)
	16:42			17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03		22	15:57	22	14:59 (E)
27	08:07			07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58			08:28		14:38 (E)
	16:44			17:45	18:37	20:34	21:24	21:46	21:18	20:16	19:03	16:52	16:02		22	15:58	22	15:00 (E)
28	08:06			07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59			08:29		14:38 (E)
	16:46			17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01			15:59	22	15:00 (E)
29	08:04				06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01		14:33 (E)	08:29		14:39 (E)
	16:48				19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	7	14:40 (E)	16:00	21	15:00 (E)
30	08:02				06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03		14:32 (E)	08:29		14:39 (E)
	16:50				19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	10	14:42 (E)	16:01	22	15:01 (E)
31	08:01				06:51		04:52		05:25	06:18		07:08				08:29		14:40 (E)
	16:52				19:44		21:29		21:12	20:07		16:44				16:01	21	15:01 (E)
Sonnenscheinstunden		251		274	367	419	482	508	530	499	382	329	260			235		
astr.max.mögl.Beschattung			216												17			634
Red.Sonnenscheinwahrsch.			0.17												0.21			0.14
Reduktion Betriebsdauer			0.91												0.91			0.91
Reduktion Windrichtung			0.65												0.65			0.65
Gesamte Reduktion			0.10												0.12			0.09
Mat.wahrsch.Beschattung			22												2			91

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** P - IO16

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar			Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November			Dezember		
1	08:29		14:41 (E)	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10			08:04		14:31 (E)
	16:03	21	15:02 (E)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42			15:58	14	14:45 (E)
2	08:29		14:41 (E)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12			08:06		14:33 (E)
	16:04	22	15:03 (E)	16:55	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40			15:57	16	14:46 (E)
3	08:28		14:42 (E)	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14			08:07		14:31 (E)
	16:05	21	15:03 (E)	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38			15:57	17	14:48 (E)
4	08:28		14:42 (E)	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16			08:09		14:30 (E)
	16:06	21	15:03 (E)	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36			15:56	18	14:48 (E)
5	08:28		14:44 (E)	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18			08:10		14:30 (E)
	16:08	20	15:04 (E)	17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34			15:55	19	14:49 (E)
6	08:28		14:44 (E)	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19			08:11		14:30 (E)
	16:09	20	15:04 (E)	17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32			15:55	20	14:50 (E)
7	08:27		14:45 (E)	07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21			08:13		14:31 (E)
	16:10	19	15:04 (E)	17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30			15:54	20	14:51 (E)
8	08:27		14:46 (E)	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23			08:14		14:31 (E)
	16:12	18	15:04 (E)	17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28			15:54	20	14:51 (E)
9	08:26		14:47 (E)	07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25			08:15		14:31 (E)
	16:13	17	15:04 (E)	17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27			15:54	20	14:51 (E)
10	08:25		14:47 (E)	07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27			08:16		14:31 (E)
	16:15	16	15:03 (E)	17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25			15:53	21	14:52 (E)
11	08:25		14:48 (E)	07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29			08:17		14:32 (E)
	16:18	15	15:03 (E)	17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23			15:53	21	14:53 (E)
12	08:24		14:50 (E)	07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31			08:19		14:32 (E)
	16:18	12	15:02 (E)	17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22			15:53	22	14:54 (E)
13	08:23		14:51 (E)	07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33			08:20		14:32 (E)
	16:19	10	15:01 (E)	17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20			15:51	22	14:54 (E)
14	08:22		14:54 (E)	07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35			08:21		14:32 (E)
	16:21	6	15:00 (E)	17:19	18:13	20:10	21:03	21:42	21:36	20:45	19:33	18:21	16:18			15:53	23	14:55 (E)
15	08:21			07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36			08:22		14:33 (E)
	16:22			17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17			15:53	22	14:55 (E)
16	08:21			07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38			08:22		14:33 (E)
	16:24			17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15			15:53	23	14:56 (E)
17	08:20			07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40			08:23		14:33 (E)
	16:26			17:25	18:19	20:15	21:08	21:44	21:32	20:38	19:26	18:14	16:14			15:53	22	14:55 (E)
18	08:19			07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42			08:24		14:34 (E)
	16:27			17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12			15:51	22	14:56 (E)
19	08:17			07:25	06:20	06:06	05:07	04:43	05:06	05:57	06:51	07:45	07:44			08:25		14:34 (E)
	16:29			17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11			15:54	23	14:57 (E)
20	08:16			07:22	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46			08:25		14:35 (E)
	16:31			17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10			15:54	23	14:58 (E)
21	08:15			07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47			08:26		14:35 (E)
	16:33			17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08			15:54	23	14:58 (E)
22	08:14			07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49			08:27		14:36 (E)
	16:35			17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:02	16:07			15:55	23	14:59 (E)
23	08:13			07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51			08:27		14:36 (E)
	16:36			17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06			15:55	23	14:59 (E)
24	08:11			07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53			08:28		14:36 (E)
	16:38			17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05			15:56	23	14:59 (E)
25	08:10			07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54			08:28		14:38 (E)
	16:40			17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04			15:56	22	15:00 (E)
26	08:08			07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56			08:28		14:38 (E)
	16:42			17:43	18:35	20:33	21:22	21:46	21:20	20:18	19:04	16:54	16:03			15:57	22	15:00 (E)
27	08:07			07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58			08:28		14:38 (E)
	16:44			17:45	18:37	20:34	21:24	21:46	21:18	20:16	19:03	16:52	16:02			15:58	23	15:01 (E)
28	08:06			07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59		14:34 (E)	08:29		14:39 (E)
	16:46			17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	6	14:40 (E)	15:59	22	15:01 (E)
29	08:04				06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01		14:32 (E)	08:29		14:39 (E)
	16:48				19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	10	14:42 (E)	16:00	22	15:01 (E)
30	08:02				06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03		14:32 (E)	08:29		14:40 (E)
	16:50				19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	12	14:44 (E)	16:01	22	15:02 (E)
31	08:01				06:51		04:52		05:25	06:18		07:08				08:29		14:41 (E)
	16:52				19:44		21:29		21:12	20:07		16:44				16:01	21	15:02 (E)
Sonnenscheinstunden		251		274	367	419	482	508	530	499	382	329	260			235		
astr.max.mögl.Beschattung			238											28			654	
Red.Sonnenscheinwahrsch.			0.17											0.21			0.24	
Reduktion Betriebsdauer			0.91											0.91			0.91	
Reduktion Windrichtung			0.65											0.65			0.65	
Gesamte Reduktion			0.10											0.12			0.08	
Mat.wahrsch.Beschattung			24											3			52	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** Q - IO17

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar			Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November			Dezember		
1	08:29		14:41 (E)	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10			08:04		14:31 (E)
	16:03	23	15:04 (E)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42			15:58	16	14:47 (E)
2	08:29		14:42 (E)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12			08:06		14:31 (E)
	16:04	22	15:04 (E)	16:55	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40			15:57	17	14:48 (E)
3	08:28		14:43 (E)	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14			08:07		14:31 (E)
	16:05	22	15:05 (E)	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38			15:57	19	14:50 (E)
4	08:28		14:43 (E)	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16			08:09		14:31 (E)
	16:06	22	15:05 (E)	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36			15:56	19	14:50 (E)
5	08:28		14:44 (E)	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18			08:10		14:31 (E)
	16:08	21	15:05 (E)	17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34			15:55	20	14:51 (E)
6	08:28		14:45 (E)	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19			08:11		14:31 (E)
	16:09	20	15:05 (E)	17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32			15:55	20	14:51 (E)
7	08:27		14:46 (E)	07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21			08:13		14:32 (E)
	16:10	20	15:06 (E)	17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30			15:54	21	14:53 (E)
8	08:27		14:46 (E)	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23			08:14		14:31 (E)
	16:12	20	15:06 (E)	17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28			15:54	22	14:53 (E)
9	08:26		14:47 (E)	07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25			08:15		14:31 (E)
	16:13	19	15:06 (E)	17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27			15:54	22	14:53 (E)
10	08:25		14:48 (E)	07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27			08:16		14:31 (E)
	16:15	17	15:05 (E)	17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25			15:53	22	14:53 (E)
11	08:25		14:49 (E)	07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29			08:17		14:33 (E)
	16:18	16	15:05 (E)	17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23			15:53	22	14:55 (E)
12	08:24		14:50 (E)	07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31			08:19		14:33 (E)
	16:18	15	15:05 (E)	17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22			15:53	22	14:55 (E)
13	08:23		14:51 (E)	07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33			08:20		14:33 (E)
	16:19	13	15:04 (E)	17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20			15:51	23	14:56 (E)
14	08:22		14:53 (E)	07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35			08:21		14:33 (E)
	16:21	10	15:03 (E)	17:19	18:13	20:10	21:03	21:42	21:36	20:45	19:33	18:21	16:18			15:53	23	14:56 (E)
15	08:21		14:55 (E)	07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36			08:22		14:34 (E)
	16:22	7	15:02 (E)	17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17			15:53	23	14:57 (E)
16	08:21			07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38			08:22		14:34 (E)
	16:24			17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15			15:53	23	14:57 (E)
17	08:20			07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40			08:23		14:34 (E)
	16:26			17:25	18:19	20:15	21:08	21:44	21:32	20:38	19:26	18:14	16:14			15:53	23	14:57 (E)
18	08:19			07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42			08:24		14:35 (E)
	16:27			17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12			15:51	22	14:57 (E)
19	08:17			07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44			08:25		14:36 (E)
	16:29			17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11			15:54	22	14:58 (E)
20	08:16			07:22	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46			08:25		14:36 (E)
	16:31			17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10			15:54	23	14:59 (E)
21	08:15			07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47			08:26		14:36 (E)
	16:33			17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08			15:54	23	14:59 (E)
22	08:14			07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49			08:27		14:37 (E)
	16:35			17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:02	16:07			15:55	23	15:00 (E)
23	08:13			07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51			08:27		14:37 (E)
	16:36			17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06			15:55	23	15:00 (E)
24	08:11			07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53			08:28		14:37 (E)
	16:38			17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05			15:56	23	15:00 (E)
25	08:10			07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54			08:28		14:39 (E)
	16:40			17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04			15:56	22	15:01 (E)
26	08:08			07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56			08:28		14:39 (E)
	16:42			17:43	18:35	20:33	21:22	21:46	21:20	20:18	19:04	16:54	16:03			15:57	23	15:02 (E)
27	08:07			07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58			08:28		14:39 (E)
	16:44			17:45	18:37	20:34	21:24	21:46	21:18	20:16	19:03	16:52	16:02	7	14:41 (E)	15:58	23	15:02 (E)
28	08:06			07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59		14:33 (E)	08:29		14:40 (E)
	16:46			17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	10	14:43 (E)	15:59	22	15:02 (E)
29	08:04				06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01		14:32 (E)	08:29		14:40 (E)
	16:48				19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	13	14:45 (E)	16:00	23	15:03 (E)
30	08:02				06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03		14:32 (E)	08:29		14:41 (E)
	16:50				19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	15	14:47 (E)	16:01	22	15:03 (E)
31	08:01				06:51		04:52		05:25	06:18		07:08				08:29		14:41 (E)
	16:52				19:44		21:29		21:12	20:07		16:44				16:01	23	15:04 (E)
Sonnenscheinstunden	251			274	367	419	482	508	530	499	382	329	260			235		
astr.max.mögl.Beschattung		267												45			674	
Red.Sonnenscheinwahrsch.		0.17												0.21			0.14	
Reduktion Betriebsdauer		0.91												0.91			0.91	
Reduktion Windrichtung		0.65												0.65			0.65	
Gesamte Reduktion		0.10												0.12			0.08	
Mat.wahrsch.Beschattung		27												5			54	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** R - IO18

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar			Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November			Dezember		
1	08:29		14:38 (B)	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10			08:04		14:28 (B)
	16:03	22	15:00 (B)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42			15:58	15	14:43 (B)
2	08:29		14:39 (B)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12			08:06		14:28 (B)
	16:04	22	15:01 (B)	16:55	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40			15:57	17	14:45 (B)
3	08:28		14:40 (B)	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14			08:07		14:29 (B)
	16:05	22	15:02 (B)	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38			15:57	17	14:46 (B)
4	08:28		14:40 (B)	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16			08:09		14:28 (B)
	16:06	21	15:01 (B)	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36			15:56	18	14:46 (B)
5	08:28		14:42 (B)	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18			08:10		14:28 (B)
	16:08	20	15:02 (B)	17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34			15:55	20	14:48 (B)
6	08:28		14:42 (B)	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19			08:11		14:28 (B)
	16:09	20	15:02 (B)	17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32			15:55	20	14:48 (B)
7	08:27		14:43 (B)	07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21			08:13		14:29 (B)
	16:10	20	15:03 (B)	17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30			15:54	20	14:49 (B)
8	08:27		14:44 (B)	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23			08:14		14:29 (B)
	16:12	18	15:03 (B)	17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28			15:54	21	14:50 (B)
9	08:26		14:44 (B)	07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25			08:15		14:28 (B)
	16:13	18	15:02 (B)	17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27			15:54	22	14:50 (B)
10	08:25		14:45 (B)	07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27			08:16		14:28 (B)
	16:15	17	15:02 (B)	17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25			15:53	22	14:50 (B)
11	08:25		14:46 (B)	07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29			08:17		14:30 (B)
	16:18	15	15:01 (B)	17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23			15:53	22	14:52 (B)
12	08:24		14:46 (B)	07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31			08:19		14:30 (B)
	16:18	13	15:01 (B)	17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22			15:53	22	14:52 (B)
13	08:23		14:49 (B)	07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33			08:20		14:30 (B)
	16:19	11	15:00 (B)	17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20			15:51	22	14:52 (B)
14	08:22		14:51 (B)	07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35			08:21		14:30 (B)
	16:21	7	14:58 (B)	17:19	18:13	20:10	21:03	21:42	21:36	20:45	19:33	18:21	16:18			15:53	23	14:53 (B)
15	08:21			07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36			08:22		14:31 (B)
	16:22			17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17			15:53	22	14:53 (B)
16	08:21			07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38			08:22		14:31 (B)
	16:24			17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15			15:53	23	14:54 (B)
17	08:20			07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40			08:23		14:31 (B)
	16:26			17:25	18:19	20:15	21:08	21:44	21:32	20:38	19:26	18:14	16:14			15:53	23	14:54 (B)
18	08:19			07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42			08:24		14:32 (B)
	16:27			17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12			15:51	22	14:54 (B)
19	08:17			07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44			08:25		14:32 (B)
	16:29			17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11			15:54	23	14:55 (B)
20	08:16			07:22	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46			08:25		14:33 (B)
	16:31			17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10			15:54	23	14:56 (B)
21	08:15			07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47			08:26		14:33 (B)
	16:33			17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08			15:54	23	14:56 (B)
22	08:14			07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49			08:27		14:34 (B)
	16:35			17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:02	16:07			15:55	23	14:57 (B)
23	08:13			07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51			08:27		14:34 (B)
	16:36			17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06			15:55	23	14:57 (B)
24	08:11			07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53			08:28		14:34 (B)
	16:38			17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05			15:56	23	14:57 (B)
25	08:10			07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54			08:28		14:35 (B)
	16:40			17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04			15:56	23	14:58 (B)
26	08:08			07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56			08:28		14:36 (B)
	16:42			17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03			15:57	23	14:59 (B)
27	08:07			07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58			08:28		14:36 (B)
	16:44			17:45	18:37	20:34	21:24	21:46	21:18	20:16	19:03	16:52	16:02			15:58	23	14:59 (B)
28	08:06			07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59		14:32 (B)	08:29		14:37 (B)
	16:46			17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	6	14:38 (B)	15:59	22	14:59 (B)
29	08:04				06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01		14:30 (B)	08:29		14:37 (B)
	16:48				19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	11	14:41 (B)	16:00	23	15:00 (B)
30	08:02				06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03		14:30 (B)	08:29		14:38 (B)
	16:50				19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	13	14:43 (B)	16:01	22	15:00 (B)
31	08:01				06:51		04:52		05:25	06:18		07:08				08:29		14:38 (B)
	16:52				19:44		21:29		21:12	20:07		16:44				16:01	23	15:01 (B)
Sonnenscheinstunden	251			274	367	419	482	508	530	499	382	329	260			235		
astr.max.mögl.Beschattung		246												30			668	
Red.Sonnenscheinwahrsch.		0.17												0.21			0.24	
Reduktion Betriebsdauer		0.91												0.91			0.91	
Reduktion Windrichtung		0.65												0.65			0.65	
Gesamte Reduktion		0.10												0.12			0.08	
Mat.wahrsch.Beschattung		25												4			53	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** S - IO19

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar			Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November			Dezember		
1	08:29		14:39 (E)	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10			08:04		14:28 (E)
	16:03	22	15:01 (E)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42			15:58	16	14:44 (E)
2	08:29		14:40 (E)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12			08:06		14:28 (E)
	16:04	22	15:02 (E)	16:55	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40			15:57	17	14:45 (E)
3	08:28		14:41 (E)	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14			08:07		14:29 (E)
	16:05	21	15:02 (E)	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38			15:57	18	14:47 (E)
4	08:28		14:41 (E)	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16			08:09		14:28 (E)
	16:06	21	15:02 (E)	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36			15:56	19	14:47 (E)
5	08:28		14:42 (E)	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18			08:10		14:29 (E)
	16:08	21	15:03 (E)	17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34			15:55	19	14:48 (E)
6	08:28		14:42 (E)	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19			08:11		14:28 (E)
	16:09	21	15:03 (E)	17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32			15:55	21	14:49 (E)
7	08:27		14:43 (E)	07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21			08:13		14:29 (E)
	16:10	20	15:03 (E)	17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30			15:54	21	14:50 (E)
8	08:27		14:44 (E)	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23			08:14		14:29 (E)
	16:12	19	15:03 (E)	17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28			15:54	21	14:50 (E)
9	08:26		14:45 (E)	07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25			08:15		14:29 (E)
	16:13	18	15:03 (E)	17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27			15:54	21	14:50 (E)
10	08:25		14:45 (E)	07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27			08:16		14:29 (E)
	16:15	17	15:02 (E)	17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25			15:53	22	14:51 (E)
11	08:25		14:46 (E)	07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29			08:17		14:30 (E)
	16:18	16	15:02 (E)	17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23			15:53	22	14:52 (E)
12	08:24		14:47 (E)	07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31			08:19		14:30 (E)
	16:18	15	15:02 (E)	17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22			15:53	23	14:53 (E)
13	08:23		14:49 (E)	07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33			08:20		14:30 (E)
	16:19	12	15:01 (E)	17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20			15:51	23	14:53 (E)
14	08:22		14:51 (E)	07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35			08:21		14:31 (E)
	16:21	9	15:00 (E)	17:19	18:13	20:10	21:03	21:42	21:36	20:45	19:33	18:21	16:18			15:51	22	14:53 (E)
15	08:21		14:54 (E)	07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36			08:22		14:31 (E)
	16:22	3	14:57 (E)	17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17			15:51	23	14:54 (E)
16	08:21			07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38			08:22		14:32 (E)
	16:24			17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15			15:53	23	14:55 (E)
17	08:20			07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40			08:23		14:31 (E)
	16:26			17:25	18:19	20:15	21:08	21:44	21:32	20:38	19:26	18:14	16:14			15:53	23	14:54 (E)
18	08:19			07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42			08:24		14:32 (E)
	16:27			17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12			15:51	23	14:55 (E)
19	08:17			07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44			08:25		14:33 (E)
	16:29			17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11			15:54	23	14:56 (E)
20	08:16			07:22	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46			08:25		14:34 (E)
	16:31			17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10			15:54	23	14:57 (E)
21	08:15			07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47			08:26		14:33 (E)
	16:33			17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08			15:54	24	14:57 (E)
22	08:14			07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49			08:27		14:34 (E)
	16:35			17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:02	16:07			15:55	24	14:58 (E)
23	08:13			07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51			08:27		14:34 (E)
	16:36			17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06			15:55	24	14:58 (E)
24	08:11			07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53			08:28		14:35 (E)
	16:38			17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05			15:56	23	14:58 (E)
25	08:10			07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54			08:28		14:36 (E)
	16:40			17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04			15:56	23	14:59 (E)
26	08:08			07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56			08:28		14:36 (E)
	16:42			17:43	18:35	20:33	21:22	21:46	21:20	20:18	19:04	16:54	16:03			15:57	23	14:59 (E)
27	08:07			07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58		14:33 (E)	08:28		14:36 (E)
	16:44			17:45	18:37	20:34	21:24	21:46	21:18	20:16	19:01	16:52	16:02	3	14:36 (E)	15:58	23	14:59 (E)
28	08:06			07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59		14:31 (E)	08:29		14:37 (E)
	16:46			17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	9	14:40 (E)	15:59	23	15:00 (E)
29	08:04				06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01		14:30 (E)	08:29		14:37 (E)
	16:48				19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	12	14:42 (E)	16:00	23	15:00 (E)
30	08:02				06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03		14:30 (E)	08:29		14:38 (E)
	16:50				19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	14	14:44 (E)	16:01	23	15:01 (E)
31	08:01				06:51		04:52		05:25	06:18		07:08				08:29		14:39 (E)
	16:52				19:44		21:29		21:12	20:07		16:44				16:01	22	15:01 (E)
Sonnenscheinstunden	251			274	367	419	482	508	530	499	382	329	260			235		
astr.max.mögl.Beschattung		257												38			678	
Red.Sonnenscheinwahrsch.		0.17												0.21			0.14	
Reduktion Betriebsdauer		0.91												0.91			0.91	
Reduktion Windrichtung		0.65												0.65			0.65	
Gesamte Reduktion		0.10												0.12			0.08	
Mat.wahrsch.Beschattung		26												5			54	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** T - IO20

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November		Dezember		
1	08:29		14:42 (E) | 07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10		08:04		14:31 (E)
	16:03	23	15:05 (E) | 16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42		15:58	18	14:49 (E)
2	08:29		14:43 (E) | 07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12		08:06		14:31 (E)
	16:04	22	15:05 (E) | 16:55	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40		15:57	19	14:50 (E)
3	08:28		14:44 (E) | 07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14		08:07		14:31 (E)
	16:05	22	15:06 (E) | 16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38		15:57	20	14:51 (E)
4	08:28		14:44 (E) | 07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16		08:09		14:31 (E)
	16:06	22	15:06 (E) | 16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36		15:56	20	14:51 (E)
5	08:28		14:45 (E) | 07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18		08:10		14:32 (E)
	16:08	22	15:07 (E) | 17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34		15:55	20	14:52 (E)
6	08:28		14:45 (E) | 07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19		08:11		14:31 (E)
	16:09	21	15:06 (E) | 17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32		15:55	22	14:53 (E)
7	08:27		14:46 (E) | 07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21		08:13		14:32 (E)
	16:10	21	15:07 (E) | 17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30		15:54	22	14:54 (E)
8	08:27		14:47 (E) | 07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23		08:14		14:32 (E)
	16:12	20	15:07 (E) | 17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28		15:54	22	14:54 (E)
9	08:26		14:47 (E) | 07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25		08:15		14:32 (E)
	16:13	20	15:07 (E) | 17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27		15:54	22	14:54 (E)
10	08:25		14:48 (E) | 07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27		08:16		14:32 (E)
	16:15	19	15:07 (E) | 17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25		15:53	22	14:54 (E)
11	08:25		14:49 (E) | 07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29		08:17		14:33 (E)
	16:18	18	15:07 (E) | 17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23		15:53	23	14:56 (E)
12	08:24		14:50 (E) | 07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31		08:19		14:33 (E)
	16:18	16	15:06 (E) | 17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22		15:53	23	14:56 (E)
13	08:23		14:51 (E) | 07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33		08:20		14:34 (E)
	16:19	15	15:06 (E) | 17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20		15:51	23	14:57 (E)
14	08:22		14:52 (E) | 07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35		08:21		14:34 (E)
	16:21	13	15:05 (E) | 17:19	18:13	20:10	21:03	21:42	21:36	20:45	19:33	18:21	16:18		15:53	23	14:57 (E)
15	08:21		14:54 (E) | 07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36		08:22		14:35 (E)
	16:22	10	15:04 (E) | 17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17		15:53	23	14:58 (E)
16	08:21		14:57 (E) | 07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38		08:22		14:35 (E)
	16:24	6	15:03 (E) | 17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15		15:53	23	14:58 (E)
17	08:20		07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40		08:23		14:35 (E)
	16:26		17:25	18:19	20:15	21:08	21:44	21:32	20:38	19:26	18:14	16:14		15:53	23	14:58 (E)
18	08:19		07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42		08:24		14:35 (E)
	16:27		17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12		15:51	23	14:58 (E)
19	08:17		07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44		08:25		13:24 (S)
	16:29		17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11		15:54	25	14:59 (E)
20	08:16		07:22	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46		08:25		13:24 (S)
	16:31		17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10		15:54	27	15:00 (E)
21	08:15		07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47		08:26		13:23 (S)
	16:33		17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08		15:54	28	15:00 (E)
22	08:14		07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49		08:27		13:24 (S)
	16:35		17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:02	16:07		15:55	28	15:01 (E)
23	08:13		07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51		08:27		13:25 (S)
	16:36		17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06		15:55	27	15:01 (E)
24	08:11		07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53		08:28		13:25 (S)
	16:38		17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05		15:56	26	15:01 (E)
25	08:10		07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54		08:28		14:39 (E)
	16:40		17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04		15:56	23	15:02 (E)
26	08:08		07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	14:36 (E)	08:28		14:40 (E)
	16:42		17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	6 14:42 (E)	15:57	23	15:03 (E)
27	08:07		07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	14:33 (E)	08:28		14:40 (E)
	16:44		17:45	18:37	20:34	21:24	21:46	21:18	20:16	19:03	16:52	16:02	10 14:43 (E)	15:58	23	15:03 (E)
28	08:06		07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	14:32 (E)	08:29		14:40 (E)
	16:46		17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	13 14:45 (E)	15:59	23	15:03 (E)
29	08:04			06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	14:32 (E)	08:29		14:41 (E)
	16:48			19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	15 14:47 (E)	16:00	23	15:04 (E)
30	08:02			06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03	14:32 (E)	08:29		14:41 (E)
	16:50			19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	16 14:48 (E)	16:01	23	15:04 (E)
31	08:01			06:51		04:52		05:25	06:18		07:08			08:29		14:42 (E)
	16:52			19:44		21:29		21:12	20:07		16:44			16:01	23	15:05 (E)
Sonnenscheinstunden	151		274	367	419	482	508	530	499	382	329	260		235		
astr.max.mögl.Beschattung		290											60		713	
Red.Sonnenscheinwahrsch.		0.17											0.21		0.14	
Reduktion Betriebsdauer		0.91											0.91		0.91	
Reduktion Windrichtung		0.65											0.65		0.64	
Gesamte Reduktion		0.10											0.12		0.08	
Mat.wahrsch.Beschattung		29											7		57	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** U - IO21

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar			Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November			Dezember		
1	08:29		14:40 (E)	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10			08:04		14:29 (E)
	16:03	23	15:03 (E)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42			15:58	18	14:47 (E)
2	08:29		14:41 (E)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12			08:06		14:29 (E)
	16:04	23	15:04 (E)	16:55	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40			15:57	19	14:48 (E)
3	08:28		14:42 (E)	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14			08:07		14:30 (E)
	16:05	23	15:05 (E)	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38			15:57	19	14:49 (E)
4	08:28		14:42 (E)	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16			08:09		14:29 (E)
	16:06	22	15:04 (E)	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36			15:56	21	14:50 (E)
5	08:28		14:43 (E)	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18			08:10		14:30 (E)
	16:08	22	15:05 (E)	17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34			15:55	21	14:51 (E)
6	08:28		14:43 (E)	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19			08:11		14:29 (E)
	16:09	22	15:05 (E)	17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32			15:55	22	14:51 (E)
7	08:27		14:45 (E)	07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21			08:13		14:30 (E)
	16:10	21	15:06 (E)	17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30			15:54	22	14:52 (E)
8	08:27		14:45 (E)	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23			08:14		14:30 (E)
	16:12	21	15:06 (E)	17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28			15:54	22	14:52 (E)
9	08:26		14:46 (E)	07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25			08:15		14:30 (E)
	16:13	19	15:05 (E)	17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27			15:54	23	14:53 (E)
10	08:25		14:46 (E)	07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27			08:16		14:30 (E)
	16:15	19	15:05 (E)	17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25			15:53	23	14:53 (E)
11	08:25		14:47 (E)	07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29			08:17		14:31 (E)
	16:18	18	15:05 (E)	17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23			15:53	23	14:54 (E)
12	08:24		14:48 (E)	07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31			08:19		14:32 (E)
	16:18	17	15:05 (E)	17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22			15:53	23	14:55 (E)
13	08:23		14:49 (E)	07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33			08:20		14:32 (E)
	16:19	15	15:04 (E)	17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20			15:51	23	14:55 (E)
14	08:22		14:51 (E)	07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35			08:21		14:32 (E)
	16:21	13	15:04 (E)	17:19	18:13	20:10	21:03	21:42	21:36	20:45	19:33	18:21	16:18			15:51	24	14:56 (E)
15	08:21		14:52 (E)	07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36			08:22		14:33 (E)
	16:22	11	15:03 (E)	17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17			15:53	23	14:56 (E)
16	08:21		14:55 (E)	07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38			08:22		14:33 (E)
	16:24	6	15:01 (E)	17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15			15:53	24	14:57 (E)
17	08:20			07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40			08:23		14:33 (E)
	16:26			17:25	18:19	20:15	21:08	21:44	21:32	20:38	19:26	18:14	16:14			15:53	23	14:56 (E)
18	08:19			07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42			08:24		13:18 (S)
	16:27			17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12			15:51	26	14:57 (E)
19	08:17			07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44			08:25		13:18 (S)
	16:29			17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11			15:54	29	14:58 (E)
20	08:16			07:22	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46			08:25		13:18 (S)
	16:31			17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10			15:54	30	14:59 (E)
21	08:15			07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47			08:26		13:18 (S)
	16:33			17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08			15:54	30	14:59 (E)
22	08:14			07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49			08:27		13:19 (S)
	16:35			17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:02	16:07			15:55	30	15:00 (E)
23	08:13			07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51			08:27		13:19 (S)
	16:36			17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06			15:55	30	15:00 (E)
24	08:11			07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53			08:28		13:20 (S)
	16:38			17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05			15:56	29	15:00 (E)
25	08:10			07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54			08:28		13:21 (S)
	16:40			17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04			15:56	29	15:01 (E)
26	08:08			07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	14:34 (E)		08:28		14:38 (E)
	16:42			17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	14:40 (E)	6	15:57	23	15:01 (E)
27	08:07			07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	14:42 (E)		08:28		14:38 (E)
	16:44			17:45	18:37	20:34	21:24	21:46	21:18	20:16	19:01	16:52	16:02	14:42 (E)	10	15:58	24	15:02 (E)
28	08:06			07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	14:31 (E)		08:29		14:39 (E)
	16:46			17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	14:44 (E)	13	15:59	23	15:02 (E)
29	08:04				06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	14:30 (E)		08:29		14:39 (E)
	16:48				19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	14:45 (E)	15	16:00	23	15:02 (E)
30	08:02				06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03	14:30 (E)		08:29		14:40 (E)
	16:50				19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	14:47 (E)	17	16:01	23	15:03 (E)
31	08:01				06:51		04:52		05:25	06:18		07:08				08:29		14:40 (E)
	16:52				19:44		21:29		21:12	20:07		16:44				16:01	23	15:03 (E)
Sonnenscheinstunden	251			274	367	419	482	508	530	499	382	329	260			235		
astr.max.mögl.Beschattung		295												61			745	
Red.Sonnenscheinwahrsch.		0.17												0.21			0.14	
Reduktion Betriebsdauer		0.91												0.91			0.91	
Reduktion Windrichtung		0.65												0.65			0.64	
Gesamte Reduktion		0.10												0.12			0.08	
Mat.wahrsch.Beschattung		30												7			59	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** V - IO22

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar			Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November			Dezember		
1	08:29		14:45 (E)	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10			08:04		14:31 (E)
	16:03	23	15:06 (E)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42			15:58	20	14:51 (E)
2	08:29		14:44 (E)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12			08:06		14:32 (E)
	16:04	23	15:07 (E)	16:55	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40			15:57	20	14:52 (E)
3	08:28		14:45 (E)	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14			08:07		14:32 (E)
	16:05	23	15:08 (E)	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38			15:57	21	14:53 (E)
4	08:28		14:45 (E)	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16			08:09		14:32 (E)
	16:06	22	15:07 (E)	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36			15:56	21	14:53 (E)
5	08:28		14:46 (E)	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18			08:10		14:32 (E)
	16:08	22	15:08 (E)	17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34			15:55	22	14:54 (E)
6	08:28		14:46 (E)	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19			08:11		14:32 (E)
	16:09	22	15:08 (E)	17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32			15:55	22	14:54 (E)
7	08:27		14:47 (E)	07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21			08:13		14:33 (E)
	16:10	22	15:09 (E)	17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30			15:54	22	14:55 (E)
8	08:27		14:47 (E)	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23			08:14		14:33 (E)
	16:12	22	15:09 (E)	17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28			15:54	23	14:56 (E)
9	08:26		14:48 (E)	07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25			08:15		14:33 (E)
	16:13	21	15:09 (E)	17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27			15:54	23	14:56 (E)
10	08:25		14:49 (E)	07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27			08:16		14:33 (E)
	16:15	20	15:09 (E)	17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25			15:53	23	14:56 (E)
11	08:25		14:49 (E)	07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29			08:17		14:34 (E)
	16:18	20	15:09 (E)	17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23			15:53	23	14:57 (E)
12	08:24		14:50 (E)	07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31			08:19		14:34 (E)
	16:18	18	15:08 (E)	17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22			15:53	24	14:58 (E)
13	08:23		14:51 (E)	07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33			08:20		14:35 (E)
	16:19	17	15:08 (E)	17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20			15:51	23	14:58 (E)
14	08:22		14:52 (E)	07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35			08:21		13:31 (S)
	16:21	16	15:08 (E)	17:19	18:13	20:10	21:03	21:42	21:36	20:45	19:33	18:21	16:18			15:51	27	14:58 (E)
15	08:21		14:54 (E)	07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36			08:22		13:20 (S)
	16:22	13	15:07 (E)	17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17			15:53	30	14:59 (E)
16	08:21		14:56 (E)	07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38			08:22		13:20 (S)
	16:24	10	15:06 (E)	17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15			15:53	31	14:59 (E)
17	08:20		14:58 (E)	07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40			08:23		13:19 (S)
	16:26	7	15:05 (E)	17:25	18:19	20:15	21:08	21:44	21:32	20:38	19:26	18:14	16:14			15:53	33	14:59 (E)
18	08:19			07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42			08:24		13:19 (S)
	16:27			17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12			15:51	35	15:00 (E)
19	08:17			07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44			08:25		13:19 (S)
	16:29			17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11			15:54	36	15:01 (E)
20	08:16			07:22	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46			08:25		13:20 (S)
	16:31			17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10			15:54	35	15:01 (E)
21	08:15			07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47			08:26		13:20 (S)
	16:33			17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08			15:54	35	15:01 (E)
22	08:14			07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49			08:27		13:21 (S)
	16:35			17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:02	16:07			15:55	35	15:02 (E)
23	08:13			07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51			08:27		13:21 (S)
	16:36			17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06			15:55	35	15:02 (E)
24	08:11			07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53			08:28		13:21 (S)
	16:38			17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05			15:56	36	15:03 (E)
25	08:10			07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54	14:36 (E)		08:28		13:23 (S)
	16:40			17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	14:43 (E)	7	15:56	35	15:04 (E)
26	08:08			07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	14:35 (E)		08:28		13:23 (S)
	16:42			17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	14:45 (E)	10	15:57	34	15:04 (E)
27	08:07			07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	14:33 (E)		08:28		13:24 (S)
	16:44			17:45	18:37	20:34	21:24	21:46	21:18	20:16	19:01	16:52	16:02	14:46 (E)	13	15:58	33	15:04 (E)
28	08:06			07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	14:32 (E)		08:29		13:25 (S)
	16:46			17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	14:48 (E)	16	15:59	32	15:05 (E)
29	08:04				06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	14:32 (E)		08:29		13:27 (S)
	16:48				19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	14:49 (E)	17	16:00	29	15:05 (E)
30	08:02				06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03	14:32 (E)		08:29		14:42 (E)
	16:50				19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	14:50 (E)	18	16:01	24	15:06 (E)
31	08:01				06:51		04:52		05:25	06:18		07:08				08:29		14:43 (E)
	16:52				19:44		21:29		21:12	20:07		16:44				16:01	23	15:06 (E)
Sonnenscheinstunden	251			274	367	419	482	508	530	499	382	329	260			235		
astr.max.mögl.Beschattung		321												91			885	
Red.Sonnenscheinwahrsch.		0.17												0.21			0.14	
Reduktion Betriebsdauer		0.91												0.91			0.91	
Reduktion Windrichtung		0.65												0.65			0.64	
Gesamte Reduktion		0.10												0.12			0.08	
Mat.wahrsch.Beschattung		32												10			68	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** W - IO23

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar			Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November			Dezember		
1	08:28		14:44 (B)	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10			08:04		14:32 (B)
	16:03	23	15:07 (B)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42			15:58	20	14:52 (B)
2	08:29		14:45 (B)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12			08:06		14:32 (B)
	16:04	23	15:08 (B)	16:55	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40			15:57	21	14:53 (B)
3	08:28		14:45 (B)	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14			08:07		14:33 (B)
	16:05	24	15:09 (B)	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38			15:57	21	14:54 (B)
4	08:28		14:45 (B)	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16			08:08		14:32 (B)
	16:06	24	15:09 (B)	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36			15:56	22	14:54 (B)
5	08:28		14:46 (B)	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18			08:10		14:33 (B)
	16:08	23	15:09 (B)	17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34			15:55	22	14:55 (B)
6	08:28		14:47 (B)	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19			08:11		14:33 (B)
	16:09	22	15:09 (B)	17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32			15:55	22	14:55 (B)
7	08:27		14:48 (B)	07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21			08:13		14:34 (B)
	16:10	22	15:10 (B)	17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30			15:54	23	14:57 (B)
8	08:27		14:48 (B)	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23			08:14		14:34 (B)
	16:12	22	15:10 (B)	17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28			15:54	23	14:57 (B)
9	08:26		14:49 (B)	07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25			08:15		14:34 (B)
	16:13	21	15:10 (B)	17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27			15:54	23	14:57 (B)
10	08:25		14:49 (B)	07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27			08:16		14:34 (B)
	16:15	21	15:10 (B)	17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25			15:53	23	14:57 (B)
11	08:25		14:50 (B)	07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29			08:17		14:35 (B)
	16:18	20	15:10 (B)	17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23			15:53	23	14:58 (B)
12	08:24		14:50 (B)	07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31			08:19		13:20 (9)
	16:18	20	15:10 (B)	17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22			15:53	26	14:59 (B)
13	08:23		14:51 (B)	07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33			08:20		13:19 (9)
	16:19	19	15:10 (B)	17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20			15:53	31	14:59 (B)
14	08:22		14:52 (B)	07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35			08:21		13:18 (9)
	16:21	17	15:09 (B)	17:19	18:13	20:10	21:03	21:42	21:36	20:45	19:33	18:21	16:18			15:53	34	14:59 (B)
15	08:21		14:54 (B)	07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36			08:22		13:18 (9)
	16:22	18	15:09 (B)	17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17			15:53	36	15:00 (B)
16	08:21		14:55 (B)	07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38			08:22		13:18 (9)
	16:24	14	15:09 (B)	17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15			15:53	37	15:01 (B)
17	08:20		14:57 (B)	07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40			08:23		13:17 (9)
	16:26	11	15:08 (B)	17:25	18:19	20:15	21:08	21:44	21:32	20:38	19:26	18:14	16:14			15:53	37	15:00 (B)
18	08:19		15:00 (B)	07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42			08:24		13:17 (9)
	16:27	6	15:06 (B)	17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12			15:53	39	15:01 (B)
19	08:17			07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44			08:25		13:18 (9)
	16:29			17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11			15:54	39	15:02 (B)
20	08:16			07:22	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46			08:25		13:19 (9)
	16:31			17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10			15:54	38	15:02 (B)
21	08:15			07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47			08:26		13:19 (9)
	16:33			17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08			15:54	38	15:02 (B)
22	08:14			07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49			08:27		13:20 (9)
	16:35			17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:02	16:07			15:55	38	15:03 (B)
23	08:13			07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51			08:27		13:20 (9)
	16:36			17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06			15:55	38	15:03 (B)
24	08:11			07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53		14:37 (B)	08:28		13:20 (9)
	16:38			17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05	6	14:43 (B)	15:56	39	15:04 (B)
25	08:10			07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54		14:35 (B)	08:28		13:21 (9)
	16:40			17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	11	14:46 (B)	15:56	39	15:05 (B)
26	08:08			07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56		14:34 (B)	08:28		13:22 (9)
	16:42			17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	14	14:48 (B)	15:57	37	15:05 (B)
27	08:07			07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58		14:33 (B)	08:28		13:23 (9)
	16:44			17:45	18:37	20:34	21:24	21:46	21:18	20:16	19:01	16:52	16:02	15	14:48 (B)	15:58	36	15:05 (B)
28	08:06			07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59		14:33 (B)	08:29		13:23 (9)
	16:46			17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	16	14:49 (B)	15:59	37	15:06 (B)
29	08:04				06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01		14:32 (B)	08:29		13:25 (9)
	16:48				19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	18	14:51 (B)	16:00	34	15:06 (B)
30	08:02				06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03		14:33 (B)	08:29		13:26 (9)
	16:50				19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	18	14:52 (B)	16:01	33	15:07 (B)
31	08:01				06:51		04:52		05:25	06:18		07:08				08:29		13:28 (9)
	16:52				19:44		21:29		21:12	20:07		16:44				16:02	30	15:07 (B)
Sonnenscheinstunden	251			274	367	419	482	508	530	499	382	329	260			235		
astr.max.mögl.Beschattung		347												100			982	
Red.Sonnenscheinwahrsch.		0.17												0.21			0.14	
Reduktion Betriebsdauer		0.91												0.91			0.91	
Reduktion Windrichtung		0.65												0.65			0.64	
Gesamte Reduktion		0.10												0.12			0.09	
Mat.wahrsch.Beschattung		35												12			76	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** X - IO24

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar			Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November			Dezember		
1	08:29		13:17 (B)	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10			08:04		14:30 (B)
	16:03	41	15:08 (B)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42			15:58	23	14:53 (B)
2	08:29		13:18 (B)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12			08:06		14:31 (B)
	16:04	39	15:08 (B)	16:56	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40			15:57	23	14:54 (B)
3	08:28		13:20 (B)	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14			08:07		14:31 (B)
	16:05	37	15:09 (B)	16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38			15:57	24	14:55 (B)
4	08:28		13:21 (B)	07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16			08:09		14:31 (B)
	16:06	35	15:09 (B)	16:59	17:54	19:52	20:46	21:34	21:43	21:05	19:57	18:44	16:36			15:56	24	14:55 (B)
5	08:28		13:24 (B)	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18			08:10		14:32 (B)
	16:08	31	15:10 (B)	17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34			15:55	24	14:56 (B)
6	08:28		14:46 (B)	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19			08:11		14:32 (B)
	16:09	24	15:10 (B)	17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:38	16:32			15:55	24	14:56 (B)
7	08:27		14:47 (B)	07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21			08:13		13:12 (9)
	16:10	24	15:11 (B)	17:05	18:00	19:57	20:51	21:37	21:42	20:59	19:50	18:37	16:30			15:54	29	14:57 (B)
8	08:27		14:47 (B)	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23			08:14		13:09 (9)
	16:12	24	15:11 (B)	17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28			15:54	34	14:57 (B)
9	08:26		14:47 (B)	07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25			08:15		13:08 (9)
	16:13	24	15:11 (B)	17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27			15:54	37	14:57 (B)
10	08:25		14:48 (B)	07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27			08:16		13:07 (9)
	16:15	23	15:11 (B)	17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25			15:53	40	14:58 (B)
11	08:25		14:48 (B)	07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29			08:17		13:08 (9)
	16:18	23	15:11 (B)	17:13	18:08	20:04	20:58	21:40	21:39	20:51	19:40	18:28	16:23			15:53	41	14:59 (B)
12	08:24		14:49 (B)	07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31			08:19		13:07 (9)
	16:18	22	15:11 (B)	17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22			15:53	43	14:59 (B)
13	08:23		14:50 (B)	07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33			08:20		13:07 (9)
	16:19	21	15:11 (B)	17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20			15:53	43	14:59 (B)
14	08:22		14:51 (B)	07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35			08:21		13:07 (9)
	16:21	20	15:11 (B)	17:19	18:13	20:10	21:03	21:42	21:36	20:45	19:33	18:21	16:18			15:53	45	15:00 (B)
15	08:21		14:52 (B)	07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36			08:22		13:07 (9)
	16:22	19	15:11 (B)	17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17			15:53	45	15:00 (B)
16	08:21		14:53 (B)	07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38			08:22		13:08 (9)
	16:24	18	15:11 (B)	17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15			15:53	46	15:01 (B)
17	08:20		14:54 (B)	07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40			08:23		13:07 (9)
	16:26	16	15:10 (B)	17:25	18:19	20:15	21:08	21:44	21:32	20:38	19:26	18:14	16:14			15:53	45	15:00 (B)
18	08:19		14:56 (B)	07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42			08:24		13:07 (9)
	16:27	14	15:10 (B)	17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12			15:53	46	15:01 (B)
19	08:17		14:57 (B)	07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44			08:25		13:08 (9)
	16:29	11	15:08 (B)	17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11			15:54	47	15:02 (B)
20	08:16		15:01 (B)	07:22	06:17	06:03	05:06	04:43	05:08	05:59	06:53	07:47	07:46			08:25		13:09 (9)
	16:31	4	15:05 (B)	17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10			15:54	47	15:03 (B)
21	08:15			07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47			08:26		13:09 (9)
	16:33			17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08			15:54	47	15:03 (B)
22	08:14			07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49			08:27		13:10 (9)
	16:35			17:35	18:28	20:25	21:16	21:45	21:26	20:27	19:13	18:02	16:07	4	14:41 (B)	15:55	47	15:04 (B)
23	08:13			07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51		14:34 (B)	08:27		13:10 (9)
	16:36			17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06	11	14:45 (B)	15:55	47	15:04 (B)
24	08:11			07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53		14:33 (B)	08:28		13:10 (9)
	16:38			17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:08	17:58	16:05	14	14:47 (B)	15:56	47	15:04 (B)
25	08:10			07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54		14:32 (B)	08:28		13:11 (9)
	16:40			17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	16	14:48 (B)	15:56	46	15:05 (B)
26	08:08			07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56		14:32 (B)	08:28		13:12 (9)
	16:42			17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	18	14:50 (B)	15:57	45	15:05 (B)
27	08:07			07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58		14:31 (B)	08:28		13:12 (9)
	16:44			17:45	18:37	20:34	21:24	21:46	21:18	20:16	19:01	16:52	16:02	19	14:50 (B)	15:58	46	15:06 (B)
28	08:06			07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59		14:31 (B)	08:29		13:13 (9)
	16:46			17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	20	14:51 (B)	15:59	45	15:06 (B)
29	08:04				06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01		14:31 (B)	08:29		13:14 (9)
	16:48				19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	21	14:52 (B)	16:00	45	15:07 (B)
30	08:02				06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03		14:31 (B)	08:29		13:15 (9)
	16:50				19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	22	14:53 (B)	16:01	43	15:07 (B)
31	08:01				06:51		04:52		05:25	06:18		07:08				08:29		13:16 (9)
	16:52				19:44		21:29		21:12	20:07		16:44				16:02	43	15:08 (B)
Sonnenscheinstunden	251			274	367	419	482	508	530	499	382	329	260			235		
astr.max.mögl.Beschattung		470												145			1231	
Red.Sonnenscheinwahrsch.		0.17												0.21			0.14	
Reduktion Betriebsdauer		0.91												0.91			0.91	
Reduktion Windrichtung		0.64												0.65			0.63	
Gesamte Reduktion		0.10												0.12			0.08	
Mat.wahrsch.Beschattung		47												18			96	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** Y - IO25

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar			Februar			März			April			Mai			Juni		
1	08:29		07:59			07:02			16:39 (2)	06:48			18:23 (6)	05:40		19:26 (11)	04:51	
	16:03		16:54			17:49	26		17:05 (2)	19:46	40		19:17 (5)	20:41	30	19:56 (11)	21:30	19
2	08:29		07:57			07:00			16:38 (2)	06:46			18:24 (6)	05:38		19:25 (11)	04:50	
	16:04		16:55			17:50	26		17:04 (2)	19:48	42		19:19 (5)	20:42	31	19:56 (11)	21:31	19
3	08:28		07:56			06:58			16:39 (2)	06:43			18:26 (6)	05:36		19:25 (11)	04:49	
	16:05		16:57			17:52	25		17:04 (2)	19:50	41		19:20 (5)	20:44	31	19:56 (11)	21:32	17
4	08:28		07:54			06:55			16:39 (2)	06:41			18:26 (6)	05:34		19:24 (11)	04:48	
	16:06		16:59			17:54	26		17:27 (3)	19:52	41		19:20 (5)	20:46	32	19:56 (11)	21:33	16
5	08:28		07:52			06:53			16:39 (2)	06:38			18:28 (6)	05:32		19:25 (11)	04:48	
	16:08		17:01			17:56	33		17:29 (3)	19:53	38		19:21 (5)	20:48	32	19:57 (11)	21:34	16
6	08:27		07:50			06:51			16:40 (2)	06:36			18:32 (6)	05:30		19:25 (11)	04:47	
	16:09		17:03			17:58	35		17:32 (3)	19:55	30		19:21 (5)	20:50	32	19:57 (11)	21:35	15
7	08:27		07:49			06:48			16:41 (2)	06:34			18:58 (5)	05:28		19:24 (11)	04:46	
	16:10		17:05			18:00	35		17:33 (3)	19:57	23		19:21 (5)	20:51	32	19:56 (11)	21:36	13
8	08:26		07:47			06:46			16:43 (2)	06:31			18:58 (5)	05:26		19:24 (11)	04:46	
	16:12		17:07			18:02	33		17:34 (3)	19:59	23		19:21 (5)	20:53	32	19:56 (11)	21:37	12
9	08:26		07:45			06:44			16:46 (2)	06:29			18:58 (5)	05:24		19:25 (11)	04:45	
	16:13		17:09			18:04	29		17:35 (3)	20:01	22		19:20 (5)	20:55	31	19:56 (11)	21:38	11
10	08:25		07:43			06:41			17:15 (3)	06:27			18:58 (5)	05:22		19:25 (11)	04:45	
	16:15		17:11			18:06	19		17:34 (3)	20:03	21		19:19 (5)	20:57	31	19:56 (11)	21:39	10
11	08:25		07:41			06:39			17:15 (3)	06:24			18:58 (5)	05:20		19:25 (11)	04:44	
	16:16		17:13			18:07	19		17:34 (3)	20:04	20		19:18 (5)	20:58	30	19:55 (11)	21:40	8
12	08:24		07:39			06:37			17:15 (3)	06:22			18:59 (5)	05:19		19:26 (11)	04:44	
	16:18		17:15			18:09	18		17:33 (3)	20:06	18		19:17 (5)	21:00	35	20:27 (9)	21:41	7
13	08:23		07:37			06:34			17:16 (3)	06:20			19:00 (5)	05:17		19:26 (11)	04:43	
	16:19		17:17			18:11	16		17:32 (3)	20:08	15		19:15 (5)	21:02	39	20:29 (9)	21:41	8
14	08:22		07:35			06:32			17:16 (3)	06:17			19:02 (5)	05:15		19:26 (11)	04:43	
	16:21		17:19			18:13	14		17:30 (3)	20:10	11		19:13 (5)	21:03	41	20:30 (9)	21:42	7
15	08:21		07:33		16:43 (1)	06:29			17:18 (3)	06:15				05:14		19:28 (11)	04:43	
	16:22		17:21	9	16:52 (1)	18:15	11		17:29 (3)	20:12				21:05	42	20:32 (9)	21:43	8
16	08:20		07:31		16:41 (1)	06:27			17:21 (3)	06:13			19:37 (7)	05:12		19:28 (11)	04:43	
	16:24		17:23	13	16:54 (1)	18:17	3		17:24 (3)	20:13	9		19:46 (7)	21:07	42	20:32 (9)	21:43	9
17	08:19		07:29		16:40 (1)	06:25				06:10			19:34 (7)	05:10		19:29 (11)	04:43	
	16:26		17:25	16	16:56 (1)	18:19				20:15	13		19:47 (7)	21:08	41	20:33 (9)	21:44	10
18	08:18		07:27		16:39 (1)	06:22				06:08			19:33 (7)	05:09		19:31 (11)	04:43	
	16:27		17:27	18	16:57 (1)	18:20				20:17	16		19:49 (7)	21:10	40	20:34 (9)	21:44	11
19	08:17		07:25		16:39 (1)	06:20			17:36 (6)	06:06			19:32 (7)	05:07		19:32 (11)	04:43	
	16:29		17:29	19	16:58 (1)	18:22	10		17:46 (6)	20:19	18		19:50 (7)	21:11	38	20:34 (9)	21:44	12
20	08:16		07:22		16:38 (1)	06:17			17:33 (6)	06:03			19:31 (7)	05:06		19:34 (11)	04:43	
	16:31		17:31	20	16:58 (1)	18:24	16		17:49 (6)	20:21	19		19:50 (7)	21:13	34	20:34 (9)	21:45	12
21	08:15		07:20		16:38 (1)	06:15			17:30 (6)	06:01			19:31 (7)	05:04		19:37 (11)	04:43	
	16:33		17:33	20	16:58 (1)	18:26	20		17:50 (6)	20:23	20		19:51 (7)	21:15	30	20:35 (9)	21:45	12
22	08:14		07:18		16:38 (1)	06:12			17:29 (6)	05:59			19:30 (7)	05:03		20:12 (9)	04:43	
	16:35		17:35	23	17:01 (2)	18:28	23		17:52 (6)	20:24	20		19:50 (7)	21:16	22	20:34 (9)	21:45	12
23	08:12		07:16		16:39 (1)	06:10			17:27 (6)	05:57			19:30 (7)	05:01		20:12 (9)	04:43	
	16:36		17:37	24	17:03 (2)	18:30	25		17:52 (6)	20:26	20		19:50 (7)	21:18	23	20:35 (9)	21:45	12
24	08:11		07:14		16:38 (1)	06:08			17:26 (6)	05:55			19:30 (7)	05:00		20:13 (9)	04:44	
	16:38		17:39	25	17:03 (2)	18:32	27		17:53 (6)	20:28	19		19:49 (7)	21:19	22	20:35 (9)	21:45	12
25	08:10		07:11		16:39 (1)	06:05			17:25 (6)	05:52			19:30 (7)	04:59		20:13 (9)	04:44	
	16:40		17:41	25	17:04 (2)	18:33	28		17:53 (6)	20:30	20		19:50 (11)	21:21	22	20:35 (9)	21:46	11
26	08:08		07:09		16:40 (2)	06:03			17:24 (6)	05:50			19:31 (7)	04:58		20:13 (9)	04:44	
	16:42		17:43	25	17:05 (2)	18:35	29		17:53 (6)	20:32	21		19:52 (11)	21:22	22	20:35 (9)	21:46	10
27	08:07		07:07		16:39 (2)	06:00			17:24 (6)	05:48			19:30 (11)	04:56		20:13 (9)	04:45	
	16:44		17:45	26	17:05 (2)	18:37	30		17:54 (6)	20:33	23		19:53 (11)	21:23	22	20:35 (9)	21:45	9
28	08:05		07:05		16:39 (2)	05:58			17:23 (6)	05:46			19:29 (11)	04:55		20:14 (9)	04:45	
	16:46		17:47	26	17:05 (2)	18:39	30		17:53 (6)	20:35	25		19:54 (11)	21:25	21	20:35 (9)	21:45	8
29	08:04					06:55			18:24 (6)	05:44			19:28 (11)	04:54		20:14 (9)	04:46	
	16:48					19:41	29		18:53 (6)	20:37	27		19:55 (11)	21:26	21	20:35 (9)	21:45	9
30	08:02					06:53			18:23 (6)	05:42			19:27 (11)	04:53		20:14 (9)	04:47	
	16:50					19:42	29		18:52 (6)	20:39	29		19:56 (11)	21:27	21	20:35 (9)	21:45	5
31	08:01					06:51			18:24 (6)					04:52		20:15 (9)		
	16:52					19:44	33		19:15 (5)					21:29	19	20:34 (9)		
Sonnenscheinstunden		252		274			367			419				492			508	
astr.max.mögl.Beschattung				289			697			684				941			340	
Red.Sonnenscheinwahrsch.				0.24			0.31			0.41				0.51			0.45	
Reduktion Betriebsdauer				0.91			0.91			0.91				0.91			0.91	
Reduktion Windrichtung				0.69			0.69			0.68				0.66			0.64	
Gesamte Reduktion				0.15			0.20			0.26				0.31			0.27	
Met.wahrsch.Beschattung				43			138			175				291			91	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** Y - IO25

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober		November	Dezember
1 | 04:47		20:27 (9) | 05:26		19:36 (11) | 06:20		18:57 (5) | 07:12		17:54 (3) | 07:10	08:04
| 21:45	8	20:35 (9) | 21:10	30	20:06 (11) | 20:04	20	19:17 (5) | 18:51	17	18:11 (3) | 16:42	15:58
2 | 04:48		20:27 (9) | 05:28		19:35 (11) | 06:22		18:56 (5) | 07:14		17:53 (3) | 07:12	08:05
| 21:44	9	20:36 (9) | 21:08	31	20:06 (11) | 20:02	22	19:18 (5) | 18:49	19	18:12 (3) | 16:40	15:57
3 | 04:49		20:26 (9) | 05:30		19:35 (11) | 06:23		18:55 (5) | 07:16		17:53 (3) | 07:14	08:07
| 21:44	10	20:36 (9) | 21:06	31	20:06 (11) | 20:00	22	19:17 (5) | 18:47	19	18:12 (3) | 16:38	15:57
4 | 04:50		20:25 (9) | 05:31		19:34 (11) | 06:25		18:55 (5) | 07:18		17:26 (2) | 07:15	08:08
| 21:43	12	20:37 (9) | 21:05	32	20:06 (11) | 19:57	23	19:18 (5) | 18:44	23	18:12 (3) | 16:36	15:56
5 | 04:50		20:25 (9) | 05:33		19:34 (11) | 06:27		18:55 (5) | 07:19		17:21 (2) | 07:17	08:10
| 21:43	13	20:38 (9) | 21:03	33	20:07 (11) | 19:55	23	19:18 (5) | 18:42	31	18:11 (3) | 16:34	15:55
6 | 04:51		20:25 (9) | 05:35		19:34 (11) | 06:29		18:28 (6) | 07:21		17:19 (2) | 07:19	08:11
| 21:42	14	20:39 (9) | 21:01	32	20:06 (11) | 19:52	29	19:16 (5) | 18:39	34	18:10 (3) | 16:32	15:55
7 | 04:52		20:25 (9) | 05:36		19:34 (11) | 06:30		18:24 (6) | 07:23		17:16 (2) | 07:21	08:12
| 21:42	15	20:40 (9) | 20:59	32	20:06 (11) | 19:50	37	19:16 (5) | 18:37	35	18:08 (3) | 16:30	15:54
8 | 04:53		20:24 (9) | 05:38		19:34 (11) | 06:32		18:22 (6) | 07:25		17:15 (2) | 07:23	08:14
| 21:41	17	20:41 (9) | 20:57	32	20:06 (11) | 19:48	39	19:15 (5) | 18:35	33	18:05 (3) | 16:28	15:54
9 | 04:54		20:24 (9) | 05:40		19:34 (11) | 06:34		18:19 (6) | 07:27		17:14 (2) | 07:25	08:15
| 21:40	17	20:41 (9) | 20:55	32	20:06 (11) | 19:45	42	19:14 (5) | 18:32	30	18:03 (3) | 16:27	15:54
10 | 04:55		20:24 (9) | 05:42		19:34 (11) | 06:36		18:18 (6) | 07:28		17:13 (2) | 07:27	08:16
| 21:39	18	20:42 (9) | 20:53	32	20:06 (11) | 19:43	41	19:12 (5) | 18:30	25	17:38 (2) | 16:25	15:53
11 | 04:56		20:24 (9) | 05:43		19:34 (11) | 06:37		18:17 (6) | 07:30		17:12 (2) | 07:29	08:17
| 21:38	18	20:42 (9) | 20:51	30	20:04 (11) | 19:40	40	19:11 (5) | 18:27	27	17:39 (2) | 16:23	15:53
12 | 04:58		20:23 (9) | 05:45		19:35 (11) | 06:39		18:15 (6) | 07:32		17:12 (2) | 07:31	08:18
| 21:38	20	20:43 (9) | 20:49	29	20:04 (11) | 19:38	36	19:07 (5) | 18:25	27	17:39 (2) | 16:22	15:53
13 | 04:59		20:23 (9) | 05:47		19:35 (11) | 06:41		18:14 (6) | 07:34		17:12 (2) | 07:33	08:19
| 21:37	20	20:43 (9) | 20:47	29	20:04 (11) | 19:35	29	18:43 (6) | 18:23	26	17:38 (2) | 16:20	15:53
14 | 05:00		20:23 (9) | 05:48		19:35 (11) | 06:42		18:14 (6) | 07:36		17:12 (2) | 07:34	08:20
| 21:36	20	20:43 (9) | 20:45	27	20:02 (11) | 19:33	29	18:43 (6) | 18:20	26	17:38 (2) | 16:18	15:53
15 | 05:01		20:22 (9) | 05:50		19:36 (11) | 06:44		18:14 (6) | 07:38		17:12 (2) | 07:36	08:21
| 21:35	22	20:44 (9) | 20:43	26	20:02 (11) | 19:30	29	18:43 (6) | 18:18	26	17:38 (2) | 16:17	15:53
16 | 05:02		20:22 (9) | 05:52		19:38 (11) | 06:46		18:13 (6) | 07:39		17:12 (2) | 07:38	08:22
| 21:33	22	20:44 (9) | 20:41	23	20:01 (11) | 19:28	29	18:42 (6) | 18:16	25	17:37 (2) | 16:15	15:53
17 | 05:04		20:23 (9) | 05:54		19:37 (7) | 06:48		18:13 (6) | 07:41		17:11 (1) | 07:40	08:23
| 21:32	22	20:45 (9) | 20:38	21	19:58 (11) | 19:26	29	18:42 (6) | 18:14	25	17:36 (2) | 16:14	15:53
18 | 05:05		20:22 (9) | 05:55		19:37 (7) | 06:49		18:13 (6) | 07:43		17:09 (1) | 07:42	08:24
| 21:31	23	20:45 (9) | 20:36	19	19:56 (11) | 19:23	28	18:41 (6) | 18:11	25	17:34 (2) | 16:12	15:53
19 | 05:07		20:22 (9) | 05:57		19:35 (7) | 06:51		18:12 (6) | 07:45		17:09 (1) | 07:44	08:25
| 21:30	23	20:45 (9) | 20:34	20	19:55 (7) | 19:21	28	18:40 (6) | 18:09	23	17:32 (2) | 16:11	15:54
20 | 05:08		20:22 (9) | 05:59		19:35 (7) | 06:53		18:13 (6) | 07:47		17:08 (1) | 07:45	08:25
| 21:29	22	20:44 (9) | 20:32	20	19:55 (7) | 19:18	26	18:39 (6) | 18:07	22	17:30 (2) | 16:10	15:54
21 | 05:09		20:23 (9) | 06:01		19:35 (7) | 06:55		18:14 (6) | 07:49		17:08 (1) | 07:47	08:26
| 21:27	22	20:45 (9) | 20:30	20	19:55 (7) | 19:16	24	18:38 (6) | 18:05	20	17:28 (1) | 16:08	15:54
22 | 05:11		19:49 (11) | 06:02		19:35 (7) | 06:56		18:15 (6) | 07:51		17:08 (1) | 07:49	08:26
| 21:26	26	20:45 (9) | 20:27	19	19:54 (7) | 19:13	21	18:36 (6) | 18:02	20	17:28 (1) | 16:07	15:55
23 | 05:12		19:45 (11) | 06:04		19:35 (7) | 06:58		18:16 (6) | 07:53		17:08 (1) | 07:51	08:27
| 21:24	33	20:44 (9) | 20:25	19	19:54 (7) | 19:11	17	18:33 (6) | 18:00	19	17:27 (1) | 16:06	15:55
24 | 05:14		19:43 (11) | 06:06		19:36 (7) | 07:00		18:18 (6) | 07:54		17:09 (1) | 07:53	08:27
| 21:23	38	20:45 (9) | 20:23	17	19:53 (7) | 19:08	13	18:31 (6) | 17:58	17	17:26 (1) | 16:05	15:56
25 | 05:15		19:42 (11) | 06:08		19:36 (7) | 07:02		| 06:56		16:10 (1) | 07:54	08:28
| 21:21	39	20:44 (9) | 20:21	16	19:52 (7) | 19:06		| 16:56	15	16:25 (1) | 16:04	15:57
26 | 05:17		19:41 (11) | 06:09		19:37 (7) | 07:03		| 06:58		16:12 (1) | 07:56	08:28
| 21:20	40	20:44 (9) | 20:18	13	19:50 (7) | 19:04		| 16:54	12	16:24 (1) | 16:03	15:57
27 | 05:18		19:39 (11) | 06:11		19:39 (7) | 07:05		| 07:00		16:14 (1) | 07:58	08:28
| 21:18	42	20:43 (9) | 20:16	9	19:48 (7) | 19:01		| 16:52	8	16:22 (1) | 16:02	15:58
28 | 05:20		19:39 (11) | 06:13		19:07 (5) | 07:07		18:00 (3) | 07:02		| 07:59	08:28
| 21:17	41	20:43 (9) | 20:14	2	19:09 (5) | 18:59	9	18:09 (3) | 16:50		| 16:01	15:59
29 | 05:22		19:38 (11) | 06:15		19:03 (5) | 07:09		17:57 (3) | 07:04		| 08:01	08:29
| 21:15	41	20:41 (9) | 20:11	11	19:14 (5) | 18:56	14	18:11 (3) | 16:48		| 16:00	16:00
30 | 05:23		19:37 (11) | 06:16		19:01 (5) | 07:11		17:56 (3) | 07:06		| 08:02	08:29
| 21:13	41	20:41 (9) | 20:09	15	19:16 (5) | 18:54	16	18:12 (3) | 16:46		| 15:59	16:01
31 | 05:25		19:36 (11) | 06:18		18:58 (5) |		| 07:08		|	08:29
| 21:12	38	20:38 (9) | 20:07	18	19:16 (5) |		| 16:44		|	16:02
Sonnenscheinstunden	510		459		382		329		260	235
astr.max.mögl.Beschattung	746		720		715		629			
Red.Sonnenscheinwahrsch.	0.45		0.49		0.40		0.33			
Reduktion Betriebsdauer	0.91		0.91		0.91		0.91			
Reduktion Windrichtung	0.66		0.67		0.69		0.69			
Gesamte Reduktion	0.27		0.30		0.26		0.21			
Met.wahrsch.Beschattung	200		214		183		130			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** Z - IO26

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April		Mai		Juni	
1	08:29		07:59		07:02		16:36 (2)	06:48	18:22 (6)	05:40	19:20 (11)	04:51	20:14 (9)
	16:03		16:54		17:49	26	17:02 (2)	19:46	41	19:17 (5)	20:41	32	19:52 (11)	21:30	15	20:29 (9)
2	08:29		07:57		07:00		16:36 (2)	06:46	18:24 (6)	05:38	19:20 (11)	04:50	20:14 (9)
	16:04		16:55		17:50	25	17:01 (2)	19:48	39	19:18 (5)	20:42	32	19:52 (11)	21:31	14	20:28 (9)
3	08:28		07:56		06:58		16:37 (2)	06:43	18:26 (6)	05:36	19:20 (11)	04:49	20:16 (9)
	16:05		16:57		17:52	24	17:01 (2)	19:50	35	19:18 (5)	20:44	32	19:52 (11)	21:32	12	20:28 (9)
4	08:28		07:54		06:55		16:38 (2)	06:41	18:30 (6)	05:34	19:20 (11)	04:48	20:17 (9)
	16:06		16:59		17:54	22	17:00 (2)	19:52	27	19:18 (5)	20:46	32	19:52 (11)	21:33	10	20:27 (9)
5	08:28		07:52		06:53		16:38 (2)	06:38	18:55 (5)	05:32	19:20 (11)	04:48	20:17 (9)
	16:08		17:01		17:56	20	16:58 (2)	19:53	23	19:18 (5)	20:48	32	19:52 (11)	21:34	14	20:48 (10)
6	08:27		07:50		06:51		16:40 (2)	06:36	18:55 (5)	05:30	19:20 (11)	04:47	20:20 (9)
	16:09		17:03		17:58	17	16:57 (2)	19:55	23	19:18 (5)	20:50	32	19:52 (11)	21:35	14	20:50 (10)
7	08:27		07:49		06:48		16:42 (2)	06:34	18:55 (5)	05:28	19:20 (11)	04:46	20:40 (10)
	16:10		17:05		18:00	11	16:53 (2)	19:57	22	19:17 (5)	20:51	31	19:51 (11)	21:36	11	20:51 (10)
8	08:26		07:47		06:46			06:31	18:55 (5)	05:26	19:21 (11)	04:46	20:39 (10)
	16:12		17:07		18:02			19:59	22	19:17 (5)	20:53	29	19:50 (11)	21:37	14	20:53 (10)
9	08:26		07:45		06:44			06:29	18:56 (5)	05:24	19:22 (11)	04:45	20:38 (10)
	16:13		17:09		18:04			20:01	20	19:16 (5)	20:55	28	19:50 (11)	21:38	15	20:53 (10)
10	08:25		07:43		06:41			06:27	18:56 (5)	05:22	19:22 (11)	04:45	20:38 (10)
	16:15		17:11		18:06			20:03	18	19:14 (5)	20:57	34	20:24 (9)	21:39	16	20:54 (10)
11	08:25		07:41		06:39			06:24	18:57 (5)	05:20	19:22 (11)	04:44	20:38 (10)
	16:16		17:13		18:07			20:04	16	19:13 (5)	20:58	38	20:26 (9)	21:40	17	20:55 (10)
12	08:24		07:39		06:37			06:22	18:59 (5)	05:19	19:24 (11)	04:44	20:38 (10)
	16:18		17:15		18:09			20:06	12	19:11 (5)	21:00	39	20:28 (9)	21:41	18	20:56 (10)
13	08:23		07:37		16:45 (1)	06:34		06:20	19:02 (5)	05:17	19:25 (11)	04:43	20:37 (10)
	16:19		17:17	3	16:48 (1)	18:11		20:08	4	19:06 (5)	21:02	38	20:28 (9)	21:41	19	20:56 (10)
14	08:22		07:35		16:41 (1)	06:32		06:17	19:36 (7)	05:15	19:25 (11)	04:43	20:37 (10)
	16:21		17:19	10	16:51 (1)	18:13		20:10	6	19:42 (7)	21:03	39	20:29 (9)	21:42	20	20:57 (10)
15	08:21		07:33		16:39 (1)	06:29		06:15	19:33 (7)	05:14	19:27 (11)	04:43	20:37 (10)
	16:22		17:21	13	16:52 (1)	18:15		20:12	11	19:44 (7)	21:05	37	20:30 (9)	21:43	20	20:57 (10)
16	08:20		07:31		16:38 (1)	06:27		06:13	19:31 (7)	05:12	19:29 (11)	04:43	20:38 (10)
	16:24		17:23	16	16:54 (1)	18:17		20:13	15	19:46 (7)	21:07	34	20:30 (9)	21:43	20	20:58 (10)
17	08:19		07:29		16:37 (1)	06:25	17:33 (6)	06:10	19:29 (7)	05:10	19:32 (11)	04:43	20:38 (10)
	16:26		17:25	18	16:55 (1)	18:19	10	17:43 (6)	20:15	18	19:47 (7)	21:08	30	20:31 (9)	21:44	20	20:58 (10)
18	08:18		07:27		16:37 (1)	06:22		17:30 (6)	06:08	19:29 (7)	05:09	20:10 (9)	04:43	20:38 (10)
	16:27		17:27	19	16:56 (1)	18:20	16	17:46 (6)	20:17	18	19:47 (7)	21:10	21	20:31 (9)	21:44	21	20:59 (10)
19	08:17		07:25		16:36 (1)	06:20		17:27 (6)	06:06	19:28 (7)	05:07	20:09 (9)	04:43	20:38 (10)
	16:29		17:29	20	16:56 (1)	18:22	20	17:47 (6)	20:19	20	19:48 (7)	21:11	22	20:31 (9)	21:44	21	20:59 (10)
20	08:16		07:22		16:36 (1)	06:17		17:26 (6)	06:03	19:28 (7)	05:06	20:09 (9)	04:43	20:38 (10)
	16:31		17:31	21	16:57 (2)	18:24	23	17:49 (6)	20:21	20	19:48 (7)	21:13	22	20:31 (9)	21:45	21	20:59 (10)
21	08:15		07:20		16:36 (1)	06:15		17:24 (6)	06:01	19:28 (7)	05:04	20:09 (9)	04:43	20:38 (10)
	16:33		17:33	23	16:59 (2)	18:26	25	17:49 (6)	20:23	20	19:48 (7)	21:15	23	20:32 (9)	21:45	21	20:59 (10)
22	08:14		07:18		16:36 (1)	06:12		17:23 (6)	05:59	19:27 (7)	05:03	20:09 (9)	04:43	20:39 (10)
	16:35		17:35	24	17:00 (2)	18:28	27	17:50 (6)	20:24	20	19:47 (7)	21:16	22	20:31 (9)	21:45	21	21:00 (10)
23	08:12		07:16		16:37 (1)	06:10		17:22 (6)	05:57	19:27 (7)	05:01	20:09 (9)	04:43	20:39 (10)
	16:36		17:37	24	17:01 (2)	18:30	28	17:50 (6)	20:26	20	19:47 (11)	21:18	22	20:31 (9)	21:45	21	21:00 (10)
24	08:11		07:14		16:37 (1)	06:08		17:21 (6)	05:55	19:26 (11)	05:00	20:10 (9)	04:44	20:39 (10)
	16:38		17:39	24	17:01 (2)	18:32	29	17:50 (6)	20:28	23	19:49 (11)	21:19	21	20:31 (9)	21:45	21	21:00 (10)
25	08:10		07:11		16:37 (2)	06:05		17:20 (6)	05:52	19:25 (11)	04:59	20:10 (9)	04:44	20:40 (10)
	16:40		17:41	25	17:02 (2)	18:33	30	17:50 (6)	20:30	25	19:50 (11)	21:21	21	20:31 (9)	21:46	20	21:00 (10)
26	08:08		07:09		16:37 (2)	06:03		17:20 (6)	05:50	19:24 (11)	04:58	20:10 (9)	04:44	20:40 (10)
	16:42		17:43	26	17:03 (2)	18:35	30	17:50 (6)	20:32	26	19:50 (11)	21:22	21	20:31 (9)	21:46	20	21:00 (10)
27	08:07		07:07		16:36 (2)	06:00		17:21 (6)	05:48	19:23 (11)	04:56	20:11 (9)	04:45	20:40 (10)
	16:44		17:45	26	17:02 (2)	18:37	29	17:50 (6)	20:33	28	19:51 (11)	21:23	20	20:31 (9)	21:45	21	21:01 (10)
28	08:05		07:05		16:36 (2)	05:58		17:20 (6)	05:46	19:22 (11)	04:55	20:11 (9)	04:45	20:40 (10)
	16:46		17:47	26	17:02 (2)	18:39	29	17:49 (6)	20:35	30	19:52 (11)	21:25	20	20:31 (9)	21:45	20	21:00 (10)
29	08:04					06:55		18:21 (6)	05:44	19:21 (11)	04:54	20:12 (9)	04:46	20:41 (10)
	16:48					19:41	27	18:48 (6)	20:37	31	19:52 (11)	21:26	18	20:30 (9)	21:45	19	21:00 (10)
30	08:02					06:53		18:21 (6)	05:42	19:21 (11)	04:53	20:13 (9)	04:47	20:41 (10)
	16:50					19:42	37	19:14 (5)	20:39	31	19:52 (11)	21:27	17	20:30 (9)	21:45	19	21:00 (10)
31	08:01					06:51		18:22 (6)				04:52		20:13 (9)			
	16:52					19:44	39	19:16 (5)				21:29	16	20:29 (9)			
Sonnenscheinstunden	252		274			367		419			492			508		
astr.max.mögl.Beschattung				318			544			664			855			535
Red.Sonnenscheinwahrsch.				0.24			0.31			0.41			0.51			0.45
Reduktion Betriebsdauer				0.91			0.91			0.91			0.91			0.91
Reduktion Windrichtung				0.69			0.70			0.68			0.66			0.64
Gesamte Reduktion				0.15			0.20			0.26			0.31			0.27
Met.wahrsch.Beschattung				48			108			169			264			142

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** Z - IO26

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November	Dezember
1	04:47		20:42 (10)	05:26		19:34 (11)	06:20		18:56 (5)	07:12			07:10	08:04
	21:45	18	21:00 (10)	21:10	29	20:38 (9)	20:04	16	19:12 (5)	18:51			16:42	15:58
2	04:48		20:43 (10)	05:28		19:33 (11)	06:22		18:55 (5)	07:14			07:12	08:05
	21:44	17	21:00 (10)	21:08	36	20:35 (9)	20:02	18	19:13 (5)	18:49			16:40	15:57
3	04:49		20:43 (10)	05:30		19:32 (11)	06:23		18:53 (5)	07:16			07:14	08:07
	21:44	16	20:59 (10)	21:06	31	20:32 (9)	20:00	20	19:13 (5)	18:47			16:38	15:57
4	04:50		20:44 (10)	05:31		19:31 (11)	06:25		18:52 (5)	07:18			07:15	08:08
	21:43	15	20:59 (10)	21:05	29	20:00 (11)	19:57	22	19:14 (5)	18:44			16:36	15:56
5	04:50		20:46 (10)	05:33		19:31 (11)	06:27		18:52 (5)	07:19			07:17	08:10
	21:43	12	20:58 (10)	21:03	30	20:01 (11)	19:55	22	19:14 (5)	18:42			16:34	15:55
6	04:51		20:27 (9)	05:35		19:30 (11)	06:29		18:51 (5)	07:21		17:21 (2)	07:19	08:11
	21:42	14	20:57 (10)	21:01	31	20:01 (11)	19:52	22	19:13 (5)	18:39	8	17:29 (2)	16:32	15:55
7	04:52		20:25 (9)	05:36		19:30 (11)	06:30		18:50 (5)	07:23		17:16 (2)	07:21	08:12
	21:42	15	20:56 (10)	20:59	31	20:01 (11)	19:50	23	19:13 (5)	18:37	15	17:31 (2)	16:30	15:54
8	04:53		20:24 (9)	05:38		19:30 (11)	06:32		18:26 (6)	07:25		17:14 (2)	07:23	08:14
	21:41	10	20:34 (9)	20:57	32	20:02 (11)	19:48	25	19:13 (5)	18:35	18	17:32 (2)	16:28	15:54
9	04:54		20:24 (9)	05:40		19:29 (11)	06:34		18:20 (6)	07:27		17:13 (2)	07:25	08:15
	21:40	11	20:35 (9)	20:55	32	20:01 (11)	19:45	35	19:12 (5)	18:32	21	17:34 (2)	16:27	15:54
10	04:55		20:23 (9)	05:42		19:29 (11)	06:36		18:17 (6)	07:28		17:11 (2)	07:27	08:16
	21:39	13	20:36 (9)	20:53	32	20:01 (11)	19:43	38	19:11 (5)	18:30	23	17:34 (2)	16:25	15:53
11	04:56		20:22 (9)	05:43		19:28 (11)	06:37		18:15 (6)	07:30		17:10 (2)	07:29	08:17
	21:38	15	20:37 (9)	20:51	32	20:00 (11)	19:40	41	19:10 (5)	18:27	25	17:35 (2)	16:23	15:53
12	04:58		20:22 (9)	05:45		19:29 (11)	06:39		18:13 (6)	07:32		17:10 (2)	07:31	08:18
	21:38	16	20:38 (9)	20:49	32	20:01 (11)	19:38	40	19:08 (5)	18:25	25	17:35 (2)	16:22	15:53
13	04:59		20:21 (9)	05:47		19:29 (11)	06:41		18:12 (6)	07:34		17:09 (2)	07:33	08:19
	21:37	17	20:38 (9)	20:47	32	20:01 (11)	19:35	37	19:05 (5)	18:23	26	17:35 (2)	16:20	15:53
14	05:00		20:21 (9)	05:48		19:29 (11)	06:42		18:11 (6)	07:36		17:09 (2)	07:34	08:20
	21:36	18	20:39 (9)	20:45	30	19:59 (11)	19:33	30	19:01 (5)	18:20	26	17:35 (2)	16:18	15:53
15	05:01		20:20 (9)	05:50		19:30 (11)	06:44		18:11 (6)	07:38		17:09 (2)	07:36	08:21
	21:35	19	20:39 (9)	20:43	29	19:59 (11)	19:30	28	18:39 (6)	18:18	26	17:35 (2)	16:17	15:53
16	05:02		20:20 (9)	05:52		19:30 (11)	06:46		18:09 (6)	07:39		17:09 (2)	07:38	08:22
	21:33	19	20:39 (9)	20:41	29	19:59 (11)	19:28	29	18:38 (6)	18:16	26	17:35 (2)	16:15	15:53
17	05:04		20:20 (9)	05:54		19:30 (11)	06:48		18:09 (6)	07:41		17:09 (2)	07:40	08:23
	21:32	21	20:41 (9)	20:38	27	19:57 (11)	19:26	29	18:38 (6)	18:14	25	17:34 (2)	16:14	15:53
18	05:05		20:20 (9)	05:55		19:31 (11)	06:49		18:09 (6)	07:43		17:08 (1)	07:42	08:24
	21:31	21	20:41 (9)	20:36	25	19:56 (11)	19:23	29	18:38 (6)	18:11	24	17:32 (2)	16:12	15:53
19	05:07		20:19 (9)	05:57		19:32 (11)	06:51		18:08 (6)	07:45		17:07 (1)	07:44	08:25
	21:30	22	20:41 (9)	20:34	22	19:54 (11)	19:21	29	18:37 (6)	18:09	24	17:31 (2)	16:11	15:54
20	05:08		20:19 (9)	05:59		19:33 (7)	06:53		18:08 (6)	07:47		17:07 (1)	07:45	08:25
	21:29	22	20:41 (9)	20:32	19	19:52 (7)	19:18	28	18:36 (6)	18:07	23	17:30 (2)	16:10	15:54
21	05:09		20:19 (9)	06:01		19:33 (7)	06:55		18:08 (6)	07:49		17:06 (1)	07:47	08:26
	21:27	23	20:42 (9)	20:30	19	19:52 (7)	19:16	28	18:36 (6)	18:05	22	17:28 (2)	16:08	15:54
22	05:11		20:19 (9)	06:02		19:32 (7)	06:56		18:09 (6)	07:51		17:06 (1)	07:49	08:26
	21:26	22	20:41 (9)	20:27	20	19:52 (7)	19:13	26	18:35 (6)	18:02	20	17:26 (1)	16:07	15:55
23	05:12		20:19 (9)	06:04		19:32 (7)	06:58		18:09 (6)	07:53		17:06 (1)	07:51	08:27
	21:24	22	20:41 (9)	20:25	20	19:52 (7)	19:11	24	18:33 (6)	18:00	20	17:26 (1)	16:06	15:55
24	05:14		20:19 (9)	06:06		19:32 (7)	07:00		18:10 (6)	07:54		17:06 (1)	07:53	08:27
	21:23	23	20:42 (9)	20:23	19	19:51 (7)	19:08	21	18:31 (6)	17:58	19	17:25 (1)	16:05	15:56
25	05:15		20:19 (9)	06:08		19:32 (7)	07:02		18:12 (6)	06:56		16:07 (1)	07:54	08:28
	21:21	22	20:41 (9)	20:21	18	19:50 (7)	19:06	17	18:29 (6)	16:56	17	16:24 (1)	16:04	15:57
26	05:17		20:20 (9)	06:09		19:32 (7)	07:03		18:14 (6)	06:58		16:08 (1)	07:56	08:28
	21:20	22	20:42 (9)	20:18	17	19:49 (7)	19:04	13	18:27 (6)	16:54	16	16:24 (1)	16:03	15:57
27	05:18		19:41 (11)	06:11		19:33 (7)	07:05			07:00		16:10 (1)	07:58	08:28
	21:18	31	20:41 (9)	20:16	15	19:48 (7)	19:01			16:52	12	16:22 (1)	16:02	15:58
28	05:20		19:39 (11)	06:13		19:34 (7)	07:07			07:02		16:11 (1)	07:59	08:28
	21:17	35	20:41 (9)	20:14	11	19:45 (7)	18:59			16:50	9	16:20 (1)	16:01	15:59
29	05:22		19:37 (11)	06:15		19:37 (7)	07:09			07:04			08:01	08:29
	21:15	37	20:40 (9)	20:11	6	19:43 (7)	18:56			16:48			16:00	16:00
30	05:23		19:36 (11)	06:16		19:03 (5)	07:11			07:06			08:02	08:29
	21:13	39	20:40 (9)	20:09	4	19:07 (5)	18:54			16:46			15:59	16:01
31	05:25		19:34 (11)	06:18		18:58 (5)				07:08				08:29
	21:12	40	20:38 (9)	20:07	12	19:10 (5)				16:44				16:02
Sonnenscheinstunden	510			459			382			329			260	235
astr.max.mögl.Beschattung		647			761			690			470			
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91			
Reduktion Windrichtung		0.65			0.66			0.70			0.69			
Gesamte Reduktion		0.27			0.30			0.26			0.21			
Met.wahrsch.Beschattung		172			225			177			97			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AA - IO27

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar			Februar			März			April			Mai			Juni		
1	08:29		07:59			07:02			16:41 (2)	06:48		18:25 (6)	05:40		19:26 (11)	04:51		20:15 (9)
	16:03		16:54			17:49	26		17:07 (2)	19:46	38	19:17 (5)	20:41	30	19:56 (11)	21:30	18	20:33 (9)
2	08:29		07:57			07:00			16:40 (2)	06:46		18:26 (6)	05:38		19:26 (11)	04:50		20:16 (9)
	16:04		16:55			17:50	26		17:06 (2)	19:48	40	19:19 (5)	20:42	30	19:56 (11)	21:31	17	20:33 (9)
3	08:28		07:56			06:58			16:40 (2)	06:43		18:27 (6)	05:36		19:25 (11)	04:49		20:17 (9)
	16:05		16:57			17:52	26		17:06 (2)	19:50	41	19:21 (5)	20:44	31	19:56 (11)	21:32	16	20:33 (9)
4	08:28		07:54			06:55			16:41 (2)	06:41		18:27 (6)	05:34		19:25 (11)	04:48		20:17 (9)
	16:06		16:59			17:54	25		17:06 (2)	19:52	41	19:21 (5)	20:46	31	19:56 (11)	21:33	15	20:32 (9)
5	08:28		07:52			06:53			16:41 (2)	06:38		18:29 (6)	05:32		19:25 (11)	04:48		20:18 (9)
	16:08		17:01			17:56	24		17:05 (2)	19:53	37	19:21 (5)	20:48	32	19:57 (11)	21:34	14	20:32 (9)
6	08:27		07:50			06:51			16:42 (2)	06:36		18:33 (6)	05:30		19:25 (11)	04:47		20:19 (9)
	16:09		17:03			17:58	22		17:04 (2)	19:55	32	19:22 (5)	20:50	32	19:57 (11)	21:35	13	20:32 (9)
7	08:27		07:49			06:48			16:42 (2)	06:34		18:58 (5)	05:28		19:25 (11)	04:46		20:19 (9)
	16:10		17:05			18:00	20		17:02 (2)	19:57	23	19:21 (5)	20:51	31	19:56 (11)	21:36	12	20:31 (9)
8	08:26		07:47			06:46			16:44 (2)	06:31		18:58 (5)	05:26		19:25 (11)	04:46		20:21 (9)
	16:12		17:07			18:02	17		17:01 (2)	19:59	23	19:21 (5)	20:53	31	19:56 (11)	21:37	10	20:31 (9)
9	08:26		07:45			06:44			16:46 (2)	06:29		18:59 (5)	05:24		19:26 (11)	04:45		20:22 (9)
	16:13		17:09			18:04	13		16:59 (2)	20:01	22	19:21 (5)	20:55	30	19:56 (11)	21:38	8	20:30 (9)
10	08:25		07:43			06:41			16:50 (2)	06:27		18:58 (5)	05:22		19:26 (11)	04:45		20:23 (9)
	16:15		17:11			18:06	4		16:54 (2)	20:03	21	19:19 (5)	20:57	30	19:56 (11)	21:39	10	20:52 (10)
11	08:25		07:41			06:39				06:24		18:59 (5)	05:20		19:26 (11)	04:44		20:25 (9)
	16:16		17:13			18:07				20:04	20	19:19 (5)	20:58	29	19:55 (11)	21:40	10	20:54 (10)
12	08:24		07:39			06:37				06:22		19:00 (5)	05:19		19:27 (11)	04:44		20:46 (10)
	16:18		17:15			18:09				20:06	18	19:18 (5)	21:00	36	20:27 (9)	21:41	10	20:56 (10)
13	08:23		07:37			06:34				06:20		19:00 (5)	05:17		19:27 (11)	04:43		20:45 (10)
	16:19		17:17			18:11				20:08	16	19:16 (5)	21:02	39	20:29 (9)	21:41	11	20:56 (10)
14	08:22		07:35			06:32				06:17		19:02 (5)	05:15		19:27 (11)	04:43		20:45 (10)
	16:21		17:19			18:13				20:10	12	19:14 (5)	21:03	41	20:30 (9)	21:42	12	20:57 (10)
15	08:21		07:33		16:47 (1)	06:29				06:15			05:14		19:29 (11)	04:43		20:45 (10)
	16:22		17:21	5	16:52 (1)	18:15				20:12			21:05	40	20:31 (9)	21:43	13	20:58 (10)
16	08:20		07:31		16:44 (1)	06:27				06:13		19:37 (7)	05:12		19:29 (11)	04:43		20:45 (10)
	16:24		17:23	10	16:54 (1)	18:17				20:13	9	19:46 (7)	21:07	41	20:32 (9)	21:43	13	20:58 (10)
17	08:19		07:29		16:42 (1)	06:25				06:10		19:34 (7)	05:10		19:31 (11)	04:43		20:45 (10)
	16:26		17:25	14	16:56 (1)	18:19				20:15	13	19:47 (7)	21:08	39	20:33 (9)	21:44	14	20:59 (10)
18	08:18		07:27		16:41 (1)	06:22				06:08		19:33 (7)	05:09		19:32 (11)	04:43		20:45 (10)
	16:27		17:27	17	16:58 (1)	18:20				20:17	16	19:49 (7)	21:10	39	20:34 (9)	21:44	14	20:59 (10)
19	08:17		07:25		16:41 (1)	06:20			17:41 (6)	06:06		19:32 (7)	05:07		19:33 (11)	04:43		20:45 (10)
	16:29		17:29	18	16:59 (1)	18:22	3		17:44 (6)	20:19	18	19:50 (7)	21:11	35	20:33 (9)	21:44	14	20:59 (10)
20	08:16		07:22		16:40 (1)	06:17			17:36 (6)	06:03		19:32 (7)	05:06		19:36 (11)	04:43		20:45 (10)
	16:31		17:31	19	16:59 (1)	18:24	13		17:49 (6)	20:21	18	19:50 (7)	21:13	32	20:34 (9)	21:45	15	21:00 (10)
21	08:15		07:20		16:39 (1)	06:15			17:32 (6)	06:01		19:31 (7)	05:04		20:13 (9)	04:43		20:45 (10)
	16:33		17:33	20	16:59 (1)	18:26	19		17:51 (6)	20:23	20	19:51 (7)	21:15	21	20:34 (9)	21:45	15	21:00 (10)
22	08:14		07:18		16:40 (1)	06:12			17:31 (6)	05:59		19:30 (7)	05:03		20:12 (9)	04:43		20:46 (10)
	16:35		17:35	21	17:01 (2)	18:28	21		17:52 (6)	20:24	20	19:50 (7)	21:16	22	20:34 (9)	21:45	15	21:01 (10)
23	08:12		07:16		16:40 (1)	06:10			17:29 (6)	05:57		19:30 (7)	05:01		20:12 (9)	04:43		20:46 (10)
	16:36		17:37	23	17:03 (2)	18:30	24		17:53 (6)	20:26	20	19:50 (7)	21:18	22	20:34 (9)	21:45	15	21:01 (10)
24	08:11		07:14		16:40 (1)	06:08			17:28 (6)	05:55		19:30 (7)	05:00		20:12 (9)	04:44		20:46 (10)
	16:38		17:39	24	17:04 (2)	18:32	26		17:54 (6)	20:28	19	19:49 (7)	21:19	22	20:34 (9)	21:45	14	21:00 (10)
25	08:10		07:11		16:40 (1)	06:05			17:26 (6)	05:52		19:30 (7)	04:59		20:13 (9)	04:44		20:47 (10)
	16:40		17:41	25	17:05 (2)	18:33	28		17:54 (6)	20:30	21	19:51 (11)	21:21	22	20:35 (9)	21:46	14	21:01 (10)
26	08:08		07:09		16:42 (1)	06:03			17:26 (6)	05:50		19:31 (7)	04:58		20:13 (9)	04:44		20:47 (10)
	16:42		17:43	24	17:06 (2)	18:35	28		17:54 (6)	20:32	21	19:52 (11)	21:22	22	20:35 (9)	21:46	14	21:01 (10)
27	08:07		07:07		16:41 (2)	06:00			17:26 (6)	05:48		19:30 (11)	04:56		20:13 (9)	04:45		20:48 (10)
	16:44		17:45	25	17:06 (2)	18:37	29		17:55 (6)	20:33	23	19:53 (11)	21:23	22	20:35 (9)	21:45	13	21:01 (10)
28	08:05		07:05		16:41 (2)	05:58			17:25 (6)	05:46		19:29 (11)	04:55		20:14 (9)	04:45		20:48 (10)
	16:46		17:47	26	17:07 (2)	18:39	29		17:54 (6)	20:35	25	19:54 (11)	21:25	20	20:34 (9)	21:45	12	21:00 (10)
29	08:04					06:55			18:25 (6)	05:44		19:28 (11)	04:54		20:14 (9)	04:46		20:49 (10)
	16:48					19:41	29		18:54 (6)	20:37	27	19:55 (11)	21:26	20	20:34 (9)	21:45	11	21:00 (10)
30	08:02					06:53			18:24 (6)	05:42		19:27 (11)	04:53		20:14 (9)	04:47		20:49 (10)
	16:50					19:42	29		18:53 (6)	20:39	29	19:56 (11)	21:27	20	20:34 (9)	21:45	10	20:59 (10)
31	08:01					06:51			18:25 (6)				04:52		20:15 (9)			
	16:52					19:44	30		19:13 (5)				21:29	19	20:34 (9)			
Sonnenscheinstunden		252		274			367			419			492			508		
astr.max.mögl.Beschattung				271			511			683			911			392		
Red.Sonnenscheinwahrsch.				0.24			0.31			0.41			0.51			0.45		
Reduktion Betriebsdauer				0.91			0.91			0.91			0.91			0.91		
Reduktion Windrichtung				0.69			0.69			0.68			0.66			0.64		
Gesamte Reduktion				0.15			0.20			0.26			0.31			0.27		
Met.wahrsch.Beschattung				41			102			175			281			104		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AA - IO27

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		20:30 (9)	05:26		19:37 (11)	06:20		18:58 (5)	07:12		07:10	08:04
	21:45	9	20:59 (10)	21:10	34	20:36 (9)	20:04	20	19:18 (5)	18:51		16:42	15:58
2	04:48		20:28 (9)	05:28		19:36 (11)	06:22		18:57 (5)	07:14		07:12	08:05
	21:44	11	20:58 (10)	21:08	29	20:05 (11)	20:02	21	19:18 (5)	18:49		16:40	15:57
3	04:49		20:27 (9)	05:30		19:36 (11)	06:23		18:56 (5)	07:16		07:14	08:07
	21:44	7	20:34 (9)	21:06	30	20:06 (11)	20:00	22	19:18 (5)	18:47		16:38	15:57
4	04:50		20:26 (9)	05:31		19:35 (11)	06:25		18:55 (5)	07:18	17:25 (2)	07:15	08:08
	21:43	10	20:36 (9)	21:05	31	20:06 (11)	19:57	23	19:18 (5)	18:44	10 17:35 (2)	16:36	15:56
5	04:50		20:26 (9)	05:33		19:35 (11)	06:27		18:55 (5)	07:19	17:22 (2)	07:17	08:10
	21:43	11	20:37 (9)	21:03	31	20:06 (11)	19:55	23	19:18 (5)	18:42	15 17:37 (2)	16:34	15:55
6	04:51		20:26 (9)	05:35		19:34 (11)	06:29		18:28 (6)	07:21	17:20 (2)	07:19	08:11
	21:42	12	20:38 (9)	21:01	32	20:06 (11)	19:52	31	19:17 (5)	18:39	19 17:39 (2)	16:32	15:55
7	04:52		20:25 (9)	05:36		19:34 (11)	06:30		18:25 (6)	07:23	17:17 (2)	07:21	08:12
	21:42	14	20:39 (9)	20:59	32	20:06 (11)	19:50	36	19:16 (5)	18:37	22 17:39 (2)	16:30	15:54
8	04:53		20:25 (9)	05:38		19:35 (11)	06:32		18:23 (6)	07:25	17:16 (2)	07:23	08:14
	21:41	14	20:39 (9)	20:57	31	20:06 (11)	19:48	40	19:16 (5)	18:35	24 17:40 (2)	16:28	15:54
9	04:54		20:24 (9)	05:40		19:34 (11)	06:34		18:20 (6)	07:27	17:15 (2)	07:25	08:15
	21:40	16	20:40 (9)	20:55	32	20:06 (11)	19:45	42	19:14 (5)	18:32	25 17:40 (2)	16:27	15:54
10	04:55		20:24 (9)	05:42		19:35 (11)	06:36		18:19 (6)	07:28	17:15 (2)	07:27	08:16
	21:39	17	20:41 (9)	20:53	31	20:06 (11)	19:43	41	19:13 (5)	18:30	25 17:40 (2)	16:25	15:53
11	04:56		20:24 (9)	05:43		19:34 (11)	06:37		18:18 (6)	07:30	17:14 (2)	07:29	08:17
	21:38	17	20:41 (9)	20:51	31	20:05 (11)	19:40	39	19:11 (5)	18:27	27 17:41 (2)	16:23	15:53
12	04:58		20:23 (9)	05:45		19:35 (11)	06:39		18:16 (6)	07:32	17:14 (2)	07:31	08:18
	21:38	19	20:42 (9)	20:49	29	20:04 (11)	19:38	33	19:06 (5)	18:25	26 17:40 (2)	16:22	15:53
13	04:59		20:23 (9)	05:47		19:36 (11)	06:41		18:16 (6)	07:34	17:14 (2)	07:33	08:19
	21:37	19	20:42 (9)	20:47	28	20:04 (11)	19:35	28	18:44 (6)	18:23	26 17:40 (2)	16:20	15:53
14	05:00		20:23 (9)	05:48		19:36 (11)	06:42		18:15 (6)	07:36	17:14 (2)	07:34	08:20
	21:36	20	20:43 (9)	20:45	26	20:02 (11)	19:33	29	18:44 (6)	18:20	26 17:40 (2)	16:18	15:53
15	05:01		20:22 (9)	05:50		19:37 (11)	06:44		18:15 (6)	07:38	17:15 (1)	07:36	08:21
	21:35	21	20:43 (9)	20:43	25	20:02 (11)	19:30	29	18:44 (6)	18:18	24 17:39 (2)	16:17	15:53
16	05:02		20:22 (9)	05:52		19:38 (11)	06:46		18:14 (6)	07:39	17:13 (1)	07:38	08:22
	21:33	21	20:43 (9)	20:41	23	20:01 (11)	19:28	29	18:43 (6)	18:16	25 17:38 (2)	16:15	15:53
17	05:04		20:23 (9)	05:54		19:37 (7)	06:48		18:14 (6)	07:41	17:12 (1)	07:40	08:23
	21:32	21	20:44 (9)	20:38	22	19:59 (11)	19:26	29	18:43 (6)	18:14	25 17:37 (2)	16:14	15:53
18	05:05		20:22 (9)	05:55		19:37 (7)	06:49		18:15 (6)	07:43	17:11 (1)	07:42	08:24
	21:31	22	20:44 (9)	20:36	20	19:57 (11)	19:23	27	18:42 (6)	18:11	24 17:35 (2)	16:12	15:53
19	05:07		20:22 (9)	05:57		19:36 (7)	06:51		18:14 (6)	07:45	17:10 (1)	07:44	08:25
	21:30	22	20:44 (9)	20:34	19	19:55 (7)	19:21	27	18:41 (6)	18:09	23 17:33 (2)	16:11	15:54
20	05:08		20:22 (9)	05:59		19:36 (7)	06:53		18:15 (6)	07:47	17:10 (1)	07:45	08:25
	21:29	22	20:44 (9)	20:32	19	19:55 (7)	19:18	25	18:40 (6)	18:07	20 17:30 (1)	16:10	15:54
21	05:09		20:22 (9)	06:01		19:36 (7)	06:55		18:16 (6)	07:49	17:10 (1)	07:47	08:26
	21:27	23	20:45 (9)	20:30	19	19:55 (7)	19:16	22	18:38 (6)	18:05	19 17:29 (1)	16:08	15:54
22	05:11		20:22 (9)	06:02		19:35 (7)	06:56		18:17 (6)	07:51	17:10 (1)	07:49	08:26
	21:26	22	20:44 (9)	20:27	19	19:54 (7)	19:13	20	18:37 (6)	18:02	19 17:29 (1)	16:07	15:55
23	05:12		19:48 (11)	06:04		19:35 (7)	06:58		18:18 (6)	07:53	17:10 (1)	07:51	08:27
	21:24	28	20:44 (9)	20:25	19	19:54 (7)	19:11	16	18:34 (6)	18:00	18 17:28 (1)	16:06	15:55
24	05:14		19:45 (11)	06:06		19:36 (7)	07:00		18:22 (6)	07:54	17:11 (1)	07:53	08:27
	21:23	33	20:44 (9)	20:23	18	19:54 (7)	19:08	8	18:30 (6)	17:58	16 17:27 (1)	16:05	15:56
25	05:15		19:43 (11)	06:08		19:36 (7)	07:02			06:56	16:12 (1)	07:54	08:28
	21:21	37	20:44 (9)	20:21	16	19:52 (7)	19:06			16:56	13 16:25 (1)	16:04	15:57
26	05:17		19:42 (11)	06:09		19:37 (7)	07:03			06:58	16:15 (1)	07:56	08:28
	21:20	39	20:44 (9)	20:18	13	19:50 (7)	19:04			16:54	9 16:24 (1)	16:03	15:57
27	05:18		19:40 (11)	06:11		19:39 (7)	07:05			07:00		07:58	08:28
	21:18	40	20:43 (9)	20:16	9	19:48 (7)	19:01			16:52		16:02	15:58
28	05:20		19:40 (11)	06:13		19:07 (5)	07:07			07:02		07:59	08:28
	21:17	41	20:43 (9)	20:14	3	19:10 (5)	18:59			16:50		16:01	15:59
29	05:22		19:39 (11)	06:15		19:03 (5)	07:09			07:04		08:01	08:29
	21:15	40	20:41 (9)	20:11	12	19:15 (5)	18:56			16:48		16:00	16:00
30	05:23		19:38 (11)	06:16		19:01 (5)	07:11			07:06		08:02	08:29
	21:13	40	20:41 (9)	20:09	16	19:17 (5)	18:54			16:46		15:59	16:01
31	05:25		19:37 (11)	06:18		18:59 (5)				07:08			08:29
	21:12	39	20:39 (9)	20:07	18	19:17 (5)				16:44			16:02
Sonnenscheinstunden	510			459			382			329		260	235
astr.max.mögl.Beschattung		707			717			660			480		
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33		
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91		
Reduktion Windrichtung		0.66			0.67			0.69			0.69		
Gesamte Reduktion		0.27			0.30			0.26			0.21		
Met.wahrsch.Beschattung		189			213			169			99		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AB - IO28

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar			März			April			Mai			Juni		
1	08:29	07:59			07:02		16:38 (2)	06:48		18:24 (6)	05:40		19:20 (11)	04:51		20:15 (9)
	16:03	16:54			17:49	26	17:04 (2)	19:46	39	19:17 (5)	20:41	31	19:51 (11)	21:30	13	20:44 (10)
2	08:29	07:57			07:00		16:38 (2)	06:46		18:26 (6)	05:38		19:20 (11)	04:50		20:16 (9)
	16:04	16:55			17:50	25	17:03 (2)	19:48	36	19:18 (5)	20:42	31	19:51 (11)	21:31	17	20:47 (10)
3	08:28	07:56			06:58		16:39 (2)	06:43		18:28 (6)	05:36		19:19 (11)	04:49		20:18 (9)
	16:05	16:57			17:52	24	17:03 (2)	19:50	33	19:18 (5)	20:44	32	19:51 (11)	21:32	17	20:49 (10)
4	08:28	07:54			06:55		16:40 (2)	06:41		18:56 (5)	05:34		19:19 (11)	04:48		20:36 (10)
	16:06	16:59			17:54	22	17:02 (2)	19:52	22	19:18 (5)	20:46	31	19:50 (11)	21:33	14	20:50 (10)
5	08:28	07:52			06:53		16:40 (2)	06:38		18:56 (5)	05:32		19:20 (11)	04:48		20:35 (10)
	16:08	17:01			17:56	20	17:00 (2)	19:53	22	19:18 (5)	20:48	31	19:51 (11)	21:34	16	20:51 (10)
6	08:27	07:50			06:51		16:42 (2)	06:36		18:56 (5)	05:30		19:21 (11)	04:47		20:35 (10)
	16:09	17:03			17:58	17	16:59 (2)	19:55	22	19:18 (5)	20:50	29	19:50 (11)	21:35	17	20:52 (10)
7	08:27	07:49			06:48		16:43 (2)	06:34		18:55 (5)	05:28		19:21 (11)	04:46		20:34 (10)
	16:10	17:05			18:00	13	16:56 (2)	19:57	22	19:17 (5)	20:51	28	19:49 (11)	21:36	18	20:52 (10)
8	08:26	07:47			06:46		16:47 (2)	06:31		18:56 (5)	05:26		19:21 (11)	04:46		20:34 (10)
	16:12	17:07			18:02	5	16:52 (2)	19:59	20	19:16 (5)	20:53	27	19:48 (11)	21:37	20	20:54 (10)
9	08:26	07:45			06:44			06:29		18:57 (5)	05:24		19:23 (11)	04:45		20:33 (10)
	16:13	17:09			18:04			20:01	19	19:16 (5)	20:55	32	20:23 (9)	21:38	21	20:54 (10)
10	08:25	07:43			06:41			06:27		18:57 (5)	05:22		19:23 (11)	04:45		20:33 (10)
	16:15	17:11			18:06			20:03	17	19:14 (5)	20:57	36	20:25 (9)	21:39	22	20:55 (10)
11	08:25	07:41			06:39			06:24		18:58 (5)	05:20		19:24 (11)	04:44		20:33 (10)
	16:16	17:13			18:07			20:04	14	19:12 (5)	20:58	37	20:26 (9)	21:40	22	20:55 (10)
12	08:24	07:39			06:37			06:22		19:01 (5)	05:19		19:25 (11)	04:44		20:34 (10)
	16:18	17:15			18:09			20:06	9	19:10 (5)	21:00	37	20:28 (9)	21:41	22	20:56 (10)
13	08:23	07:37			06:34			06:20			05:17		19:26 (11)	04:43		20:33 (10)
	16:19	17:17			18:11			20:08			21:02	35	20:28 (9)	21:41	23	20:56 (10)
14	08:22	07:35		16:44 (1)	06:32			06:17		19:34 (7)	05:15		19:28 (11)	04:43		20:33 (10)
	16:21	17:19	7	16:51 (1)	18:13			20:10	8	19:42 (7)	21:03	33	20:28 (9)	21:42	23	20:56 (10)
15	08:21	07:33		16:41 (1)	06:29			06:15		19:32 (7)	05:14		19:31 (11)	04:43		20:33 (10)
	16:22	17:21	11	16:52 (1)	18:15			20:12	12	19:44 (7)	21:05	29	20:29 (9)	21:43	24	20:57 (10)
16	08:20	07:31		16:40 (1)	06:27			06:13		19:31 (7)	05:12		20:08 (9)	04:43		20:33 (10)
	16:24	17:23	14	16:54 (1)	18:17			20:13	15	19:46 (7)	21:07	21	20:29 (9)	21:43	24	20:57 (10)
17	08:19	07:29		16:39 (1)	06:25		17:34 (6)	06:10		19:29 (7)	05:10		20:08 (9)	04:43		20:33 (10)
	16:26	17:25	17	16:56 (1)	18:19	9	17:43 (6)	20:15	17	19:46 (7)	21:08	22	20:30 (9)	21:44	25	20:58 (10)
18	08:18	07:27		16:39 (1)	06:22		17:31 (6)	06:08		19:28 (7)	05:09		20:08 (9)	04:43		20:34 (10)
	16:27	17:27	18	16:57 (1)	18:20	16	17:47 (6)	20:17	19	19:47 (7)	21:10	22	20:30 (9)	21:44	24	20:58 (10)
19	08:17	07:25		16:38 (1)	06:20		17:28 (6)	06:06		19:28 (7)	05:07		20:08 (9)	04:43		20:34 (10)
	16:29	17:29	19	16:57 (1)	18:22	20	17:48 (6)	20:19	19	19:47 (7)	21:11	22	20:30 (9)	21:44	24	20:58 (10)
20	08:16	07:22		16:37 (1)	06:17		17:27 (6)	06:03		19:28 (7)	05:06		20:08 (9)	04:43		20:34 (10)
	16:31	17:31	20	16:57 (1)	18:24	22	17:49 (6)	20:21	19	19:47 (7)	21:13	22	20:30 (9)	21:45	24	20:58 (10)
21	08:15	07:20		16:37 (1)	06:15		17:25 (6)	06:01		19:28 (7)	05:04		20:08 (9)	04:43		20:34 (10)
	16:33	17:33	22	16:59 (2)	18:26	25	17:50 (6)	20:23	19	19:47 (7)	21:15	22	20:30 (9)	21:45	24	20:58 (10)
22	08:14	07:18		16:38 (1)	06:12		17:24 (6)	05:59		19:27 (7)	05:03		20:08 (9)	04:43		20:35 (10)
	16:35	17:35	23	17:01 (2)	18:28	27	17:51 (6)	20:24	19	19:46 (7)	21:16	21	20:29 (9)	21:45	24	20:59 (10)
23	08:12	07:16		16:39 (1)	06:10		17:23 (6)	05:57		19:26 (11)	05:01		20:08 (9)	04:43		20:35 (10)
	16:36	17:37	24	17:03 (2)	18:30	27	17:50 (6)	20:26	22	19:48 (11)	21:18	21	20:29 (9)	21:45	24	20:59 (10)
24	08:11	07:14		16:39 (1)	06:08		17:23 (6)	05:55		19:24 (11)	05:00		20:09 (9)	04:44		20:35 (10)
	16:38	17:39	24	17:03 (2)	18:32	28	17:51 (6)	20:28	25	19:49 (11)	21:19	20	20:29 (9)	21:45	24	20:59 (10)
25	08:10	07:11		16:39 (2)	06:05		17:22 (6)	05:52		19:23 (11)	04:59		20:09 (9)	04:44		20:35 (10)
	16:40	17:41	25	17:04 (2)	18:33	28	17:50 (6)	20:30	27	19:50 (11)	21:21	20	20:29 (9)	21:46	25	21:00 (10)
26	08:08	07:09		16:39 (2)	06:03		17:22 (6)	05:50		19:22 (11)	04:58		20:10 (9)	04:44		20:35 (10)
	16:42	17:43	25	17:04 (2)	18:35	28	17:50 (6)	20:32	28	19:50 (11)	21:22	19	20:29 (9)	21:46	25	21:00 (10)
27	08:07	07:07		16:38 (2)	06:00		17:22 (6)	05:48		19:22 (11)	04:56		20:11 (9)	04:45		20:36 (10)
	16:44	17:45	26	17:04 (2)	18:37	28	17:50 (6)	20:33	29	19:51 (11)	21:23	18	20:29 (9)	21:45	24	21:00 (10)
28	08:05	07:05		16:38 (2)	05:58		17:22 (6)	05:46		19:21 (11)	04:55		20:11 (9)	04:45		20:36 (10)
	16:46	17:47	26	17:04 (2)	18:39	27	17:49 (6)	20:35	30	19:51 (11)	21:25	17	20:28 (9)	21:45	24	21:00 (10)
29	08:04				06:55		18:22 (6)	05:44		19:20 (11)	04:54		20:12 (9)	04:46		20:37 (10)
	16:48				19:41	30	19:11 (5)	20:37	31	19:51 (11)	21:26	16	20:28 (9)	21:45	23	21:00 (10)
30	08:02				06:53		18:22 (6)	05:42		19:20 (11)	04:53		20:13 (9)	04:47		20:37 (10)
	16:50				19:42	37	19:14 (5)	20:39	31	19:51 (11)	21:27	14	20:27 (9)	21:45	22	20:59 (10)
31	08:01				06:51		18:23 (6)				04:52		20:14 (9)			
	16:52				19:44	38	19:16 (5)				21:29	12	20:26 (9)			
Sonnenscheinstunden		252	274		367			419			492			508		
astr.max.mögl.Beschattung			301			542			645			788			649	
Red.Sonnenscheinwahrsch.			0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer			0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung			0.69			0.69			0.68			0.66			0.64	
Gesamte Reduktion			0.15			0.20			0.25			0.31			0.27	
Met.wahrsch.Beschattung			45			108			164			244			172	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AB - IO28

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli			August			September			Oktober			November	Dezember
1	04:47		20:38 (10)	05:26		19:35 (11)	06:20		18:57 (5)	07:12			07:10	08:04
	21:45	22	21:00 (10)	21:10	38	20:38 (9)	20:04	14	19:11 (5)	18:51			16:42	15:58
2	04:48		20:38 (10)	05:28		19:34 (11)	06:22		18:56 (5)	07:14			07:12	08:05
	21:44	22	21:00 (10)	21:08	37	20:36 (9)	20:02	17	19:13 (5)	18:49			16:40	15:57
3	04:49		20:38 (10)	05:30		19:33 (11)	06:23		18:54 (5)	07:16			07:14	08:07
	21:44	21	20:59 (10)	21:06	36	20:35 (9)	20:00	19	19:13 (5)	18:47			16:38	15:57
4	04:50		20:39 (10)	05:31		19:32 (11)	06:25		18:53 (5)	07:18			07:15	08:08
	21:43	20	20:59 (10)	21:05	30	20:31 (9)	19:57	20	19:13 (5)	18:44			16:36	15:56
5	04:50		20:40 (10)	05:33		19:31 (11)	06:27		18:52 (5)	07:19			07:17	08:10
	21:43	19	20:59 (10)	21:03	28	19:59 (11)	19:55	22	19:14 (5)	18:42			16:34	15:55
6	04:51		20:41 (10)	05:35		19:30 (11)	06:29		18:51 (5)	07:21		17:22 (2)	07:19	08:11
	21:42	18	20:59 (10)	21:01	29	19:59 (11)	19:52	22	19:13 (5)	18:39	10	17:32 (2)	16:32	15:55
7	04:52		20:42 (10)	05:36		19:30 (11)	06:30		18:51 (5)	07:23		17:18 (2)	07:21	08:12
	21:42	16	20:58 (10)	20:59	30	20:00 (11)	19:50	22	19:13 (5)	18:37	15	17:33 (2)	16:30	15:54
8	04:53		20:43 (10)	05:38		19:30 (11)	06:32		18:51 (5)	07:25		17:16 (2)	07:23	08:14
	21:41	15	20:58 (10)	20:57	30	20:00 (11)	19:48	22	19:13 (5)	18:35	19	17:35 (2)	16:28	15:54
9	04:54		20:27 (9)	05:40		19:29 (11)	06:34		18:22 (6)	07:27		17:14 (2)	07:25	08:15
	21:40	15	20:57 (10)	20:55	31	20:00 (11)	19:45	33	19:12 (5)	18:32	22	17:36 (2)	16:27	15:54
10	04:55		20:25 (9)	05:42		19:29 (11)	06:36		18:19 (6)	07:28		17:13 (2)	07:27	08:16
	21:39	18	20:56 (10)	20:53	31	20:00 (11)	19:43	36	19:11 (5)	18:30	23	17:36 (2)	16:25	15:53
11	04:56		20:24 (9)	05:43		19:28 (11)	06:37		18:17 (6)	07:30		17:12 (2)	07:29	08:17
	21:38	16	20:54 (10)	20:51	31	19:59 (11)	19:40	39	19:10 (5)	18:27	25	17:37 (2)	16:23	15:53
12	04:58		20:23 (9)	05:45		19:28 (11)	06:39		18:15 (6)	07:32		17:12 (2)	07:31	08:18
	21:38	11	20:34 (9)	20:49	32	20:00 (11)	19:38	38	19:08 (5)	18:25	25	17:37 (2)	16:22	15:53
13	04:59		20:22 (9)	05:47		19:29 (11)	06:41		18:14 (6)	07:34		17:11 (2)	07:33	08:19
	21:37	13	20:35 (9)	20:47	31	20:00 (11)	19:35	37	19:06 (5)	18:23	26	17:37 (2)	16:20	15:53
14	05:00		20:21 (9)	05:48		19:28 (11)	06:42		18:13 (6)	07:36		17:11 (2)	07:34	08:20
	21:36	15	20:36 (9)	20:45	31	19:59 (11)	19:33	31	19:02 (5)	18:20	26	17:37 (2)	16:18	15:53
15	05:01		20:20 (9)	05:50		19:29 (11)	06:44		18:12 (6)	07:38		17:11 (2)	07:36	08:21
	21:35	16	20:36 (9)	20:43	29	19:58 (11)	19:30	27	18:39 (6)	18:18	26	17:37 (2)	16:17	15:53
16	05:02		20:20 (9)	05:52		19:29 (11)	06:46		18:11 (6)	07:39		17:11 (2)	07:38	08:22
	21:33	17	20:37 (9)	20:41	29	19:58 (11)	19:28	28	18:39 (6)	18:16	25	17:36 (2)	16:15	15:53
17	05:04		20:20 (9)	05:54		19:29 (11)	06:48		18:10 (6)	07:41		17:12 (1)	07:40	08:23
	21:32	18	20:38 (9)	20:38	28	19:57 (11)	19:26	29	18:39 (6)	18:14	24	17:36 (2)	16:14	15:53
18	05:05		20:19 (9)	05:55		19:30 (11)	06:49		18:10 (6)	07:43		17:10 (1)	07:42	08:24
	21:31	20	20:39 (9)	20:36	26	19:56 (11)	19:23	29	18:39 (6)	18:11	24	17:34 (2)	16:12	15:53
19	05:07		20:19 (9)	05:57		19:30 (11)	06:51		18:09 (6)	07:45		17:09 (1)	07:44	08:25
	21:30	20	20:39 (9)	20:34	24	19:54 (11)	19:21	28	18:37 (6)	18:09	24	17:33 (2)	16:11	15:54
20	05:08		20:18 (9)	05:59		19:32 (11)	06:53		18:09 (6)	07:47		17:08 (1)	07:45	08:25
	21:29	21	20:39 (9)	20:32	21	19:53 (11)	19:18	28	18:37 (6)	18:07	23	17:31 (2)	16:10	15:54
21	05:09		20:19 (9)	06:01		19:33 (7)	06:55		18:10 (6)	07:49		17:08 (1)	07:47	08:26
	21:27	21	20:40 (9)	20:30	19	19:52 (7)	19:16	26	18:36 (6)	18:05	21	17:29 (2)	16:08	15:54
22	05:11		20:18 (9)	06:02		19:31 (7)	06:56		18:10 (6)	07:51		17:08 (1)	07:49	08:26
	21:26	22	20:40 (9)	20:27	20	19:51 (7)	19:13	26	18:36 (6)	18:02	19	17:27 (1)	16:07	15:55
23	05:12		20:18 (9)	06:04		19:31 (7)	06:58		18:10 (6)	07:53		17:08 (1)	07:51	08:27
	21:24	22	20:40 (9)	20:25	20	19:51 (7)	19:11	23	18:33 (6)	18:00	19	17:27 (1)	16:06	15:55
24	05:14		20:18 (9)	06:06		19:32 (7)	07:00		18:11 (6)	07:54		17:08 (1)	07:53	08:27
	21:23	22	20:40 (9)	20:23	19	19:51 (7)	19:08	21	18:32 (6)	17:58	18	17:26 (1)	16:05	15:56
25	05:15		20:18 (9)	06:08		19:31 (7)	07:02		18:13 (6)	06:56		16:09 (1)	07:54	08:28
	21:21	22	20:40 (9)	20:21	19	19:50 (7)	19:06	17	18:30 (6)	16:56	16	16:25 (1)	16:04	15:57
26	05:17		20:19 (9)	06:09		19:32 (7)	07:03		18:16 (6)	06:58		16:11 (1)	07:56	08:28
	21:20	21	20:40 (9)	20:18	17	19:49 (7)	19:04	11	18:27 (6)	16:54	13	16:24 (1)	16:03	15:57
27	05:18		20:18 (9)	06:11		19:33 (7)	07:05			07:00		16:12 (1)	07:58	08:28
	21:18	22	20:40 (9)	20:16	15	19:48 (7)	19:01			16:52	10	16:22 (1)	16:02	15:58
28	05:20		20:19 (9)	06:13		19:33 (7)	07:07			07:02		16:15 (1)	07:59	08:28
	21:17	21	20:40 (9)	20:14	12	19:45 (7)	18:59			16:50	5	16:20 (1)	16:01	15:59
29	05:22		19:40 (11)	06:15		19:35 (7)	07:09			07:04			08:01	08:29
	21:15	30	20:39 (9)	20:11	8	19:43 (7)	18:56			16:48			16:00	16:00
30	05:23		19:38 (11)	06:16			07:11			07:06			08:02	08:29
	21:13	34	20:39 (9)	20:09			18:54			16:46			15:59	16:01
31	05:25		19:36 (11)	06:18		19:00 (5)				07:08				08:29
	21:12	36	20:38 (9)	20:07	9	19:09 (5)				16:44				16:02
Sonnenscheinstunden	510			459			382			329			260	235
astr.max.mögl.Beschattung		626			760			665			458			
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91			
Reduktion Windrichtung		0.65			0.66			0.70			0.69			
Gesamte Reduktion		0.27			0.30			0.26			0.21			
Met.wahrsch.Beschattung		166			225			170			95			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AC - IO29

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar			März			April			Mai			Juni		
1	08:29		07:59			07:02		16:42 (2)	06:48		18:25 (6)	05:40		19:25 (11)	04:51		20:15 (9)
	16:03		16:54			17:49	26	17:08 (2)	19:46	38	19:17 (5)	20:41	30	19:55 (11)	21:30	16	20:31 (9)
2	08:29		07:57			07:00		16:41 (2)	06:46		18:26 (6)	05:38		19:25 (11)	04:50		20:16 (9)
	16:04		16:55			17:50	26	17:07 (2)	19:48	40	19:19 (5)	20:42	30	19:55 (11)	21:31	15	20:31 (9)
3	08:28		07:56			06:58		16:42 (2)	06:43		18:28 (6)	05:36		19:24 (11)	04:49		20:17 (9)
	16:05		16:57			17:52	25	17:07 (2)	19:50	40	19:21 (5)	20:44	31	19:55 (11)	21:32	14	20:31 (9)
4	08:28		07:54			06:55		16:42 (2)	06:41		18:28 (6)	05:34		19:24 (11)	04:48		20:18 (9)
	16:06		16:59			17:54	25	17:07 (2)	19:52	40	19:21 (5)	20:46	31	19:55 (11)	21:33	12	20:30 (9)
5	08:28		07:52			06:53		16:42 (2)	06:38		18:31 (6)	05:32		19:25 (11)	04:48		20:18 (9)
	16:08		17:01			17:56	24	17:06 (2)	19:53	35	19:21 (5)	20:48	31	19:56 (11)	21:34	11	20:29 (9)
6	08:27		07:50			06:51		16:43 (2)	06:36		18:35 (6)	05:30		19:25 (11)	04:47		20:20 (9)
	16:09		17:03			17:58	22	17:05 (2)	19:55	28	19:22 (5)	20:50	31	19:56 (11)	21:35	9	20:29 (9)
7	08:27		07:49			06:48		16:43 (2)	06:34		18:58 (5)	05:28		19:25 (11)	04:46		20:21 (9)
	16:10		17:05			18:00	20	17:03 (2)	19:57	23	19:21 (5)	20:51	30	19:55 (11)	21:36	13	20:51 (10)
8	08:26		07:47			06:46		16:45 (2)	06:31		18:58 (5)	05:26		19:25 (11)	04:46		20:23 (9)
	16:12		17:07			18:02	17	17:02 (2)	19:59	23	19:21 (5)	20:53	30	19:55 (11)	21:37	13	20:53 (10)
9	08:26		07:45			06:44		16:47 (2)	06:29		18:59 (5)	05:24		19:26 (11)	04:45		20:42 (10)
	16:13		17:09			18:04	13	17:00 (2)	20:01	21	19:20 (5)	20:55	29	19:55 (11)	21:38	12	20:54 (10)
10	08:25		07:43			06:41		16:51 (2)	06:27		18:58 (5)	05:22		19:26 (11)	04:45		20:42 (10)
	16:15		17:11			18:06	4	16:55 (2)	20:03	21	19:19 (5)	20:57	28	19:54 (11)	21:39	13	20:55 (10)
11	08:25		07:41			06:39			06:24		18:59 (5)	05:20		19:26 (11)	04:44		20:42 (10)
	16:16		17:13			18:07			20:04	19	19:18 (5)	20:58	34	20:25 (9)	21:40	14	20:56 (10)
12	08:24		07:39			06:37			06:22		19:00 (5)	05:19		19:27 (11)	04:44		20:42 (10)
	16:18		17:15			18:09			20:06	17	19:17 (5)	21:00	37	20:28 (9)	21:41	15	20:57 (10)
13	08:23		07:37			06:34			06:20		19:01 (5)	05:17		19:27 (11)	04:43		20:41 (10)
	16:19		17:17			18:11			20:08	14	19:15 (5)	21:02	39	20:29 (9)	21:41	16	20:57 (10)
14	08:22		07:35			06:32			06:17		19:04 (5)	05:15		19:28 (11)	04:43		20:41 (10)
	16:21		17:19			18:13			20:10	8	19:12 (5)	21:03	40	20:30 (9)	21:42	17	20:58 (10)
15	08:21		07:33			06:29			06:15		19:39 (7)	05:14		19:29 (11)	04:43		20:41 (10)
	16:22		17:21			18:15			20:12	5	19:44 (7)	21:05	39	20:31 (9)	21:43	17	20:58 (10)
16	08:20		07:31		16:45 (1)	06:27			06:13		19:36 (7)	05:12		19:30 (11)	04:43		20:41 (10)
	16:24		17:23	9	16:54 (1)	18:17			20:13	10	19:46 (7)	21:07	38	20:31 (9)	21:43	18	20:59 (10)
17	08:19		07:29		16:43 (1)	06:25			06:10		19:33 (7)	05:10		19:32 (11)	04:43		20:41 (10)
	16:26		17:25	13	16:56 (1)	18:19			20:15	14	19:47 (7)	21:08	36	20:32 (9)	21:44	18	20:59 (10)
18	08:18		07:27		16:42 (1)	06:22			06:08		19:32 (7)	05:09		19:35 (11)	04:43		20:41 (10)
	16:27		17:27	17	16:59 (1)	18:20			20:17	17	19:49 (7)	21:10	32	20:33 (9)	21:44	19	21:00 (10)
19	08:17		07:25		16:42 (1)	06:20		17:40 (6)	06:06		19:32 (7)	05:07		19:37 (11)	04:43		20:41 (10)
	16:29		17:29	18	17:00 (1)	18:22	5	17:45 (6)	20:19	18	19:50 (7)	21:11	27	20:33 (9)	21:44	19	21:00 (10)
20	08:16		07:22		16:40 (1)	06:17		17:36 (6)	06:03		19:31 (7)	05:06		20:11 (9)	04:43		20:41 (10)
	16:31		17:31	19	16:59 (1)	18:24	14	17:50 (6)	20:21	19	19:50 (7)	21:13	22	20:33 (9)	21:45	19	21:00 (10)
21	08:15		07:20		16:40 (1)	06:15		17:32 (6)	06:01		19:31 (7)	05:04		20:12 (9)	04:43		20:41 (10)
	16:33		17:33	20	17:00 (1)	18:26	19	17:51 (6)	20:23	19	19:50 (7)	21:15	21	20:33 (9)	21:45	19	21:00 (10)
22	08:14		07:18		16:40 (1)	06:12		17:31 (6)	05:59		19:30 (7)	05:03		20:11 (9)	04:43		20:42 (10)
	16:35		17:35	21	17:01 (2)	18:28	22	17:53 (6)	20:24	19	19:49 (7)	21:16	22	20:33 (9)	21:45	19	21:01 (10)
23	08:12		07:16		16:41 (1)	06:10		17:29 (6)	05:57		19:30 (7)	05:01		20:11 (9)	04:43		20:42 (10)
	16:36		17:37	23	17:04 (2)	18:30	24	17:53 (6)	20:26	19	19:49 (7)	21:18	22	20:33 (9)	21:45	19	21:01 (10)
24	08:11		07:14		16:40 (1)	06:08		17:28 (6)	05:55		19:30 (7)	05:00		20:12 (9)	04:44		20:42 (10)
	16:38		17:39	25	17:05 (2)	18:32	26	17:54 (6)	20:28	19	19:49 (11)	21:19	21	20:33 (9)	21:45	19	21:01 (10)
25	08:10		07:11		16:41 (1)	06:05		17:27 (6)	05:52		19:30 (7)	04:59		20:12 (9)	04:44		20:43 (10)
	16:40		17:41	25	17:06 (2)	18:33	27	17:54 (6)	20:30	21	19:51 (11)	21:21	21	20:33 (9)	21:46	18	21:01 (10)
26	08:08		07:09		16:42 (1)	06:03		17:26 (6)	05:50		19:30 (11)	04:58		20:12 (9)	04:44		20:43 (10)
	16:42		17:43	25	17:07 (2)	18:35	29	17:55 (6)	20:32	22	19:52 (11)	21:22	21	20:33 (9)	21:46	18	21:01 (10)
27	08:07		07:07		16:42 (2)	06:00		17:26 (6)	05:48		19:29 (11)	04:56		20:13 (9)	04:45		20:44 (10)
	16:44		17:45	25	17:07 (2)	18:37	29	17:55 (6)	20:33	24	19:53 (11)	21:23	20	20:33 (9)	21:45	18	21:02 (10)
28	08:05		07:05		16:42 (2)	05:58		17:25 (6)	05:46		19:28 (11)	04:55		20:13 (9)	04:45		20:44 (10)
	16:46		17:47	25	17:07 (2)	18:39	29	17:54 (6)	20:35	26	19:54 (11)	21:25	20	20:33 (9)	21:45	17	21:01 (10)
29	08:04					06:55		18:26 (6)	05:44		19:27 (11)	04:54		20:14 (9)	04:46		20:45 (10)
	16:48					19:41	28	18:54 (6)	20:37	28	19:55 (11)	21:26	19	20:33 (9)	21:45	16	21:01 (10)
30	08:02					06:53		18:25 (6)	05:42		19:26 (11)	04:53		20:14 (9)	04:47		20:45 (10)
	16:50					19:42	28	18:53 (6)	20:39	29	19:55 (11)	21:27	18	20:32 (9)	21:45	16	21:01 (10)
31	08:01					06:51		18:26 (6)				04:52		20:15 (9)			
	16:52					19:44	33	19:15 (5)				21:29	17	20:32 (9)			
Sonnenscheinstunden	252		274			367			419			492			508		
astr.max.mögl.Beschattung				265			515			676			867			479	
Red.Sonnenscheinwahrsch.				0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer				0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung				0.69			0.69			0.68			0.66			0.64	
Gesamte Reduktion				0.15			0.20			0.26			0.31			0.26	
Met.wahrsch.Beschattung				40			102			173			268			127	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AC - IO29

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober				November	Dezember
1 | 04:47		20:46 (10) | 05:26		19:37 (11) | 06:20		18:58 (5) | 07:12			07:10	08:04
| 21:45	15	21:01 (10) | 21:10	37	20:38 (9) | 20:04	19	19:17 (5) | 18:51			16:42	15:58
2 | 04:48		20:47 (10) | 05:28		19:36 (11) | 06:22		18:57 (5) | 07:14			07:12	08:05
| 21:44	14	21:01 (10) | 21:08	32	20:34 (9) | 20:02	21	19:18 (5) | 18:49			16:40	15:57
3 | 04:49		20:47 (10) | 05:30		19:36 (11) | 06:23		18:56 (5) | 07:16			07:14	08:07
| 21:44	12	20:59 (10) | 21:06	29	20:05 (11) | 20:00	21	19:17 (5) | 18:47			16:38	15:57
4 | 04:50		20:48 (10) | 05:31		19:35 (11) | 06:25		18:56 (5) | 07:18		17:26 (2) | 07:15		08:08
| 21:43	11	20:59 (10) | 21:05	29	20:04 (11) | 19:57	22	19:18 (5) | 18:44	10	17:36 (2) | 16:36		15:56
5 | 04:50		20:28 (9) | 05:33		19:35 (11) | 06:27		18:55 (5) | 07:19		17:23 (2) | 07:17		08:10
| 21:43	13	20:58 (10) | 21:03	30	20:05 (11) | 19:55	23	19:18 (5) | 18:42	15	17:38 (2) | 16:34		15:55
6 | 04:51		20:27 (9) | 05:35		19:34 (11) | 06:29		18:31 (6) | 07:21		17:21 (2) | 07:19		08:11
| 21:42	12	20:56 (10) | 21:01	31	20:05 (11) | 19:52	27	19:17 (5) | 18:39	19	17:40 (2) | 16:32		15:55
7 | 04:52		20:26 (9) | 05:36		19:34 (11) | 06:30		18:26 (6) | 07:23		17:18 (2) | 07:21		08:12
| 21:42	10	20:36 (9) | 20:59	31	20:05 (11) | 19:50	35	19:16 (5) | 18:37	22	17:40 (2) | 16:30		15:54
8 | 04:53		20:25 (9) | 05:38		19:34 (11) | 06:32		18:24 (6) | 07:25		17:17 (2) | 07:23		08:14
| 21:41	12	20:37 (9) | 20:57	31	20:05 (11) | 19:48	39	19:16 (5) | 18:35	24	17:41 (2) | 16:28		15:54
9 | 04:54		20:25 (9) | 05:40		19:34 (11) | 06:34		18:21 (6) | 07:27		17:16 (2) | 07:25		08:15
| 21:40	13	20:38 (9) | 20:55	31	20:05 (11) | 19:45	40	19:14 (5) | 18:32	25	17:41 (2) | 16:27		15:54
10 | 04:55		20:24 (9) | 05:42		19:34 (11) | 06:36		18:20 (6) | 07:28		17:16 (2) | 07:27		08:16
| 21:39	15	20:39 (9) | 20:53	31	20:05 (11) | 19:43	40	19:13 (5) | 18:30	25	17:41 (2) | 16:25		15:53
11 | 04:56		20:24 (9) | 05:43		19:33 (11) | 06:37		18:19 (6) | 07:30		17:15 (2) | 07:29		08:17
| 21:38	15	20:39 (9) | 20:51	31	20:04 (11) | 19:40	38	19:11 (5) | 18:27	26	17:41 (2) | 16:23		15:53
12 | 04:58		20:23 (9) | 05:45		19:34 (11) | 06:39		18:17 (6) | 07:32		17:15 (2) | 07:31		08:18
| 21:38	17	20:40 (9) | 20:49	30	20:04 (11) | 19:38	34	19:07 (5) | 18:25	26	17:41 (2) | 16:22		15:53
13 | 04:59		20:23 (9) | 05:47		19:35 (11) | 06:41		18:16 (6) | 07:34		17:15 (2) | 07:33		08:19
| 21:37	17	20:40 (9) | 20:47	29	20:04 (11) | 19:35	28	18:44 (6) | 18:23	26	17:41 (2) | 16:20		15:53
14 | 05:00		20:22 (9) | 05:48		19:34 (11) | 06:42		18:16 (6) | 07:36		17:15 (2) | 07:34		08:20
| 21:36	19	20:41 (9) | 20:45	28	20:02 (11) | 19:33	28	18:44 (6) | 18:20	25	17:40 (2) | 16:18		15:53
15 | 05:01		20:22 (9) | 05:50		19:35 (11) | 06:44		18:16 (6) | 07:38		17:16 (1) | 07:36		08:21
| 21:35	19	20:41 (9) | 20:43	27	20:02 (11) | 19:30	28	18:44 (6) | 18:18	24	17:40 (2) | 16:17		15:53
16 | 05:02		20:22 (9) | 05:52		19:36 (11) | 06:46		18:15 (6) | 07:39		17:14 (1) | 07:38		08:22
| 21:33	19	20:41 (9) | 20:41	25	20:01 (11) | 19:28	28	18:43 (6) | 18:16	25	17:39 (2) | 16:15		15:53
17 | 05:04		20:22 (9) | 05:54		19:37 (11) | 06:48		18:15 (6) | 07:41		17:13 (1) | 07:40		08:23
| 21:32	21	20:43 (9) | 20:38	22	19:59 (11) | 19:26	28	18:43 (6) | 18:14	25	17:38 (2) | 16:14		15:53
18 | 05:05		20:22 (9) | 05:55		19:37 (7) | 06:49		18:15 (6) | 07:43		17:11 (1) | 07:42		08:24
| 21:31	21	20:43 (9) | 20:36	20	19:57 (11) | 19:23	28	18:43 (6) | 18:11	24	17:35 (2) | 16:12		15:53
19 | 05:07		20:21 (9) | 05:57		19:36 (7) | 06:51		18:15 (6) | 07:45		17:11 (1) | 07:44		08:25
| 21:30	22	20:43 (9) | 20:34	19	19:55 (11) | 19:21	26	18:41 (6) | 18:09	22	17:33 (2) | 16:11		15:54
20 | 05:08		20:21 (9) | 05:59		19:35 (7) | 06:53		18:15 (6) | 07:47		17:11 (1) | 07:45		08:25
| 21:29	22	20:43 (9) | 20:32	20	19:55 (7) | 19:18	25	18:40 (6) | 18:07	19	17:30 (1) | 16:10		15:54
21 | 05:09		20:22 (9) | 06:01		19:35 (7) | 06:55		18:16 (6) | 07:49		17:11 (1) | 07:47		08:26
| 21:27	21	20:43 (9) | 20:30	20	19:55 (7) | 19:16	23	18:39 (6) | 18:05	19	17:30 (1) | 16:08		15:54
22 | 05:11		20:21 (9) | 06:02		19:34 (7) | 06:56		18:18 (6) | 07:51		17:11 (1) | 07:49		08:26
| 21:26	22	20:43 (9) | 20:27	20	19:54 (7) | 19:13	19	18:37 (6) | 18:02	19	17:30 (1) | 16:07		15:55
23 | 05:12		20:21 (9) | 06:04		19:35 (7) | 06:58		18:18 (6) | 07:53		17:11 (1) | 07:51		08:27
| 21:24	22	20:43 (9) | 20:25	19	19:54 (7) | 19:11	16	18:34 (6) | 18:00	18	17:29 (1) | 16:06		15:55
24 | 05:14		20:22 (9) | 06:06		19:35 (7) | 07:00		18:22 (6) | 07:54		17:12 (1) | 07:53		08:27
| 21:23	21	20:43 (9) | 20:23	18	19:53 (7) | 19:08	9	18:31 (6) | 17:58	16	17:28 (1) | 16:05		15:56
25 | 05:15		19:46 (11) | 06:08		19:35 (7) | 07:02		| 06:56		16:13 (1) | 07:54		08:28
| 21:21	29	20:43 (9) | 20:21	17	19:52 (7) | 19:06		| 16:56	12	16:25 (1) | 16:04		15:57
26 | 05:17		19:44 (11) | 06:09		19:36 (7) | 07:03		| 06:58		16:16 (1) | 07:56		08:28
| 21:20	34	20:43 (9) | 20:18	14	19:50 (7) | 19:04		| 16:54	8	16:24 (1) | 16:03		15:57
27 | 05:18		19:42 (11) | 06:11		19:38 (7) | 07:05		| 07:00			07:58		08:28
| 21:18	37	20:42 (9) | 20:16	10	19:48 (7) | 19:01		| 16:52			16:02		15:58
28 | 05:20		19:41 (11) | 06:13		19:41 (7) | 07:07		| 07:02			07:59		08:28
| 21:17	37	20:42 (9) | 20:14	3	19:44 (7) | 18:59		| 16:50			16:01		15:59
29 | 05:22		19:39 (11) | 06:15		19:04 (5) | 07:09		| 07:04			08:01		08:29
| 21:15	39	20:41 (9) | 20:11	9	19:13 (5) | 18:56		| 16:48			16:00		16:00
30 | 05:23		19:39 (11) | 06:16		19:02 (5) | 07:11		| 07:06			08:02		08:29
| 21:13	39	20:41 (9) | 20:09	14	19:16 (5) | 18:54		| 16:46			15:59		16:01
31 | 05:25		19:37 (11) | 06:18		18:59 (5) |		| 07:08					08:29
| 21:12	39	20:39 (9) | 20:07	17	19:16 (5) |		| 16:44					16:02
Sonnenscheinstunden	510		459		382			329			260		235
astr.max.mögl.Beschattung		659		724		645			474				
Red.Sonnenscheinwahrsch.		0.45		0.49		0.40			0.33				
Reduktion Betriebsdauer		0.91		0.91		0.91			0.91				
Reduktion Windrichtung		0.65		0.67		0.69			0.69				
Gesamte Reduktion		0.27		0.30		0.26			0.21				
Met.wahrsch.Beschattung		176		215		165			98				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AD - IO30

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar			Februar			März			April			Mai			Juni		
1	08:29		07:59			07:02			16:42 (2)	06:48		18:25 (6)	05:40		19:22 (11)	04:51	
	16:03		16:54			17:49	25		17:07 (2)	19:46	40	19:18 (5)	20:41	31	19:53 (11)	21:30	16
2	08:29		07:57			07:00			16:41 (2)	06:46		18:27 (6)	05:38		19:22 (11)	04:50	
	16:04		16:55			17:50	25		17:06 (2)	19:48	39	19:19 (5)	20:42	30	19:52 (11)	21:31	16
3	08:28		07:56			06:58			16:41 (2)	06:43		18:29 (6)	05:36		19:22 (11)	04:49	
	16:05		16:57			17:52	25		17:06 (2)	19:50	37	19:20 (5)	20:44	30	19:52 (11)	21:32	16
4	08:28		07:54			06:55			16:42 (2)	06:41		18:31 (6)	05:34		19:21 (11)	04:48	
	16:06		16:59			17:54	24		17:06 (2)	19:52	31	19:19 (5)	20:46	31	19:52 (11)	21:33	15
5	08:28		07:52			06:53			16:42 (2)	06:38		18:58 (5)	05:32		19:22 (11)	04:48	
	16:08		17:01			17:56	22		17:04 (2)	19:53	22	19:20 (5)	20:48	30	19:52 (11)	21:34	16
6	08:27		07:50			06:51			16:43 (2)	06:36		18:58 (5)	05:30		19:23 (11)	04:47	
	16:09		17:03			17:58	21		17:04 (2)	19:55	22	19:20 (5)	20:50	29	19:52 (11)	21:35	18
7	08:27		07:49			06:48			16:44 (2)	06:34		18:57 (5)	05:28		19:23 (11)	04:46	
	16:10		17:05			18:00	17		17:01 (2)	19:57	22	19:19 (5)	20:51	28	19:51 (11)	21:36	19
8	08:26		07:47			06:46			16:46 (2)	06:31		18:57 (5)	05:26		19:23 (11)	04:46	
	16:12		17:07			18:02	13		16:59 (2)	19:59	21	19:18 (5)	20:53	27	19:50 (11)	21:37	20
9	08:26		07:45			06:44			16:50 (2)	06:29		18:58 (5)	05:24		19:24 (11)	04:45	
	16:13		17:09			18:04	6		16:56 (2)	20:01	20	19:18 (5)	20:55	32	20:23 (9)	21:38	21
10	08:25		07:43			06:41				06:27		18:58 (5)	05:22		19:25 (11)	04:45	
	16:15		17:11			18:06				20:03	18	19:16 (5)	20:57	35	20:25 (9)	21:39	21
11	08:25		07:41			06:39				06:24		18:59 (5)	05:20		19:25 (11)	04:44	
	16:16		17:13			18:07				20:04	16	19:15 (5)	20:58	37	20:26 (9)	21:40	22
12	08:24		07:39			06:37				06:22		19:01 (5)	05:19		19:27 (11)	04:44	
	16:18		17:15			18:09				20:06	12	19:13 (5)	21:00	36	20:28 (9)	21:41	23
13	08:23		07:37			06:34				06:20		19:04 (5)	05:17		19:28 (11)	04:43	
	16:19		17:17			18:11				20:08	5	19:09 (5)	21:02	35	20:28 (9)	21:41	23
14	08:22		07:35			06:32				06:17		19:37 (7)	05:15		19:29 (11)	04:43	
	16:21		17:19			18:13				20:10	5	19:42 (7)	21:03	33	20:28 (9)	21:42	24
15	08:21		07:33		16:46 (1)	06:29				06:15		19:34 (7)	05:14		19:32 (11)	04:43	
	16:22		17:21	6	16:52 (1)	18:15				20:12	10	19:44 (7)	21:05	29	20:29 (9)	21:43	23
16	08:20		07:31		16:44 (1)	06:27				06:13		19:32 (7)	05:12		20:08 (9)	04:43	
	16:24		17:23	10	16:54 (1)	18:17				20:13	14	19:46 (7)	21:07	21	20:29 (9)	21:43	24
17	08:19		07:29		16:43 (1)	06:25				06:10		19:30 (7)	05:10		20:09 (9)	04:43	
	16:26		17:25	13	16:56 (1)	18:19				20:15	17	19:47 (7)	21:08	21	20:30 (9)	21:44	24
18	08:18		07:27		16:42 (1)	06:22			17:38 (6)	06:08		19:30 (7)	05:09		20:09 (9)	04:43	
	16:27		17:27	17	16:59 (1)	18:20	8		17:46 (6)	20:17	18	19:48 (7)	21:10	22	20:31 (9)	21:44	24
19	08:17		07:25		16:41 (1)	06:20			17:33 (6)	06:06		19:29 (7)	05:07		20:08 (9)	04:43	
	16:29		17:29	18	16:59 (1)	18:22	15		17:48 (6)	20:19	19	19:48 (7)	21:11	22	20:30 (9)	21:44	25
20	08:16		07:22		16:40 (1)	06:17			17:31 (6)	06:03		19:29 (7)	05:06		20:09 (9)	04:43	
	16:31		17:31	19	16:59 (1)	18:24	20		17:51 (6)	20:21	19	19:48 (7)	21:13	21	20:30 (9)	21:45	25
21	08:15		07:20		16:40 (1)	06:15			17:29 (6)	06:01		19:29 (7)	05:04		20:09 (9)	04:43	
	16:33		17:33	19	16:59 (1)	18:26	22		17:51 (6)	20:23	19	19:48 (7)	21:15	22	20:31 (9)	21:45	25
22	08:14		07:18		16:40 (1)	06:12			17:28 (6)	05:59		19:28 (7)	05:03		20:09 (9)	04:43	
	16:35		17:35	22	17:02 (2)	18:28	24		17:52 (6)	20:24	19	19:47 (7)	21:16	21	20:30 (9)	21:45	25
23	08:12		07:16		16:41 (1)	06:10			17:26 (6)	05:57		19:28 (7)	05:01		20:09 (9)	04:43	
	16:36		17:37	23	17:04 (2)	18:30	26		17:52 (6)	20:26	20	19:48 (11)	21:18	21	20:30 (9)	21:45	25
24	08:11		07:14		16:40 (1)	06:08			17:26 (6)	05:55		19:27 (11)	05:00		20:10 (9)	04:44	
	16:38		17:39	25	17:05 (2)	18:32	27		17:53 (6)	20:28	23	19:50 (11)	21:19	20	20:30 (9)	21:45	24
25	08:10		07:11		16:41 (1)	06:05			17:25 (6)	05:52		19:26 (11)	04:59		20:10 (9)	04:44	
	16:40		17:41	25	17:06 (2)	18:33	28		17:53 (6)	20:30	25	19:51 (11)	21:21	20	20:30 (9)	21:46	24
26	08:08		07:09		16:43 (1)	06:03			17:25 (6)	05:50		19:25 (11)	04:58		20:11 (9)	04:44	
	16:42		17:43	24	17:07 (2)	18:35	28		17:53 (6)	20:32	26	19:51 (11)	21:22	18	20:29 (9)	21:46	24
27	08:07		07:07		16:42 (2)	06:00			17:25 (6)	05:48		19:24 (11)	04:56		20:12 (9)	04:45	
	16:44		17:45	24	17:06 (2)	18:37	28		17:53 (6)	20:33	28	19:52 (11)	21:23	17	20:29 (9)	21:45	24
28	08:05		07:05		16:42 (2)	05:58			17:24 (6)	05:46		19:23 (11)	04:55		20:12 (9)	04:45	
	16:46		17:47	25	17:07 (2)	18:39	28		17:52 (6)	20:35	29	19:52 (11)	21:25	17	20:29 (9)	21:45	23
29	08:04					06:55			18:25 (6)	05:44		19:23 (11)	04:54		20:13 (9)	04:46	
	16:48					19:41	27		18:52 (6)	20:37	30	19:53 (11)	21:26	15	20:28 (9)	21:45	24
30	08:02					06:53			18:24 (6)	05:42		19:22 (11)	04:53		20:14 (9)	04:47	
	16:50					19:42	33		19:14 (5)	20:39	31	19:53 (11)	21:27	13	20:27 (9)	21:45	23
31	08:01					06:51			18:25 (6)				04:52		20:14 (9)		
	16:52					19:44	38		19:17 (5)				21:29	13	20:27 (9)		
Sonnenscheinstunden		252		274			367			419			492			508	
astr.max.mögl.Beschattung				270			530			657			777			656	
Red.Sonnenscheinwahrsch.				0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer				0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung				0.69			0.69			0.68			0.66			0.64	
Gesamte Reduktion				0.15			0.20			0.26			0.31			0.27	
Met.wahrsch.Beschattung				40			105			168			240			174	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AD - IO30

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli			August			September			Oktober			November	Dezember
1	04:47		20:38 (10)	05:26		19:37 (11)	06:20		18:58 (5)	07:12			07:10	08:04
	21:45	22	21:00 (10)	21:10	37	20:38 (9)	20:04	16	19:14 (5)	18:51			16:42	15:58
2	04:48		20:39 (10)	05:28		19:35 (11)	06:22		18:57 (5)	07:14			07:12	08:05
	21:44	21	21:00 (10)	21:08	36	20:36 (9)	20:02	18	19:15 (5)	18:49			16:40	15:57
3	04:49		20:39 (10)	05:30		19:35 (11)	06:23		18:55 (5)	07:16			07:14	08:07
	21:44	21	21:00 (10)	21:06	35	20:35 (9)	20:00	20	19:15 (5)	18:47			16:38	15:57
4	04:50		20:39 (10)	05:31		19:33 (11)	06:25		18:54 (5)	07:18			07:15	08:08
	21:43	21	21:00 (10)	21:05	27	20:00 (11)	19:57	21	19:15 (5)	18:44			16:36	15:56
5	04:50		20:40 (10)	05:33		19:33 (11)	06:27		18:54 (5)	07:19		17:25 (2)	07:17	08:10
	21:43	19	20:59 (10)	21:03	28	20:01 (11)	19:55	22	19:16 (5)	18:42	10	17:35 (2)	16:34	15:55
6	04:51		20:41 (10)	05:35		19:32 (11)	06:29		18:53 (5)	07:21		17:22 (2)	07:19	08:11
	21:42	18	20:59 (10)	21:01	28	20:00 (11)	19:52	22	19:15 (5)	18:39	15	17:37 (2)	16:32	15:55
7	04:52		20:42 (10)	05:36		19:32 (11)	06:30		18:53 (5)	07:23		17:19 (2)	07:21	08:12
	21:42	17	20:59 (10)	20:59	29	20:01 (11)	19:50	22	19:15 (5)	18:37	19	17:38 (2)	16:30	15:54
8	04:53		20:43 (10)	05:38		19:32 (11)	06:32		18:26 (6)	07:25		17:18 (2)	07:23	08:14
	21:41	15	20:58 (10)	20:57	30	20:02 (11)	19:48	31	19:14 (5)	18:35	21	17:39 (2)	16:28	15:54
9	04:54		20:44 (10)	05:40		19:31 (11)	06:34		18:22 (6)	07:27		17:17 (2)	07:25	08:15
	21:40	14	20:58 (10)	20:55	30	20:01 (11)	19:45	37	19:13 (5)	18:32	23	17:40 (2)	16:27	15:54
10	04:55		20:26 (9)	05:42		19:31 (11)	06:36		18:20 (6)	07:28		17:16 (2)	07:27	08:16
	21:39	18	20:57 (10)	20:53	31	20:02 (11)	19:43	39	19:12 (5)	18:30	24	17:40 (2)	16:25	15:53
11	04:56		20:24 (9)	05:43		19:30 (11)	06:37		18:19 (6)	07:30		17:15 (2)	07:29	08:17
	21:38	18	20:55 (10)	20:51	31	20:01 (11)	19:40	39	19:11 (5)	18:27	25	17:40 (2)	16:23	15:53
12	04:58		20:23 (9)	05:45		19:30 (11)	06:39		18:17 (6)	07:32		17:15 (2)	07:31	08:18
	21:38	12	20:35 (9)	20:49	31	20:01 (11)	19:38	37	19:08 (5)	18:25	25	17:40 (2)	16:22	15:53
13	04:59		20:23 (9)	05:47		19:31 (11)	06:41		18:16 (6)	07:34		17:15 (2)	07:33	08:19
	21:37	13	20:36 (9)	20:47	30	20:01 (11)	19:35	35	19:06 (5)	18:23	25	17:40 (2)	16:20	15:53
14	05:00		20:22 (9)	05:48		19:30 (11)	06:42		18:15 (6)	07:36		17:15 (2)	07:34	08:20
	21:36	14	20:36 (9)	20:45	30	20:00 (11)	19:33	27	18:42 (6)	18:20	25	17:40 (2)	16:18	15:53
15	05:01		20:21 (9)	05:50		19:31 (11)	06:44		18:15 (6)	07:38		17:15 (2)	07:36	08:21
	21:35	16	20:37 (9)	20:43	29	20:00 (11)	19:30	27	18:42 (6)	18:18	24	17:39 (2)	16:17	15:53
16	05:02		20:20 (9)	05:52		19:32 (11)	06:46		18:13 (6)	07:39		17:15 (1)	07:38	08:22
	21:33	17	20:37 (9)	20:41	27	19:59 (11)	19:28	28	18:41 (6)	18:16	24	17:39 (2)	16:15	15:53
17	05:04		20:21 (9)	05:54		19:32 (11)	06:48		18:13 (6)	07:41		17:13 (1)	07:40	08:23
	21:32	18	20:39 (9)	20:38	26	19:58 (11)	19:26	28	18:41 (6)	18:14	25	17:38 (2)	16:14	15:53
18	05:05		20:20 (9)	05:55		19:33 (11)	06:49		18:13 (6)	07:43		17:11 (1)	07:42	08:24
	21:31	19	20:39 (9)	20:36	24	19:57 (11)	19:23	28	18:41 (6)	18:11	24	17:35 (2)	16:12	15:53
19	05:07		20:20 (9)	05:57		19:33 (11)	06:51		18:12 (6)	07:45		17:11 (1)	07:44	08:25
	21:30	19	20:39 (9)	20:34	22	19:55 (11)	19:21	28	18:40 (6)	18:09	23	17:34 (2)	16:11	15:54
20	05:08		20:19 (9)	05:59		19:34 (7)	06:53		18:13 (6)	07:47		17:10 (1)	07:45	08:25
	21:29	20	20:39 (9)	20:32	20	19:54 (11)	19:18	26	18:39 (6)	18:07	22	17:32 (2)	16:10	15:54
21	05:09		20:19 (9)	06:01		19:34 (7)	06:55		18:13 (6)	07:49		17:10 (1)	07:47	08:26
	21:27	21	20:40 (9)	20:30	19	19:53 (7)	19:16	25	18:38 (6)	18:05	20	17:30 (1)	16:08	15:54
22	05:11		20:19 (9)	06:02		19:33 (7)	06:56		18:14 (6)	07:51		17:10 (1)	07:49	08:26
	21:26	21	20:40 (9)	20:27	19	19:52 (7)	19:13	23	18:37 (6)	18:02	19	17:29 (1)	16:07	15:55
23	05:12		20:19 (9)	06:04		19:33 (7)	06:58		18:15 (6)	07:53		17:11 (1)	07:51	08:27
	21:24	21	20:40 (9)	20:25	19	19:52 (7)	19:11	20	18:35 (6)	18:00	18	17:29 (1)	16:06	15:55
24	05:14		20:19 (9)	06:06		19:33 (7)	07:00		18:16 (6)	07:54		17:11 (1)	07:53	08:27
	21:23	22	20:41 (9)	20:23	19	19:52 (7)	19:08	17	18:33 (6)	17:58	17	17:28 (1)	16:05	15:56
25	05:15		20:19 (9)	06:08		19:32 (7)	07:02		18:19 (6)	06:56		16:12 (1)	07:54	08:28
	21:21	21	20:40 (9)	20:21	18	19:50 (7)	19:06	11	18:30 (6)	16:56	13	16:25 (1)	16:04	15:56
26	05:17		20:19 (9)	06:09		19:33 (7)	07:03			06:58		16:15 (1)	07:56	08:28
	21:20	22	20:41 (9)	20:18	17	19:50 (7)	19:04			16:54	9	16:24 (1)	16:03	15:57
27	05:18		20:19 (9)	06:11		19:34 (7)	07:05			07:00		16:18 (1)	07:58	08:28
	21:18	21	20:40 (9)	20:16	14	19:48 (7)	19:01			16:52	4	16:22 (1)	16:02	15:58
28	05:20		19:46 (11)	06:13		19:35 (7)	07:07			07:02			07:59	08:28
	21:17	24	20:40 (9)	20:14	10	19:45 (7)	18:59			16:50			16:01	15:59
29	05:22		19:41 (11)	06:15		19:38 (7)	07:09			07:04			08:01	08:29
	21:15	32	20:40 (9)	20:11	5	19:43 (7)	18:56			16:48			16:00	16:00
30	05:23		19:40 (11)	06:16		19:04 (5)	07:11			07:06			08:02	08:29
	21:13	34	20:40 (9)	20:09	6	19:10 (5)	18:54			16:46			15:59	16:01
31	05:25		19:38 (11)	06:18		19:00 (5)				07:08				08:29
	21:12	35	20:38 (9)	20:07	12	19:12 (5)				16:44				16:02
Sonnenscheinstunden	510			459			382			329			260	235
astr.max.mögl.Beschattung		626			739			647			454			
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91			
Reduktion Windrichtung		0.65			0.66			0.70			0.69			
Gesamte Reduktion		0.27			0.30			0.26			0.21			
Met.wahrsch.Beschattung		166			219			166			94			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AE - IO31

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April		Mai		Juni	
1	08:29		07:59		07:02		16:39 (2)	06:48	18:25 (6)	05:40	19:18 (11)	04:51	20:31 (10)
	16:03		16:54		17:49	25	17:04 (2)	19:46	19:16 (5)	20:41	19:49 (11)	21:30	20:47 (10)
2	08:29		07:57		07:00		16:39 (2)	06:46	18:28 (6)	05:38	19:18 (11)	04:50	20:30 (10)
	16:04		16:55		17:50	24	17:03 (2)	19:48	19:17 (5)	20:42	19:48 (11)	21:31	20:48 (10)
3	08:28		07:56		06:58		16:39 (2)	06:43	18:56 (5)	05:36	19:18 (11)	04:49	20:30 (10)
	16:05		16:57		17:52	23	17:02 (2)	19:50	19:18 (5)	20:44	19:48 (11)	21:32	20:50 (10)
4	08:28		07:54		06:55		16:40 (2)	06:41	18:55 (5)	05:34	19:18 (11)	04:48	20:29 (10)
	16:06		16:59		17:54	22	17:02 (2)	19:52	19:17 (5)	20:46	19:47 (11)	21:33	20:50 (10)
5	08:28		07:52		06:53		16:41 (2)	06:38	18:55 (5)	05:32	19:20 (11)	04:48	20:28 (10)
	16:08		17:01		17:56	19	17:00 (2)	19:53	19:17 (5)	20:48	19:47 (11)	21:34	20:50 (10)
6	08:27		07:50		06:51		16:43 (2)	06:36	18:55 (5)	05:30	19:20 (11)	04:47	20:29 (10)
	16:09		17:03		17:58	15	16:58 (2)	19:55	19:17 (5)	20:50	19:46 (11)	21:35	20:52 (10)
7	08:27		07:49		06:48		16:45 (2)	06:34	18:55 (5)	05:28	19:20 (11)	04:46	20:28 (10)
	16:10		17:05		18:00	10	16:55 (2)	19:57	19:15 (5)	20:51	19:45 (11)	21:36	20:52 (10)
8	08:26		07:47		06:46			06:31	18:56 (5)	05:26	19:21 (11)	04:46	20:28 (10)
	16:12		17:07		18:02			19:59	19:15 (5)	20:53	20:21 (9)	21:37	20:53 (10)
9	08:26		07:45		06:44			06:29	18:57 (5)	05:24	19:23 (11)	04:45	20:28 (10)
	16:13		17:09		18:04			20:01	19:14 (5)	20:55	20:24 (9)	21:38	20:53 (10)
10	08:25		07:43		06:41			06:27	18:57 (5)	05:22	19:24 (11)	04:45	20:28 (10)
	16:15		17:11		18:06			20:03	19:11 (5)	20:57	20:25 (9)	21:39	20:53 (10)
11	08:25		07:41		06:39			06:24	19:00 (5)	05:20	19:25 (11)	04:44	20:28 (10)
	16:16		17:13		18:07			20:04	19:09 (5)	20:58	20:25 (9)	21:40	20:54 (10)
12	08:24		07:39		06:37			06:22		05:19	19:28 (11)	04:44	20:29 (10)
	16:18		17:15		18:09			20:06		21:00	20:27 (9)	21:41	20:55 (10)
13	08:23		07:37		06:34			06:20	19:33 (7)	05:17	20:07 (9)	04:43	20:28 (10)
	16:19		17:17		18:11			20:08	19:40 (7)	21:02	20:27 (9)	21:41	20:54 (10)
14	08:22		07:35	16:44 (1)	06:32			06:17	19:31 (7)	05:15	20:06 (9)	04:43	20:28 (10)
	16:21		17:19	7 16:51 (1)	18:13			20:10	19:42 (7)	21:03	20:27 (9)	21:42	20:55 (10)
15	08:21		07:33	16:41 (1)	06:29			06:15	19:30 (7)	05:14	20:06 (9)	04:43	20:28 (10)
	16:22		17:21	11 16:52 (1)	18:15			20:12	19:44 (7)	21:05	20:27 (9)	21:43	20:55 (10)
16	08:20		07:31	16:40 (1)	06:27		17:36 (6)	06:13	19:29 (7)	05:12	20:05 (9)	04:43	20:29 (10)
	16:24		17:23	14 16:54 (1)	18:17	4	17:40 (6)	20:13	19:46 (7)	21:07	20:27 (9)	21:43	20:56 (10)
17	08:19		07:29	16:39 (1)	06:25		17:31 (6)	06:10	19:27 (7)	05:10	20:06 (9)	04:43	20:29 (10)
	16:26		17:25	17 16:56 (1)	18:19	14	17:45 (6)	20:15	19:46 (7)	21:08	20:28 (9)	21:44	20:56 (10)
18	08:18		07:27	16:39 (1)	06:22		17:29 (6)	06:08	19:27 (7)	05:09	20:06 (9)	04:43	20:29 (10)
	16:27		17:27	18 16:57 (1)	18:20	18	17:47 (6)	20:17	19:46 (7)	21:10	20:28 (9)	21:44	20:56 (10)
19	08:17		07:25	16:39 (1)	06:20		17:27 (6)	06:06	19:27 (7)	05:07	20:06 (9)	04:43	20:29 (10)
	16:29		17:29	19 16:58 (1)	18:22	21	17:48 (6)	20:19	19:46 (7)	21:11	20:27 (9)	21:44	20:56 (10)
20	08:16		07:22	16:38 (1)	06:17		17:26 (6)	06:03	19:27 (7)	05:06	20:06 (9)	04:43	20:29 (10)
	16:31		17:31	20 16:58 (2)	18:24	23	17:49 (6)	20:21	19:46 (7)	21:13	20:27 (9)	21:45	20:56 (10)
21	08:15		07:20	16:38 (1)	06:15		17:24 (6)	06:01	19:26 (11)	05:04	20:07 (9)	04:43	20:29 (10)
	16:33		17:33	22 17:00 (2)	18:26	25	17:49 (6)	20:23	19:46 (11)	21:15	20:28 (9)	21:45	20:57 (10)
22	08:14		07:18	16:38 (1)	06:12		17:23 (6)	05:59	19:23 (11)	05:03	20:07 (9)	04:43	20:30 (10)
	16:35		17:35	24 17:02 (2)	18:28	27	17:50 (6)	20:24	19:46 (11)	21:16	20:27 (9)	21:45	20:57 (10)
23	08:12		07:16	16:39 (1)	06:10		17:22 (6)	05:57	19:22 (11)	05:01	20:07 (9)	04:43	20:30 (10)
	16:36		17:37	24 17:03 (2)	18:30	28	17:50 (6)	20:26	19:47 (11)	21:18	20:26 (9)	21:45	20:57 (10)
24	08:11		07:14	16:39 (1)	06:08		17:22 (6)	05:55	19:21 (11)	05:00	20:08 (9)	04:44	20:30 (10)
	16:38		17:39	24 17:03 (2)	18:32	28	17:50 (6)	20:28	19:48 (11)	21:19	20:26 (9)	21:45	20:57 (10)
25	08:10		07:11	16:40 (2)	06:05		17:21 (6)	05:52	19:20 (11)	04:59	20:09 (9)	04:44	20:31 (10)
	16:40		17:41	24 17:04 (2)	18:33	28	17:49 (6)	20:30	19:48 (11)	21:21	20:26 (9)	21:46	20:58 (10)
26	08:08		07:09	16:39 (2)	06:03		17:21 (6)	05:50	19:20 (11)	04:58	20:10 (9)	04:44	20:31 (10)
	16:42		17:43	25 17:04 (2)	18:35	28	17:49 (6)	20:32	19:49 (11)	21:22	20:26 (9)	21:46	20:58 (10)
27	08:07		07:07	16:38 (2)	06:00		17:22 (6)	05:48	19:19 (11)	04:56	20:10 (9)	04:45	20:31 (10)
	16:44		17:45	26 17:04 (2)	18:37	27	17:49 (6)	20:33	19:49 (11)	21:23	20:25 (9)	21:45	20:58 (10)
28	08:05		07:05	16:39 (2)	05:58		17:22 (6)	05:46	19:19 (11)	04:55	20:11 (9)	04:45	20:31 (10)
	16:46		17:47	25 17:04 (2)	18:39	26	17:48 (6)	20:35	19:49 (11)	21:25	20:24 (9)	21:45	20:58 (10)
29	08:04				06:55		18:22 (6)	05:44	19:18 (11)	04:54	20:13 (9)	04:46	20:32 (10)
	16:48				19:41	35	19:13 (5)	20:37	19:49 (11)	21:26	20:43 (10)	21:45	20:59 (10)
30	08:02				06:53		18:23 (6)	05:42	19:18 (11)	04:53	20:14 (9)	04:47	20:32 (10)
	16:50				19:42	37	19:15 (5)	20:39	19:49 (11)	21:27	20:45 (10)	21:45	20:58 (10)
31	08:01				06:51		18:24 (6)			04:52	20:16 (9)		
	16:52				19:44	37	19:16 (5)			21:29	20:46 (10)		
Sonnenscheinstunden	252		274		367			419		492		508	
astr.max.mögl.Beschattung			300		544			633		723		756	
Red.Sonnenscheinwahrsch.			0.24		0.31			0.41		0.51		0.45	
Reduktion Betriebsdauer			0.91		0.91			0.91		0.91		0.91	
Reduktion Windrichtung			0.69		0.69			0.68		0.66		0.64	
Gesamte Reduktion			0.15		0.20			0.25		0.31		0.27	
Met.wahrsch.Beschattung			45		108			161		223		201	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AE - IO31

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November	Dezember
1	04:47		20:33 (10)	05:26	19:37 (11)	06:20	18:58 (5)	07:12	07:10	08:04
	21:45	25	20:58 (10)	21:10 32	20:37 (9)	20:04 10	19:08 (5)	18:51	16:42	15:58
2	04:48		20:33 (10)	05:28	19:35 (11)	06:22	18:56 (5)	07:14	07:12	08:05
	21:44	26	20:59 (10)	21:08 33	20:35 (9)	20:02 14	19:10 (5)	18:49	16:40	15:57
3	04:49		20:33 (10)	05:30	19:34 (11)	06:23	18:54 (5)	07:16	07:14	08:07
	21:44	25	20:58 (10)	21:06 34	20:35 (9)	20:00 17	19:11 (5)	18:47	16:38	15:57
4	04:49		20:34 (10)	05:31	19:32 (11)	06:25	18:53 (5)	07:18	07:15	08:08
	21:43	24	20:58 (10)	21:05 34	20:33 (9)	19:57 19	19:12 (5)	18:44	16:36	15:56
5	04:50		20:34 (10)	05:33	19:31 (11)	06:27	18:52 (5)	07:19	07:17	08:10
	21:43	24	20:58 (10)	21:03 32	20:31 (9)	19:55 20	19:12 (5)	18:42	16:34	15:55
6	04:51		20:35 (10)	05:35	19:30 (11)	06:29	18:50 (5)	07:21	07:19	08:11
	21:42	23	20:58 (10)	21:01 25	19:55 (11)	19:52 22	19:12 (5)	18:39 6	17:30 (2)	16:32 15:55
7	04:52		20:36 (10)	05:36	19:29 (11)	06:30	18:50 (5)	07:23	17:19 (2)	07:21 08:12
	21:42	22	20:58 (10)	20:59 27	19:56 (11)	19:50 22	19:12 (5)	18:37 13	17:32 (2)	16:30 15:54
8	04:53		20:36 (10)	05:38	19:29 (11)	06:32	18:50 (5)	07:25	17:17 (2)	07:23 08:14
	21:41	22	20:58 (10)	20:57 28	19:57 (11)	19:48 22	19:12 (5)	18:35 17	17:34 (2)	16:28 15:54
9	04:54		20:37 (10)	05:40	19:28 (11)	06:34	18:49 (5)	07:27	17:15 (2)	07:25 08:15
	21:40	20	20:57 (10)	20:55 29	19:57 (11)	19:45 22	19:11 (5)	18:32 20	17:35 (2)	16:27 15:54
10	04:55		20:38 (10)	05:42	19:28 (11)	06:36	18:21 (6)	07:28	17:14 (2)	07:27 08:16
	21:39	19	20:57 (10)	20:53 29	19:57 (11)	19:43 32	19:10 (5)	18:30 22	17:36 (2)	16:25 15:53
11	04:56		20:39 (10)	05:43	19:27 (11)	06:37	18:18 (6)	07:30	17:13 (2)	07:29 08:17
	21:38	17	20:56 (10)	20:51 30	19:57 (11)	19:40 36	19:10 (5)	18:27 24	17:37 (2)	16:23 15:53
12	04:58		20:40 (10)	05:45	19:27 (11)	06:39	18:16 (6)	07:32	17:12 (2)	07:31 08:18
	21:38	15	20:55 (10)	20:49 30	19:57 (11)	19:38 37	19:08 (5)	18:25 25	17:37 (2)	16:22 15:53
13	04:59		20:23 (9)	05:47	19:27 (11)	06:41	18:14 (6)	07:34	17:12 (2)	07:33 08:19
	21:37	19	20:54 (10)	20:47 30	19:57 (11)	19:35 37	19:06 (5)	18:23 25	17:37 (2)	16:20 15:53
14	05:00		20:22 (9)	05:48	19:26 (11)	06:42	18:13 (6)	07:36	17:12 (2)	07:34 08:20
	21:36	20	20:53 (10)	20:45 31	19:57 (11)	19:33 35	19:04 (5)	18:20 25	17:37 (2)	16:18 15:53
15	05:01		20:20 (9)	05:50	19:26 (11)	06:44	18:12 (6)	07:38	17:12 (2)	07:36 08:21
	21:35	17	20:50 (10)	20:43 31	19:57 (11)	19:30 26	18:38 (6)	18:18 25	17:37 (2)	16:17 15:53
16	05:02		20:19 (9)	05:52	19:27 (11)	06:46	18:10 (6)	07:39	17:12 (2)	07:38 08:22
	21:33	14	20:33 (9)	20:41 30	19:57 (11)	19:28 27	18:37 (6)	18:16 24	17:36 (2)	16:15 15:53
17	05:04		20:19 (9)	05:54	19:26 (11)	06:48	18:10 (6)	07:41	17:12 (1)	07:40 08:23
	21:32	16	20:35 (9)	20:38 29	19:55 (11)	19:26 28	18:38 (6)	18:14 24	17:36 (2)	16:14 15:53
18	05:05		20:19 (9)	05:55	19:27 (11)	06:49	18:10 (6)	07:43	17:10 (1)	07:42 08:24
	21:31	16	20:35 (9)	20:36 28	19:55 (11)	19:23 28	18:38 (6)	18:11 24	17:34 (2)	16:12 15:53
19	05:07		20:18 (9)	05:57	19:27 (11)	06:51	18:09 (6)	07:45	17:09 (1)	07:44 08:25
	21:30	18	20:36 (9)	20:34 26	19:53 (11)	19:21 28	18:37 (6)	18:09 24	17:33 (2)	16:11 15:54
20	05:08		20:17 (9)	05:59	19:28 (11)	06:53	18:09 (6)	07:47	17:09 (1)	07:45 08:25
	21:29	19	20:36 (9)	20:32 25	19:53 (11)	19:18 27	18:36 (6)	18:07 23	17:32 (2)	16:10 15:54
21	05:09		20:17 (9)	06:01	19:29 (11)	06:55	18:09 (6)	07:49	17:08 (1)	07:47 08:26
	21:27	20	20:37 (9)	20:30 23	19:52 (11)	19:16 27	18:36 (6)	18:05 22	17:30 (2)	16:08 15:54
22	05:11		20:17 (9)	06:02	19:30 (7)	06:56	18:09 (6)	07:51	17:08 (1)	07:49 08:26
	21:26	20	20:37 (9)	20:27 19	19:49 (7)	19:13 26	18:35 (6)	18:02 19	17:27 (1)	16:07 15:55
23	05:12		20:16 (9)	06:04	19:30 (7)	06:58	18:09 (6)	07:53	17:08 (1)	07:51 08:27
	21:24	21	20:37 (9)	20:25 20	19:50 (7)	19:11 24	18:33 (6)	18:00 19	17:27 (1)	16:06 15:55
24	05:14		20:17 (9)	06:06	19:30 (7)	07:00	18:10 (6)	07:54	17:08 (1)	07:53 08:27
	21:23	21	20:38 (9)	20:23 20	19:50 (7)	19:08 22	18:32 (6)	17:58 18	17:26 (1)	16:05 15:56
25	05:15		20:16 (9)	06:08	19:29 (7)	07:02	18:11 (6)	06:56	16:09 (1)	07:54 08:28
	21:21	22	20:38 (9)	20:21 20	19:49 (7)	19:06 20	18:31 (6)	16:56 16	16:25 (1)	16:04 15:56
26	05:17		20:17 (9)	06:09	19:30 (7)	07:03	18:13 (6)	06:58	16:11 (1)	07:56 08:28
	21:20	21	20:38 (9)	20:18 18	19:48 (7)	19:04 15	18:28 (6)	16:54 13	16:24 (1)	16:03 15:57
27	05:18		20:16 (9)	06:11	19:31 (7)	07:05	18:15 (6)	07:00	16:12 (1)	07:58 08:28
	21:18	22	20:38 (9)	20:16 17	19:48 (7)	19:01 9	18:24 (6)	16:52 10	16:22 (1)	16:02 15:58
28	05:20		20:17 (9)	06:13	19:31 (7)	07:07		07:02	16:15 (1)	07:59 08:28
	21:17	21	20:38 (9)	20:14 14	19:45 (7)	18:59		16:50 5	16:20 (1)	16:01 15:59
29	05:22		20:17 (9)	06:15	19:32 (7)	07:09		07:04		08:01 08:29
	21:15	21	20:38 (9)	20:11 11	19:43 (7)	18:56		16:48		16:00 16:00
30	05:23		20:17 (9)	06:16	19:34 (7)	07:11		07:06		08:02 08:29
	21:13	21	20:38 (9)	20:09 7	19:41 (7)	18:54		16:46		15:59 16:01
31	05:25		19:40 (11)	06:18				07:08		08:29
	21:12	26	20:37 (9)	20:07				16:44		16:02
Sonnenscheinstunden	510			459		382		329	260	235
astr.max.mögl.Beschattung		637		762		652		443		
Red.Sonnenscheinwahrsch.		0.45		0.49		0.40		0.33		
Reduktion Betriebsdauer		0.91		0.91		0.91		0.91		
Reduktion Windrichtung		0.65		0.66		0.70		0.69		
Gesamte Reduktion		0.26		0.30		0.26		0.21		
Met.wahrsch.Beschattung		169		225		167		92		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AF - IO32

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar			März			April			Mai			Juni		
1	08:29		07:59			07:02			16:43 (2)	06:48		18:26 (6)	05:40		19:22 (11)	04:51		20:16 (9)
	16:03		16:54			17:48	25		17:08 (2)	19:46	39	19:18 (5)	20:41	30	19:52 (11)	21:30	18	20:47 (10)
2	08:29		07:57			07:00			16:42 (2)	06:46		18:27 (6)	05:38		19:22 (11)	04:50		20:18 (9)
	16:04		16:55			17:50	25		17:07 (2)	19:48	39	19:19 (5)	20:42	30	19:52 (11)	21:31	17	20:48 (10)
3	08:28		07:56			06:58			16:42 (2)	06:43		18:29 (6)	05:36		19:22 (11)	04:49		20:36 (10)
	16:05		16:57			17:52	25		17:07 (2)	19:50	36	19:20 (5)	20:44	30	19:52 (11)	21:32	14	20:50 (10)
4	08:28		07:54			06:55			16:43 (2)	06:41		18:31 (6)	05:34		19:22 (11)	04:48		20:35 (10)
	16:06		16:59			17:54	24		17:07 (2)	19:52	31	19:19 (5)	20:46	30	19:52 (11)	21:33	16	20:51 (10)
5	08:28		07:52			06:53			16:43 (2)	06:38		18:58 (5)	05:32		19:23 (11)	04:48		20:34 (10)
	16:08		17:01			17:56	22		17:05 (2)	19:53	22	19:20 (5)	20:48	29	19:52 (11)	21:34	17	20:51 (10)
6	08:27		07:50			06:51			16:44 (2)	06:36		18:58 (5)	05:30		19:23 (11)	04:47		20:34 (10)
	16:09		17:03			17:58	21		17:05 (2)	19:55	22	19:20 (5)	20:50	28	19:51 (11)	21:35	19	20:53 (10)
7	08:27		07:49			06:48			16:44 (2)	06:34		18:57 (5)	05:28		19:23 (11)	04:46		20:33 (10)
	16:10		17:05			18:00	18		17:02 (2)	19:57	22	19:19 (5)	20:51	28	19:51 (11)	21:36	20	20:53 (10)
8	08:26		07:47			06:46			16:47 (2)	06:31		18:58 (5)	05:26		19:23 (11)	04:46		20:33 (10)
	16:12		17:07			18:02	14		17:01 (2)	19:59	21	19:19 (5)	20:53	27	19:50 (11)	21:37	21	20:54 (10)
9	08:26		07:45			06:44			16:50 (2)	06:29		18:58 (5)	05:24		19:25 (11)	04:45		20:32 (10)
	16:13		17:09			18:04	8		16:58 (2)	20:01	20	19:18 (5)	20:55	32	20:23 (9)	21:38	22	20:54 (10)
10	08:25		07:43			06:41				06:27		18:58 (5)	05:22		19:25 (11)	04:45		20:33 (10)
	16:15		17:11			18:06				20:03	18	19:16 (5)	20:57	35	20:25 (9)	21:39	22	20:55 (10)
11	08:25		07:41			06:39				06:24		19:00 (5)	05:20		19:26 (11)	04:44		20:33 (10)
	16:16		17:13			18:07				20:04	15	19:15 (5)	20:58	35	20:26 (9)	21:40	23	20:56 (10)
12	08:24		07:39			06:37				06:22		19:01 (5)	05:19		19:28 (11)	04:44		20:33 (10)
	16:18		17:15			18:09				20:06	12	19:13 (5)	21:00	35	20:28 (9)	21:41	23	20:56 (10)
13	08:23		07:37			06:34				06:20		19:04 (5)	05:17		19:29 (11)	04:43		20:32 (10)
	16:19		17:17			18:11				20:08	4	19:08 (5)	21:02	34	20:28 (9)	21:41	24	20:56 (10)
14	08:22		07:35			06:32				06:17		19:36 (7)	05:15		19:30 (11)	04:43		20:32 (10)
	16:21		17:19			18:13				20:10	6	19:42 (7)	21:03	31	20:28 (9)	21:42	25	20:57 (10)
15	08:21		07:33		16:48 (1)	06:29				06:15		19:34 (7)	05:14		19:34 (11)	04:43		20:33 (10)
	16:22		17:21	4	16:52 (1)	18:15				20:12	10	19:44 (7)	21:05	25	20:29 (9)	21:43	24	20:57 (10)
16	08:20		07:31		16:45 (1)	06:27				06:13		19:32 (7)	05:12		20:08 (9)	04:43		20:33 (10)
	16:24		17:23	9	16:54 (1)	18:17				20:13	14	19:46 (7)	21:07	21	20:29 (9)	21:43	25	20:58 (10)
17	08:19		07:29		16:44 (1)	06:25				06:10		19:30 (7)	05:10		20:08 (9)	04:43		20:33 (10)
	16:26		17:25	12	16:56 (1)	18:19				20:15	17	19:47 (7)	21:08	22	20:30 (9)	21:44	25	20:58 (10)
18	08:18		07:27		16:43 (1)	06:22			17:39 (6)	06:08		19:30 (7)	05:09		20:09 (9)	04:43		20:33 (10)
	16:27		17:27	16	16:59 (1)	18:20	6		17:45 (6)	20:17	18	19:48 (7)	21:10	21	20:30 (9)	21:44	25	20:58 (10)
19	08:17		07:25		16:42 (1)	06:20			17:34 (6)	06:06		19:29 (7)	05:07		20:08 (9)	04:43		20:33 (10)
	16:29		17:29	18	17:00 (1)	18:22	14		17:48 (6)	20:19	19	19:48 (7)	21:11	22	20:30 (9)	21:44	25	20:58 (10)
20	08:16		07:22		16:41 (1)	06:17			17:32 (6)	06:03		19:29 (7)	05:06		20:09 (9)	04:43		20:33 (10)
	16:31		17:31	19	17:00 (1)	18:24	19		17:51 (6)	20:21	19	19:48 (7)	21:13	21	20:30 (9)	21:45	25	20:58 (10)
21	08:15		07:20		16:41 (1)	06:15			17:30 (6)	06:01		19:29 (7)	05:04		20:09 (9)	04:43		20:33 (10)
	16:33		17:33	19	17:00 (1)	18:26	21		17:51 (6)	20:23	19	19:48 (7)	21:15	21	20:30 (9)	21:45	25	20:58 (10)
22	08:14		07:18		16:41 (1)	06:12			17:29 (6)	05:59		19:28 (7)	05:03		20:09 (9)	04:43		20:34 (10)
	16:35		17:35	21	17:02 (2)	18:28	24		17:53 (6)	20:24	19	19:47 (7)	21:16	20	20:29 (9)	21:45	25	20:59 (10)
23	08:12		07:16		16:41 (1)	06:10			17:27 (6)	05:57		19:28 (11)	05:01		20:09 (9)	04:43		20:34 (10)
	16:36		17:37	23	17:04 (2)	18:30	26		17:53 (6)	20:26	20	19:48 (11)	21:18	20	20:29 (9)	21:45	25	20:59 (10)
24	08:11		07:14		16:41 (1)	06:08			17:27 (6)	05:55		19:27 (11)	05:00		20:10 (9)	04:44		20:34 (10)
	16:38		17:39	24	17:05 (2)	18:32	26		17:53 (6)	20:28	23	19:50 (11)	21:19	19	20:29 (9)	21:45	25	20:59 (10)
25	08:10		07:11		16:42 (1)	06:05			17:26 (6)	05:52		19:26 (11)	04:59		20:10 (9)	04:44		20:35 (10)
	16:40		17:41	24	17:06 (2)	18:33	27		17:53 (6)	20:30	25	19:51 (11)	21:21	19	20:29 (9)	21:46	25	21:00 (10)
26	08:08		07:09		16:43 (1)	06:03			17:25 (6)	05:50		19:25 (11)	04:58		20:11 (9)	04:44		20:35 (10)
	16:42		17:43	24	17:07 (2)	18:35	28		17:53 (6)	20:32	26	19:51 (11)	21:22	18	20:29 (9)	21:46	25	21:00 (10)
27	08:07		07:07		16:43 (2)	06:00			17:26 (6)	05:48		19:24 (11)	04:56		20:12 (9)	04:45		20:36 (10)
	16:44		17:45	24	17:07 (2)	18:37	27		17:53 (6)	20:33	28	19:52 (11)	21:23	17	20:29 (9)	21:45	24	21:00 (10)
28	08:05		07:05		16:43 (2)	05:58			17:25 (6)	05:46		19:23 (11)	04:55		20:12 (9)	04:45		20:36 (10)
	16:46		17:47	25	17:08 (2)	18:39	27		17:52 (6)	20:35	29	19:52 (11)	21:25	16	20:28 (9)	21:45	24	21:00 (10)
29	08:04					06:55			18:25 (6)	05:44		19:23 (11)	04:54		20:13 (9)	04:46		20:36 (10)
	16:48					19:41	27		18:52 (6)	20:37	29	19:52 (11)	21:26	14	20:27 (9)	21:45	24	21:00 (10)
30	08:02					06:53			18:25 (6)	05:42		19:22 (11)	04:53		20:14 (9)	04:47		20:36 (10)
	16:50					19:42	33		19:14 (5)	20:39	31	19:53 (11)	21:27	13	20:27 (9)	21:45	24	21:00 (10)
31	08:01					06:51			18:26 (6)				04:52		20:15 (9)			
	16:52					19:44	37		19:17 (5)				21:29	15	20:44 (10)			
Sonnenscheinstunden		252		274			367			419			492			508		
astr.max.mögl.Beschattung				262			524			653			758			676		
Red.Sonnenscheinwahrsch.				0.24			0.31			0.41			0.51			0.45		
Reduktion Betriebsdauer				0.91			0.91			0.91			0.91			0.91		
Reduktion Windrichtung				0.69			0.69			0.68			0.66			0.64		
Gesamte Reduktion				0.15			0.20			0.26			0.31			0.27		
Met.wahrsch.Beschattung				39			104			167			234			179		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AF - IO32

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober		November	Dezember
1 | 04:47		20:37 (10) | 05:26		19:38 (11) | 06:20		18:58 (5) | 07:12		| 07:10 | 08:04
| 21:45	23	21:00 (10) | 21:10	35	20:38 (9) | 20:04	16	19:14 (5) | 18:51		| 16:42 | 15:58
2 | 04:48		20:38 (10) | 05:28		19:36 (11) | 06:22		18:57 (5) | 07:14		| 07:12 | 08:05
| 21:44	22	21:00 (10) | 21:08	36	20:36 (9) | 20:02	18	19:15 (5) | 18:49		| 16:40 | 15:57
3 | 04:49		20:37 (10) | 05:30		19:35 (11) | 06:23		18:55 (5) | 07:16		| 07:14 | 08:07
| 21:44	22	20:59 (10) | 21:06	35	20:35 (9) | 20:00	20	19:15 (5) | 18:47		| 16:38 | 15:57
4 | 04:49		20:38 (10) | 05:31		19:34 (11) | 06:25		18:55 (5) | 07:18		| 07:15 | 08:08
| 21:43	21	20:59 (10) | 21:05	30	20:32 (9) | 19:57	21	19:16 (5) | 18:44		| 16:36 | 15:56
5 | 04:50		20:39 (10) | 05:33		19:33 (11) | 06:27		18:54 (5) | 07:19	17:25 (2)	| 07:17 | 08:10
| 21:43	20	20:59 (10) | 21:03	27	20:00 (11) | 19:55	22	19:16 (5) | 18:42	12 17:37 (2)	| 16:34 | 15:55
6 | 04:51		20:40 (10) | 05:35		19:32 (11) | 06:29		18:53 (5) | 07:21	17:22 (2)	| 07:19 | 08:11
| 21:42	19	20:59 (10) | 21:01	28	20:00 (11) | 19:52	22	19:15 (5) | 18:39	17 17:39 (2)	| 16:32 | 15:55
7 | 04:52		20:41 (10) | 05:36		19:32 (11) | 06:30		18:53 (5) | 07:23	17:20 (2)	| 07:21 | 08:12
| 21:42	18	20:59 (10) | 20:59	29	20:01 (11) | 19:50	22	19:15 (5) | 18:37	19 17:39 (2)	| 16:30 | 15:54
8 | 04:53		20:42 (10) | 05:38		19:32 (11) | 06:32		18:27 (6) | 07:25	17:18 (2)	| 07:23 | 08:14
| 21:41	17	20:59 (10) | 20:57	30	20:02 (11) | 19:48	31	19:15 (5) | 18:35	22 17:40 (2)	| 16:28 | 15:54
9 | 04:54		20:43 (10) | 05:40		19:31 (11) | 06:34		18:23 (6) | 07:27	17:17 (2)	| 07:25 | 08:15
| 21:40	15	20:58 (10) | 20:55	30	20:01 (11) | 19:45	35	19:13 (5) | 18:32	24 17:41 (2)	| 16:27 | 15:54
10 | 04:55		20:28 (9) | 05:42		19:31 (11) | 06:36		18:21 (6) | 07:28	17:17 (2)	| 07:27 | 08:16
| 21:39	14	20:57 (10) | 20:53	30	20:01 (11) | 19:43	38	19:12 (5) | 18:30	24 17:41 (2)	| 16:25 | 15:53
11 | 04:56		20:25 (9) | 05:43		19:30 (11) | 06:37		18:19 (6) | 07:30	17:16 (2)	| 07:29 | 08:17
| 21:38	18	20:56 (10) | 20:51	31	20:01 (11) | 19:40	39	19:11 (5) | 18:27	25 17:41 (2)	| 16:23 | 15:53
12 | 04:58		20:24 (9) | 05:45		19:31 (11) | 06:39		18:17 (6) | 07:32	17:16 (2)	| 07:31 | 08:18
| 21:38	17	20:54 (10) | 20:49	30	20:01 (11) | 19:38	37	19:08 (5) | 18:25	25 17:41 (2)	| 16:22 | 15:53
13 | 04:59		20:23 (9) | 05:47		19:31 (11) | 06:41		18:16 (6) | 07:34	17:16 (2)	| 07:33 | 08:19
| 21:37	12	20:35 (9) | 20:47	30	20:01 (11) | 19:35	34	19:06 (5) | 18:23	25 17:41 (2)	| 16:20 | 15:53
14 | 05:00		20:22 (9) | 05:48		19:30 (11) | 06:42		18:16 (6) | 07:36	17:16 (2)	| 07:34 | 08:20
| 21:36	14	20:36 (9) | 20:45	30	20:00 (11) | 19:33	26	18:42 (6) | 18:20	25 17:41 (2)	| 16:18 | 15:53
15 | 05:01		20:21 (9) | 05:50		19:31 (11) | 06:44		18:15 (6) | 07:38	17:16 (2)	| 07:36 | 08:21
| 21:34	15	20:36 (9) | 20:43	29	20:00 (11) | 19:30	28	18:43 (6) | 18:18	24 17:40 (2)	| 16:17 | 15:53
16 | 05:02		20:20 (9) | 05:52		19:32 (11) | 06:46		18:14 (6) | 07:39	17:15 (1)	| 07:38 | 08:22
| 21:33	17	20:37 (9) | 20:41	27	19:59 (11) | 19:28	28	18:42 (6) | 18:16	24 17:39 (2)	| 16:15 | 15:53
17 | 05:04		20:21 (9) | 05:54		19:31 (11) | 06:48		18:14 (6) | 07:41	17:14 (1)	| 07:40 | 08:23
| 21:32	17	20:38 (9) | 20:38	27	19:58 (11) | 19:26	28	18:42 (6) | 18:14	24 17:38 (2)	| 16:14 | 15:53
18 | 05:05		20:20 (9) | 05:55		19:32 (11) | 06:49		18:14 (6) | 07:43	17:12 (1)	| 07:42 | 08:24
| 21:31	19	20:39 (9) | 20:36	25	19:57 (11) | 19:23	28	18:42 (6) | 18:11	24 17:36 (2)	| 16:12 | 15:53
19 | 05:07		20:19 (9) | 05:57		19:33 (11) | 06:51		18:13 (6) | 07:45	17:11 (1)	| 07:44 | 08:25
| 21:30	20	20:39 (9) | 20:34	22	19:55 (11) | 19:21	27	18:40 (6) | 18:09	23 17:34 (2)	| 16:11 | 15:54
20 | 05:08		20:19 (9) | 05:59		19:34 (7) | 06:53		18:14 (6) | 07:47	17:11 (1)	| 07:45 | 08:25
| 21:29	20	20:39 (9) | 20:32	20	19:54 (11) | 19:18	25	18:39 (6) | 18:07	20 17:31 (2)	| 16:10 | 15:54
21 | 05:09		20:19 (9) | 06:01		19:34 (7) | 06:55		18:14 (6) | 07:49	17:11 (1)	| 07:47 | 08:26
| 21:27	21	20:40 (9) | 20:30	19	19:53 (7) | 19:16	25	18:39 (6) | 18:05	19 17:30 (1)	| 16:08 | 15:54
22 | 05:11		20:19 (9) | 06:02		19:33 (7) | 06:56		18:15 (6) | 07:51	17:11 (1)	| 07:49 | 08:26
| 21:26	21	20:40 (9) | 20:27	19	19:52 (7) | 19:13	22	18:37 (6) | 18:02	19 17:30 (1)	| 16:07 | 15:55
23 | 05:12		20:18 (9) | 06:04		19:33 (7) | 06:58		18:15 (6) | 07:53	17:12 (1)	| 07:51 | 08:27
| 21:24	22	20:40 (9) | 20:25	19	19:52 (7) | 19:11	20	18:35 (6) | 18:00	17 17:29 (1)	| 16:06 | 15:55
24 | 05:14		20:19 (9) | 06:06		19:33 (7) | 07:00		18:17 (6) | 07:54	17:12 (1)	| 07:53 | 08:27
| 21:23	21	20:40 (9) | 20:23	19	19:52 (7) | 19:08	16	18:33 (6) | 17:58	16 17:28 (1)	| 16:05 | 15:56
25 | 05:15		20:19 (9) | 06:08		19:32 (7) | 07:02		18:20 (6) | 06:56	16:13 (1)	| 07:54 | 08:28
| 21:21	21	20:40 (9) | 20:21	18	19:50 (7) | 19:06	10	18:30 (6) | 16:56	12 16:25 (1)	| 16:04 | 15:56
26 | 05:17		20:19 (9) | 06:09		19:33 (7) | 07:03		| 06:58	16:16 (1)	| 07:56 | 08:28
| 21:20	22	20:41 (9) | 20:18	17	19:50 (7) | 19:04		| 16:54	8 16:24 (1)	| 16:03 | 15:57
27 | 05:18		20:19 (9) | 06:11		19:34 (7) | 07:05		| 07:00		| 07:58 | 08:28
| 21:18	21	20:40 (9) | 20:16	14	19:48 (7) | 19:01		| 16:52		| 16:02 | 15:58
28 | 05:20		20:20 (9) | 06:13		19:35 (7) | 07:07		| 07:02		| 07:59 | 08:28
| 21:17	20	20:40 (9) | 20:14	10	19:45 (7) | 18:59		| 16:50		| 16:01 | 15:59
29 | 05:22		19:43 (11) | 06:15		19:38 (7) | 07:09		| 07:04		| 08:01 | 08:29
| 21:15	27	20:39 (9) | 20:11	5	19:43 (7) | 18:56		| 16:48		| 16:00 | 16:00
30 | 05:23		19:41 (11) | 06:16		19:05 (5) | 07:11		| 07:06		| 08:02 | 08:29
| 21:13	32	20:39 (9) | 20:09	5	19:10 (5) | 18:54		| 16:46		| 15:59 | 16:01
31 | 05:25		19:39 (11) | 06:18		19:00 (5) |		| 07:08		| | 08:29
| 21:12	34	20:38 (9) | 20:07	12	19:12 (5) |		| 16:44		| | 16:02
Sonnenscheinstunden	510		459		382		329		260 | 235
astr.max.mögl.Beschattung	622		738		638		448		
Red.Sonnenscheinwahrsch.	0.45		0.49		0.40		0.33		
Reduktion Betriebsdauer	0.91		0.91		0.91		0.91		
Reduktion Windrichtung	0.65		0.66		0.69		0.69		
Gesamte Reduktion	0.27		0.30		0.26		0.21		
Met.wahrsch.Beschattung	165		218		163		93		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AG - IO33

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar			Februar			März			April			Mai			Juni		
1	08:29		07:59			07:02		16:45 (2)	06:48		18:27 (6)	05:40		19:26 (11)	04:51		20:16 (9)
	16:03		16:54			17:49	25	17:10 (2)	19:46	37	19:18 (5)	20:41	29	19:55 (11)	21:30	14	20:30 (9)
2	08:29		07:57			07:00		16:44 (2)	06:46		18:28 (6)	05:38		19:25 (11)	04:50		20:16 (9)
	16:04		16:55			17:50	25	17:09 (2)	19:48	40	19:20 (5)	20:42	30	19:55 (11)	21:31	13	20:29 (9)
3	08:28		07:56			06:58		16:44 (2)	06:43		18:29 (6)	05:36		19:25 (11)	04:49		20:18 (9)
	16:05		16:57			17:52	25	17:09 (2)	19:50	40	19:21 (5)	20:44	30	19:55 (11)	21:32	11	20:29 (9)
4	08:28		07:54			06:55		16:44 (2)	06:41		18:30 (6)	05:34		19:25 (11)	04:48		20:19 (9)
	16:06		16:59			17:54	25	17:09 (2)	19:52	38	19:21 (5)	20:46	30	19:55 (11)	21:33	13	20:48 (10)
5	08:28		07:52			06:53		16:44 (2)	06:38		18:32 (6)	05:32		19:25 (11)	04:48		20:20 (9)
	16:08		17:01			17:56	24	17:08 (2)	19:53	36	19:22 (5)	20:48	31	19:56 (11)	21:34	14	20:50 (10)
6	08:27		07:50			06:51		16:45 (2)	06:36		18:36 (6)	05:30		19:25 (11)	04:47		20:23 (9)
	16:09		17:03			17:58	23	17:08 (2)	19:55	28	19:22 (5)	20:50	30	19:55 (11)	21:35	13	20:52 (10)
7	08:27		07:49			06:48		16:45 (2)	06:34		18:59 (5)	05:28		19:25 (11)	04:46		20:40 (10)
	16:10		17:05			18:00	21	17:06 (2)	19:57	22	19:21 (5)	20:51	30	19:55 (11)	21:36	13	20:53 (10)
8	08:26		07:47			06:46		16:46 (2)	06:31		18:59 (5)	05:26		19:25 (11)	04:46		20:40 (10)
	16:12		17:07			18:02	19	17:05 (2)	19:59	22	19:21 (5)	20:53	29	19:54 (11)	21:37	14	20:54 (10)
9	08:26		07:45			06:44		16:48 (2)	06:29		19:00 (5)	05:24		19:26 (11)	04:45		20:39 (10)
	16:13		17:09			18:04	15	17:03 (2)	20:01	21	19:21 (5)	20:55	28	19:54 (11)	21:38	16	20:55 (10)
10	08:25		07:43			06:41		16:50 (2)	06:27		18:59 (5)	05:22		19:26 (11)	04:45		20:39 (10)
	16:15		17:11			18:06	10	17:00 (2)	20:03	20	19:19 (5)	20:57	30	20:23 (9)	21:39	17	20:56 (10)
11	08:25		07:41			06:39			06:24		19:00 (5)	05:20		19:27 (11)	04:44		20:39 (10)
	16:16		17:13			18:07			20:04	19	19:19 (5)	20:58	36	20:26 (9)	21:40	18	20:57 (10)
12	08:24		07:39			06:37			06:22		19:01 (5)	05:19		19:28 (11)	04:44		20:39 (10)
	16:18		17:15			18:09			20:06	17	19:18 (5)	21:00	37	20:28 (9)	21:41	19	20:58 (10)
13	08:23		07:37			06:34			06:20		19:02 (5)	05:17		19:29 (11)	04:43		20:38 (10)
	16:19		17:17			18:11			20:08	13	19:15 (5)	21:02	37	20:29 (9)	21:41	19	20:57 (10)
14	08:22		07:35			06:32			06:17		19:05 (5)	05:15		19:29 (11)	04:43		20:38 (10)
	16:21		17:19			18:13			20:10	7	19:12 (5)	21:03	39	20:30 (9)	21:42	20	20:58 (10)
15	08:21		07:33			06:29			06:15		19:39 (7)	05:14		19:31 (11)	04:43		20:38 (10)
	16:22		17:21			18:15			20:12	5	19:44 (7)	21:05	37	20:31 (9)	21:43	20	20:58 (10)
16	08:20		07:31		16:49 (1)	06:27			06:13		19:36 (7)	05:12		19:32 (11)	04:43		20:38 (10)
	16:24		17:23	5	16:54 (1)	18:17			20:13	10	19:46 (7)	21:07	35	20:31 (9)	21:43	21	20:59 (10)
17	08:19		07:29		16:46 (1)	06:25			06:10		19:34 (7)	05:10		19:35 (11)	04:43		20:38 (10)
	16:26		17:25	10	16:56 (1)	18:19			20:15	13	19:47 (7)	21:08	31	20:32 (9)	21:44	21	20:59 (10)
18	08:18		07:27		16:45 (1)	06:22			06:08		19:32 (7)	05:09		19:39 (11)	04:43		20:38 (10)
	16:27		17:27	14	16:59 (1)	18:20			20:17	17	19:49 (7)	21:10	24	20:32 (9)	21:44	22	21:00 (10)
19	08:17		07:25		16:44 (1)	06:20			06:06		19:32 (7)	05:07		20:11 (9)	04:43		20:38 (10)
	16:29		17:29	17	17:01 (1)	18:22			20:19	18	19:50 (7)	21:11	21	20:32 (9)	21:44	22	21:00 (10)
20	08:16		07:22		16:43 (1)	06:17		17:38 (6)	06:03		19:31 (7)	05:06		20:11 (9)	04:43		20:38 (10)
	16:31		17:31	18	17:01 (1)	18:24	12	17:50 (6)	20:21	19	19:50 (7)	21:13	21	20:32 (9)	21:45	22	21:00 (10)
21	08:15		07:20		16:42 (1)	06:15		17:35 (6)	06:01		19:31 (7)	05:04		20:11 (9)	04:43		20:38 (10)
	16:33		17:33	19	17:01 (1)	18:26	17	17:52 (6)	20:23	19	19:50 (7)	21:15	22	20:33 (9)	21:45	22	21:00 (10)
22	08:14		07:18		16:42 (1)	06:12		17:33 (6)	05:59		19:30 (7)	05:03		20:11 (9)	04:43		20:39 (10)
	16:35		17:35	20	17:02 (1)	18:28	21	17:54 (6)	20:24	19	19:49 (7)	21:16	21	20:32 (9)	21:45	22	21:01 (10)
23	08:12		07:16		16:42 (1)	06:10		17:31 (6)	05:57		19:30 (7)	05:01		20:11 (9)	04:43		20:39 (10)
	16:36		17:37	22	17:04 (2)	18:30	23	17:54 (6)	20:26	19	19:49 (7)	21:18	21	20:32 (9)	21:45	22	21:01 (10)
24	08:11		07:14		16:42 (1)	06:08		17:30 (6)	05:55		19:30 (7)	05:00		20:11 (9)	04:44		20:39 (10)
	16:38		17:39	23	17:05 (2)	18:32	25	17:55 (6)	20:28	20	19:50 (11)	21:19	21	20:32 (9)	21:45	22	21:01 (10)
25	08:10		07:11		16:43 (1)	06:05		17:29 (6)	05:52		19:31 (7)	04:59		20:12 (9)	04:44		20:40 (10)
	16:40		17:41	24	17:07 (2)	18:33	26	17:55 (6)	20:30	21	19:52 (11)	21:21	20	20:32 (9)	21:46	21	21:01 (10)
26	08:08		07:09		16:44 (1)	06:03		17:28 (6)	05:50		19:30 (11)	04:58		20:12 (9)	04:44		20:40 (10)
	16:42		17:43	24	17:08 (2)	18:35	28	17:56 (6)	20:32	23	19:53 (11)	21:22	20	20:32 (9)	21:46	21	21:01 (10)
27	08:07		07:07		16:44 (1)	06:00		17:28 (6)	05:48		19:29 (11)	04:56		20:13 (9)	04:45		20:41 (10)
	16:44		17:45	24	17:08 (2)	18:37	28	17:56 (6)	20:33	25	19:54 (11)	21:23	19	20:32 (9)	21:45	21	21:02 (10)
28	08:05		07:05		16:45 (2)	05:58		17:27 (6)	05:46		19:28 (11)	04:55		20:13 (9)	04:45		20:41 (10)
	16:46		17:47	24	17:09 (2)	18:39	28	17:55 (6)	20:35	26	19:54 (11)	21:25	19	20:32 (9)	21:45	20	21:01 (10)
29	08:04					06:55		18:27 (6)	05:44		19:27 (11)	04:54		20:14 (9)	04:46		20:42 (10)
	16:48					19:41	28	18:55 (6)	20:37	28	19:55 (11)	21:26	17	20:31 (9)	21:45	20	21:02 (10)
30	08:02					06:53		18:27 (6)	05:42		19:26 (11)	04:53		20:14 (9)	04:47		20:42 (10)
	16:50					19:42	27	18:54 (6)	20:39	29	19:55 (11)	21:27	17	20:31 (9)	21:45	19	21:01 (10)
31	08:01					06:51		18:27 (6)				04:52		20:15 (9)			
	16:52					19:44	31	19:15 (5)				21:29	15	20:30 (9)			
Sonnenscheinstunden	252		274			367			419			492			508		
astr.max.mögl.Beschattung				244			506			671			827			552	
Red.Sonnenscheinwahrsch.				0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer				0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung				0.69			0.69			0.68			0.66			0.64	
Gesamte Reduktion				0.15			0.20			0.26			0.31			0.26	
Met.wahrsch.Beschattung				37			100			172			256			146	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AG - IO33

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober			November	Dezember
1 | 04:47		20:43 (10) | 05:26		19:38 (11) | 06:20		18:59 (5) | 07:12		07:10	08:04
| 21:45	18	21:01 (10) | 21:10	37	20:38 (9) | 20:04	19	19:18 (5) | 18:51		16:42	15:58
2 | 04:48		20:44 (10) | 05:28		19:37 (11) | 06:22		18:58 (5) | 07:14		07:12	08:05
| 21:44	17	21:01 (10) | 21:08	34	20:36 (9) | 20:02	20	19:18 (5) | 18:49		16:40	15:57
3 | 04:49		20:44 (10) | 05:30		19:37 (11) | 06:23		18:57 (5) | 07:16		17:30 (2) | 07:14	08:07
| 21:44	16	21:00 (10) | 21:06	27	20:04 (11) | 20:00	21	19:18 (5) | 18:47	5	17:35 (2) | 16:38	15:57
4 | 04:50		20:45 (10) | 05:31		19:36 (11) | 06:25		18:56 (5) | 07:18		17:26 (2) | 07:15	08:08
| 21:43	15	21:00 (10) | 21:05	28	20:04 (11) | 19:57	22	19:18 (5) | 18:44	13	17:39 (2) | 16:36	15:56
5 | 04:50		20:46 (10) | 05:33		19:35 (11) | 06:27		18:56 (5) | 07:19		17:24 (2) | 07:17	08:10
| 21:43	14	21:00 (10) | 21:03	30	20:05 (11) | 19:55	22	19:18 (5) | 18:42	17	17:41 (2) | 16:34	15:55
6 | 04:51		20:47 (10) | 05:35		19:34 (11) | 06:29		18:31 (6) | 07:21		17:22 (2) | 07:19	08:11
| 21:42	12	20:59 (10) | 21:01	30	20:04 (11) | 19:52	28	19:17 (5) | 18:39	20	17:42 (2) | 16:32	15:55
7 | 04:52		20:28 (9) | 05:36		19:35 (11) | 06:30		18:27 (6) | 07:23		17:20 (2) | 07:21	08:12
| 21:42	15	20:58 (10) | 20:59	30	20:05 (11) | 19:50	35	19:17 (5) | 18:37	22	17:42 (2) | 16:30	15:54
8 | 04:53		20:27 (9) | 05:38		19:35 (11) | 06:32		18:25 (6) | 07:25		17:19 (2) | 07:23	08:14
| 21:41	15	20:57 (10) | 20:57	30	20:05 (11) | 19:48	38	19:16 (5) | 18:35	24	17:43 (2) | 16:28	15:54
9 | 04:54		20:26 (9) | 05:40		19:34 (11) | 06:34		18:22 (6) | 07:27		17:19 (2) | 07:25	08:15
| 21:40	10	20:36 (9) | 20:55	31	20:05 (11) | 19:45	40	19:14 (5) | 18:32	24	17:43 (2) | 16:27	15:54
10 | 04:55		20:25 (9) | 05:42		19:34 (11) | 06:36		18:21 (6) | 07:28		17:18 (2) | 07:27	08:16
| 21:39	12	20:37 (9) | 20:53	31	20:05 (11) | 19:43	40	19:13 (5) | 18:30	25	17:43 (2) | 16:25	15:53
11 | 04:56		20:24 (9) | 05:43		19:34 (11) | 06:37		18:20 (6) | 07:30		17:18 (2) | 07:29	08:17
| 21:38	14	20:38 (9) | 20:51	30	20:04 (11) | 19:40	38	19:11 (5) | 18:27	25	17:43 (2) | 16:23	15:53
12 | 04:58		20:24 (9) | 05:45		19:34 (11) | 06:39		18:19 (6) | 07:32		17:18 (2) | 07:31	08:18
| 21:38	15	20:39 (9) | 20:49	30	20:04 (11) | 19:38	32	19:07 (5) | 18:25	25	17:43 (2) | 16:22	15:53
13 | 04:59		20:23 (9) | 05:47		19:35 (11) | 06:41		18:18 (6) | 07:34		17:18 (2) | 07:33	08:19
| 21:37	16	20:39 (9) | 20:47	29	20:04 (11) | 19:35	27	18:45 (6) | 18:23	25	17:43 (2) | 16:20	15:53
14 | 05:00		20:23 (9) | 05:48		19:35 (11) | 06:42		18:18 (6) | 07:36		17:18 (1) | 07:34	08:20
| 21:36	17	20:40 (9) | 20:45	27	20:02 (11) | 19:33	28	18:46 (6) | 18:20	24	17:42 (2) | 16:18	15:53
15 | 05:01		20:22 (9) | 05:50		19:35 (11) | 06:44		18:17 (6) | 07:38		17:17 (1) | 07:36	08:21
| 21:34	18	20:40 (9) | 20:43	27	20:02 (11) | 19:30	29	18:46 (6) | 18:18	24	17:41 (2) | 16:17	15:53
16 | 05:02		20:22 (9) | 05:52		19:36 (11) | 06:46		18:16 (6) | 07:39		17:15 (1) | 07:38	08:22
| 21:33	18	20:40 (9) | 20:41	25	20:01 (11) | 19:28	28	18:44 (6) | 18:16	25	17:40 (2) | 16:15	15:53
17 | 05:04		20:22 (9) | 05:54		19:37 (11) | 06:48		18:17 (6) | 07:41		17:15 (1) | 07:40	08:23
| 21:32	20	20:42 (9) | 20:38	22	19:59 (11) | 19:26	27	18:44 (6) | 18:14	24	17:39 (2) | 16:14	15:53
18 | 05:05		20:22 (9) | 05:55		19:37 (7) | 06:49		18:17 (6) | 07:43		17:13 (1) | 07:42	08:24
| 21:31	20	20:42 (9) | 20:36	21	19:58 (11) | 19:23	27	18:44 (6) | 18:11	23	17:36 (2) | 16:12	15:53
19 | 05:07		20:21 (9) | 05:57		19:36 (7) | 06:51		18:17 (6) | 07:45		17:13 (1) | 07:44	08:25
| 21:30	21	20:42 (9) | 20:34	19	19:55 (11) | 19:21	25	18:42 (6) | 18:09	20	17:33 (2) | 16:11	15:54
20 | 05:08		20:21 (9) | 05:59		19:36 (7) | 06:53		18:17 (6) | 07:47		17:13 (1) | 07:45	08:25
| 21:29	21	20:42 (9) | 20:32	19	19:55 (7) | 19:18	24	18:41 (6) | 18:07	19	17:32 (1) | 16:10	15:54
21 | 05:09		20:21 (9) | 06:01		19:36 (7) | 06:55		18:18 (6) | 07:49		17:13 (1) | 07:47	08:26
| 21:27	22	20:43 (9) | 20:30	19	19:55 (7) | 19:16	22	18:40 (6) | 18:05	18	17:31 (1) | 16:08	15:54
22 | 05:11		20:21 (9) | 06:02		19:35 (7) | 06:56		18:20 (6) | 07:51		17:13 (1) | 07:49	08:26
| 21:26	21	20:42 (9) | 20:27	19	19:54 (7) | 19:13	18	18:38 (6) | 18:02	18	17:31 (1) | 16:07	15:55
23 | 05:12		20:21 (9) | 06:04		19:35 (7) | 06:58		18:21 (6) | 07:53		17:14 (1) | 07:51	08:27
| 21:24	21	20:42 (9) | 20:25	19	19:54 (7) | 19:11	13	18:34 (6) | 18:00	16	17:30 (1) | 16:06	15:55
24 | 05:14		20:21 (9) | 06:06		19:36 (7) | 07:00		18:26 (6) | 07:54		17:15 (1) | 07:53	08:27
| 21:23	22	20:43 (9) | 20:23	17	19:53 (7) | 19:08	3	18:29 (6) | 17:58	13	17:28 (1) | 16:05	15:56
25 | 05:15		20:21 (9) | 06:08		19:35 (7) | 07:02			06:56		16:16 (1) | 07:54	08:28
| 21:21	21	20:42 (9) | 20:21	17	19:52 (7) | 19:06			16:56	9	16:25 (1) | 16:04	15:57
26 | 05:17		19:47 (11) | 06:09		19:36 (7) | 07:03			06:58		16:21 (1) | 07:56	08:28
| 21:20	29	20:43 (9) | 20:18	14	19:50 (7) | 19:04			16:54	2	16:23 (1) | 16:03	15:57
27 | 05:18		19:44 (11) | 06:11		19:38 (7) | 07:05			07:00		07:58	08:28
| 21:18	33	20:42 (9) | 20:16	10	19:48 (7) | 19:01			16:52		16:02	15:58
28 | 05:20		19:43 (11) | 06:13		19:40 (7) | 07:07			07:02		07:59	08:28
| 21:17	35	20:42 (9) | 20:14	5	19:45 (7) | 18:59			16:50		16:01	15:59
29 | 05:22		19:41 (11) | 06:15		19:05 (5) | 07:09			07:04		08:01	08:29
| 21:15	37	20:41 (9) | 20:11	8	19:13 (5) | 18:56			16:48		16:00	16:00
30 | 05:23		19:40 (11) | 06:16		19:03 (5) | 07:11			07:06		08:02	08:29
| 21:13	38	20:41 (9) | 20:09	13	19:16 (5) | 18:54			16:46		15:59	16:01
31 | 05:25		19:39 (11) | 06:18		19:00 (5) |			07:08			08:29
| 21:12	37	20:39 (9) | 20:07	17	19:17 (5) |			16:44			16:02
Sonnenscheinstunden	510		459		382			329		260	235
astr.max.mögl.Beschattung		640		715		626			460			
Red.Sonnenscheinwahrsch.		0.45		0.49		0.40			0.33			
Reduktion Betriebsdauer		0.91		0.91		0.91			0.91			
Reduktion Windrichtung		0.65		0.67		0.69			0.69			
Gesamte Reduktion		0.27		0.30		0.26			0.21			
Met.wahrsch.Beschattung		170		212		160			95			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AH - IO34

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar			Februar			März			April			Mai			Juni		
1	08:29		07:59			07:02		16:46 (2)	06:48		18:28 (6)	05:40		19:26 (11)	04:51		20:16 (9)
	16:03		16:54			17:48	25	17:11 (2)	19:46	37	19:18 (5)	20:41	29	19:55 (11)	21:30	12	20:28 (9)
2	08:29		07:57			07:00		16:45 (2)	06:46		18:29 (6)	05:38		19:25 (11)	04:50		20:17 (9)
	16:04		16:55			17:50	25	17:10 (2)	19:48	39	19:20 (5)	20:42	30	19:55 (11)	21:31	10	20:27 (9)
3	08:28		07:56			06:58		16:45 (2)	06:43		18:30 (6)	05:36		19:25 (11)	04:49		20:19 (9)
	16:05		16:57			17:52	25	17:10 (2)	19:50	39	19:21 (5)	20:44	30	19:55 (11)	21:32	16	20:49 (10)
4	08:28		07:54			06:55		16:46 (2)	06:41		18:31 (6)	05:34		19:25 (11)	04:48		20:20 (9)
	16:06		16:59			17:54	24	17:10 (2)	19:52	38	19:21 (5)	20:46	30	19:55 (11)	21:33	16	20:51 (10)
5	08:28		07:52			06:53		16:45 (2)	06:38		18:33 (6)	05:32		19:26 (11)	04:48		20:38 (10)
	16:08		17:01			17:56	24	17:09 (2)	19:53	35	19:22 (5)	20:48	29	19:55 (11)	21:34	13	20:51 (10)
6	08:27		07:50			06:51		16:46 (2)	06:36		18:37 (6)	05:30		19:25 (11)	04:47		20:38 (10)
	16:09		17:03			17:58	23	17:09 (2)	19:55	27	19:22 (5)	20:50	30	19:55 (11)	21:35	15	20:53 (10)
7	08:27		07:49			06:48		16:46 (2)	06:34		19:00 (5)	05:28		19:25 (11)	04:46		20:37 (10)
	16:10		17:05			18:00	21	17:07 (2)	19:57	21	19:21 (5)	20:51	29	19:54 (11)	21:36	16	20:53 (10)
8	08:26		07:47			06:46		16:47 (2)	06:31		19:00 (5)	05:26		19:26 (11)	04:46		20:37 (10)
	16:12		17:07			18:02	19	17:06 (2)	19:59	21	19:21 (5)	20:53	28	19:54 (11)	21:37	18	20:55 (10)
9	08:26		07:45			06:44		16:49 (2)	06:29		19:00 (5)	05:24		19:27 (11)	04:45		20:36 (10)
	16:13		17:09			18:04	16	17:05 (2)	20:01	21	19:21 (5)	20:55	27	19:54 (11)	21:38	19	20:55 (10)
10	08:25		07:43			06:41		16:51 (2)	06:27		19:00 (5)	05:22		19:27 (11)	04:45		20:37 (10)
	16:15		17:11			18:06	11	17:02 (2)	20:03	20	19:20 (5)	20:57	32	20:24 (9)	21:39	19	20:56 (10)
11	08:25		07:41			06:39			06:24		19:01 (5)	05:20		19:27 (11)	04:44		20:37 (10)
	16:16		17:13			18:07			20:04	18	19:19 (5)	20:58	36	20:26 (9)	21:40	20	20:57 (10)
12	08:24		07:39			06:37			06:22		19:02 (5)	05:19		19:29 (11)	04:44		20:37 (10)
	16:18		17:15			18:09			20:06	16	19:18 (5)	21:00	37	20:28 (9)	21:41	20	20:57 (10)
13	08:23		07:37			06:34			06:20		19:02 (5)	05:17		19:29 (11)	04:43		20:36 (10)
	16:19		17:17			18:11			20:08	13	19:15 (5)	21:02	37	20:29 (9)	21:41	21	20:57 (10)
14	08:22		07:35			06:32			06:17		19:05 (5)	05:15		19:30 (11)	04:43		20:36 (10)
	16:21		17:19			18:13			20:10	7	19:12 (5)	21:03	36	20:29 (9)	21:42	22	20:58 (10)
15	08:21		07:33			06:29			06:15			05:14		19:32 (11)	04:43		20:36 (10)
	16:22		17:21			18:15			20:12			21:05	34	20:30 (9)	21:43	22	20:58 (10)
16	08:20		07:31			06:27			06:13			05:12		19:34 (11)	04:43		20:36 (10)
	16:24		17:23			18:17			20:13			21:07	30	20:30 (9)	21:43	23	20:59 (10)
17	08:19		07:29		16:48 (1)	06:25			06:10			05:10		19:38 (11)	04:43		20:37 (10)
	16:26	1	17:25	8	16:56 (1)	18:19			20:15			21:08	24	20:31 (9)	21:44	22	20:59 (10)
18	08:18		07:27		16:47 (1)	06:22			06:08			05:09		20:11 (9)	04:43		20:37 (10)
	16:27		17:27	12	16:59 (1)	18:20			20:17			21:10	21	20:32 (9)	21:44	22	20:59 (10)
19	08:17		07:25		16:46 (1)	06:20			06:06			05:07		20:10 (9)	04:43		20:37 (10)
	16:29		17:29	15	17:01 (1)	18:22			20:19			21:11	21	20:31 (9)	21:44	23	21:00 (10)
20	08:16		07:22		16:44 (1)	06:17		17:40 (6)	06:03			05:06		20:10 (9)	04:43		20:37 (10)
	16:31		17:31	17	17:01 (1)	18:24	10	17:50 (6)	20:21			21:13	22	20:32 (9)	21:45	23	21:00 (10)
21	08:15		07:20		16:44 (1)	06:15		17:36 (6)	06:01			05:04		20:11 (9)	04:43		20:37 (10)
	16:33		17:33	18	17:02 (1)	18:26	16	17:52 (6)	20:23			21:15	21	20:32 (9)	21:45	23	21:00 (10)
22	08:14		07:18		16:43 (1)	06:12		17:34 (6)	05:59		19:39 (11)	05:03		20:10 (9)	04:43		20:38 (10)
	16:35		17:35	20	17:03 (1)	18:28	20	17:54 (6)	20:24	5	19:44 (11)	21:16	21	20:31 (9)	21:45	23	21:01 (10)
23	08:12		07:16		16:44 (1)	06:10		17:32 (6)	05:57		19:35 (11)	05:01		20:11 (9)	04:43		20:38 (10)
	16:36		17:37	20	17:04 (2)	18:30	23	17:55 (6)	20:26	13	19:48 (11)	21:18	21	20:32 (9)	21:45	23	21:01 (10)
24	08:11		07:14		16:43 (1)	06:08		17:31 (6)	05:55		19:32 (11)	05:00		20:11 (9)	04:44		20:38 (10)
	16:38		17:39	23	17:06 (2)	18:32	25	17:56 (6)	20:28	18	19:50 (11)	21:19	21	20:32 (9)	21:45	22	21:00 (10)
25	08:10		07:11		16:44 (1)	06:05		17:30 (6)	05:52		19:31 (11)	04:59		20:12 (9)	04:44		20:39 (10)
	16:40		17:41	24	17:08 (2)	18:33	26	17:56 (6)	20:30	21	19:52 (11)	21:21	20	20:32 (9)	21:46	22	21:01 (10)
26	08:08		07:09		16:44 (1)	06:03		17:29 (6)	05:50		19:29 (11)	04:58		20:12 (9)	04:44		20:38 (10)
	16:42		17:43	25	17:09 (2)	18:35	27	17:56 (6)	20:32	24	19:53 (11)	21:22	19	20:31 (9)	21:46	23	21:01 (10)
27	08:07		07:07		16:45 (1)	06:00		17:29 (6)	05:48		19:28 (11)	04:56		20:13 (9)	04:45		20:39 (10)
	16:44		17:45	24	17:09 (2)	18:37	28	17:57 (6)	20:33	26	19:54 (11)	21:23	18	20:31 (9)	21:45	22	21:01 (10)
28	08:05		07:05		16:46 (2)	05:58		17:28 (6)	05:46		19:27 (11)	04:55		20:13 (9)	04:45		20:39 (10)
	16:46		17:47	24	17:10 (2)	18:39	28	17:56 (6)	20:35	27	19:54 (11)	21:25	18	20:31 (9)	21:45	22	21:01 (10)
29	08:04					06:55		18:28 (6)	05:44		19:27 (11)	04:54		20:14 (9)	04:46		20:40 (10)
	16:48					19:41	28	17:56 (6)	20:37	28	19:55 (11)	21:26	16	20:30 (9)	21:45	21	21:01 (10)
30	08:02					06:53		18:28 (6)	05:42		19:26 (11)	04:53		20:15 (9)	04:47		20:40 (10)
	16:50					19:42	27	18:55 (6)	20:39	29	19:55 (11)	21:27	15	20:30 (9)	21:45	21	21:01 (10)
31	08:01					06:51		18:28 (6)				04:52		20:15 (9)			
	16:52					19:44	31	19:15 (5)				21:29	14	20:29 (9)			
Sonnenscheinstunden		252		274			367			419			492			508	
astr.max.mögl.Beschattung				230			502			543			796			594	
Red.Sonnenscheinwahrsch.				0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer				0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung				0.69			0.69			0.68			0.66			0.64	
Gesamte Reduktion				0.15			0.20			0.26			0.31			0.26	
Met.wahrsch.Beschattung				34			100			140			246			157	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AH - IO34

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		20:41 (10)	05:26		19:39 (11)	06:20		18:59 (5)	07:12		07:10	08:04
	21:45	20	21:01 (10)	21:10	36	20:38 (9)	20:04	19	19:18 (5)	18:51		16:42	15:58
2	04:48		20:42 (10)	05:28		19:37 (11)	06:22		18:59 (5)	07:14		07:12	08:05
	21:44	19	21:01 (10)	21:08	35	20:36 (9)	20:02	20	19:19 (5)	18:49		16:40	15:57
3	04:49		20:41 (10)	05:30		19:37 (11)	06:23		18:57 (5)	07:16		07:14	08:07
	21:44	19	21:00 (10)	21:06	30	20:33 (9)	20:00	21	19:18 (5)	18:47	8	17:38 (2)	16:38	15:57
4	04:50		20:42 (10)	05:31		19:36 (11)	06:25		18:57 (5)	07:18		17:27 (2)	07:15	08:08
	21:43	18	21:00 (10)	21:05	27	20:03 (11)	19:57	21	19:18 (5)	18:44	14	17:41 (2)	16:36	15:56
5	04:50		20:43 (10)	05:33		19:36 (11)	06:27		18:57 (5)	07:19		17:25 (2)	07:17	08:10
	21:43	17	21:00 (10)	21:03	28	20:04 (11)	19:55	22	19:19 (5)	18:42	18	17:43 (2)	16:34	15:55
6	04:51		20:44 (10)	05:35		19:35 (11)	06:29		18:33 (6)	07:21		17:23 (2)	07:19	08:11
	21:42	16	21:00 (10)	21:01	29	20:04 (11)	19:52	26	19:17 (5)	18:39	21	17:44 (2)	16:32	15:55
7	04:52		20:45 (10)	05:36		19:35 (11)	06:30		18:28 (6)	07:23		17:21 (2)	07:21	08:12
	21:42	14	20:59 (10)	20:59	29	20:04 (11)	19:50	35	19:17 (5)	18:37	23	17:44 (2)	16:30	15:54
8	04:53		20:29 (9)	05:38		19:35 (11)	06:32		18:26 (6)	07:25		17:20 (2)	07:23	08:14
	21:41	14	20:58 (10)	20:57	30	20:05 (11)	19:48	38	19:16 (5)	18:35	24	17:44 (2)	16:28	15:54
9	04:54		20:27 (9)	05:40		19:34 (11)	06:34		18:23 (6)	07:27		17:20 (2)	07:25	08:15
	21:40	16	20:57 (10)	20:55	30	20:04 (11)	19:45	40	19:15 (5)	18:32	25	17:45 (2)	16:27	15:54
10	04:55		20:26 (9)	05:42		19:34 (11)	06:36		18:22 (6)	07:28		17:19 (2)	07:27	08:16
	21:39	14	20:55 (10)	20:53	30	20:04 (11)	19:43	39	19:13 (5)	18:30	26	17:45 (2)	16:25	15:53
11	04:56		20:25 (9)	05:43		19:34 (11)	06:37		18:21 (6)	07:30		17:19 (2)	07:29	08:17
	21:38	11	20:36 (9)	20:51	30	20:04 (11)	19:40	37	19:11 (5)	18:27	25	17:44 (2)	16:23	15:53
12	04:58		20:24 (9)	05:45		19:34 (11)	06:39		18:20 (6)	07:32		17:19 (2)	07:31	08:18
	21:38	13	20:37 (9)	20:49	30	20:04 (11)	19:38	32	19:07 (5)	18:25	25	17:44 (2)	16:22	15:53
13	04:59		20:23 (9)	05:47		19:35 (11)	06:41		18:19 (6)	07:34		17:19 (2)	07:33	08:19
	21:37	15	20:38 (9)	20:47	28	20:03 (11)	19:35	27	18:46 (6)	18:23	25	17:44 (2)	16:20	15:53
14	05:00		20:23 (9)	05:48		19:34 (11)	06:42		18:19 (6)	07:36		17:19 (1)	07:34	08:20
	21:36	16	20:39 (9)	20:45	28	20:02 (11)	19:33	27	18:46 (6)	18:20	24	17:43 (2)	16:18	15:53
15	05:01		20:22 (9)	05:50		19:35 (11)	06:44		18:18 (6)	07:38		17:17 (1)	07:36	08:21
	21:34	17	20:39 (9)	20:43	27	20:02 (11)	19:30	28	18:46 (6)	18:18	25	17:42 (2)	16:17	15:53
16	05:02		20:22 (9)	05:52		19:36 (11)	06:46		18:17 (6)	07:39		17:16 (1)	07:38	08:22
	21:33	17	20:39 (9)	20:41	25	20:01 (11)	19:28	28	18:45 (6)	18:16	25	17:41 (2)	16:15	15:53
17	05:04		20:22 (9)	05:54		19:36 (11)	06:48		18:18 (6)	07:41		17:16 (1)	07:40	08:23
	21:32	19	20:41 (9)	20:38	23	19:59 (11)	19:26	27	18:45 (6)	18:14	23	17:39 (2)	16:14	15:53
18	05:05		20:21 (9)	05:55		19:38 (11)	06:49		18:18 (6)	07:43		17:14 (1)	07:42	08:24
	21:31	20	20:41 (9)	20:36	20	19:58 (11)	19:23	26	18:44 (6)	18:11	22	17:36 (2)	16:12	15:53
19	05:07		20:21 (9)	05:57		19:38 (11)	06:51		18:18 (6)	07:45		17:14 (1)	07:44	08:25
	21:30	20	20:41 (9)	20:34	18	19:56 (11)	19:21	24	18:42 (6)	18:09	19	17:33 (1)	16:11	15:54
20	05:08		20:20 (9)	05:59		19:41 (11)	06:53		18:18 (6)	07:47		17:14 (1)	07:45	08:25
	21:29	21	20:41 (9)	20:32	12	19:53 (11)	19:18	23	18:41 (6)	18:07	19	17:33 (1)	16:10	15:54
21	05:09		20:21 (9)	06:01			06:55		18:20 (6)	07:49		17:14 (1)	07:47	08:26
	21:27	21	20:42 (9)	20:30			19:16	20	18:40 (6)	18:05	18	17:32 (1)	16:08	15:54
22	05:11		20:21 (9)	06:02			06:56		18:21 (6)	07:51		17:14 (1)	07:49	08:26
	21:26	21	20:42 (9)	20:27			19:13	17	18:38 (6)	18:02	18	17:32 (1)	16:07	15:55
23	05:12		20:20 (9)	06:04			06:58		18:23 (6)	07:53		17:15 (1)	07:51	08:27
	21:24	22	20:42 (9)	20:25			19:11	12	18:35 (6)	18:00	15	17:30 (1)	16:06	15:55
24	05:14		20:21 (9)	06:06			07:00			07:54		17:16 (1)	07:53	08:27
	21:23	21	20:42 (9)	20:23			19:08			17:58	12	17:28 (1)	16:05	15:56
25	05:15		20:21 (9)	06:08			07:02			06:56		16:19 (1)	07:54	08:28
	21:21	21	20:42 (9)	20:21			19:06			16:56	6	16:25 (1)	16:04	15:56
26	05:17		20:21 (9)	06:09			07:03			06:58			07:56	08:28
	21:20	21	20:42 (9)	20:18			19:04			16:54			16:03	15:57
27	05:18		19:46 (11)	06:11			07:05			07:00			07:58	08:28
	21:18	28	20:41 (9)	20:16			19:01			16:52			16:02	15:58
28	05:20		19:44 (11)	06:13			07:07			07:02			07:59	08:28
	21:17	33	20:42 (9)	20:14			18:59			16:50			16:01	15:59
29	05:22		19:42 (11)	06:15		19:06 (5)	07:09			07:04			08:01	08:29
	21:15	36	20:41 (9)	20:11	7	19:13 (5)	18:56			16:48			16:00	16:00
30	05:23		19:41 (11)	06:16		19:03 (5)	07:11			07:06			08:02	08:29
	21:13	36	20:40 (9)	20:09	13	19:16 (5)	18:54			16:46			15:59	16:01
31	05:25		19:39 (11)	06:18		19:01 (5)				07:08				08:29
	21:12	37	20:39 (9)	20:07	16	19:17 (5)				16:44				16:02
Sonnenscheinstunden	510			459			382			329			260	235
astr.max.mögl.Beschattung		633			581			609			460			
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91			
Reduktion Windrichtung		0.65			0.67			0.69			0.69			
Gesamte Reduktion		0.27			0.30			0.26			0.21			
Met.wahrsch.Beschattung		168			172			156			95			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AI - IO35

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar			März			April			Mai			Juni		
1	08:29		07:59			07:02		16:45 (2)	06:48		18:27 (6)	05:40		19:22 (11)	04:51		20:33 (10)
	16:03		16:54			17:48	24	17:09 (2)	19:46	38	19:18 (5)	20:41	30	19:52 (11)	21:30	15	20:48 (10)
2	08:29		07:57			07:00		16:44 (2)	06:46		18:29 (6)	05:38		19:22 (11)	04:50		20:32 (10)
	16:04		16:55			17:50	25	17:09 (2)	19:48	37	19:19 (5)	20:42	30	19:52 (11)	21:31	17	20:49 (10)
3	08:28		07:56			06:58		16:44 (2)	06:43		18:31 (6)	05:36		19:22 (11)	04:49		20:33 (10)
	16:05		16:57			17:52	25	17:09 (2)	19:50	35	19:20 (5)	20:44	29	19:51 (11)	21:32	18	20:51 (10)
4	08:28		07:54			06:55		16:45 (2)	06:41		18:33 (6)	05:34		19:22 (11)	04:48		20:32 (10)
	16:06		16:59			17:54	24	17:09 (2)	19:52	30	19:20 (5)	20:46	29	19:51 (11)	21:33	19	20:51 (10)
5	08:28		07:52			06:53		16:44 (2)	06:38		18:59 (5)	05:32		19:23 (11)	04:48		20:31 (10)
	16:08		17:01			17:56	23	17:07 (2)	19:53	21	19:20 (5)	20:48	28	19:51 (11)	21:34	20	20:51 (10)
6	08:27		07:50			06:51		16:45 (2)	06:36		18:59 (5)	05:30		19:23 (11)	04:47		20:31 (10)
	16:09		17:03			17:58	22	17:07 (2)	19:55	21	19:20 (5)	20:50	28	19:51 (11)	21:35	22	20:53 (10)
7	08:27		07:49			06:48		16:46 (2)	06:34		18:58 (5)	05:28		19:24 (11)	04:46		20:31 (10)
	16:10		17:05			18:00	19	17:05 (2)	19:57	21	19:19 (5)	20:51	26	19:50 (11)	21:36	22	20:53 (10)
8	08:26		07:47			06:46		16:48 (2)	06:31		18:58 (5)	05:26		19:24 (11)	04:46		20:31 (10)
	16:12		17:07			18:02	15	17:03 (2)	19:59	21	19:19 (5)	20:53	29	20:20 (9)	21:37	23	20:54 (10)
9	08:26		07:45			06:44		16:50 (2)	06:29		18:59 (5)	05:24		19:26 (11)	04:45		20:30 (10)
	16:13		17:09			18:04	11	17:01 (2)	20:01	19	19:18 (5)	20:55	33	20:24 (9)	21:38	24	20:54 (10)
10	08:25		07:43			06:41			06:27		18:59 (5)	05:22		19:26 (11)	04:45		20:30 (10)
	16:15		17:11			18:06			20:03	17	19:16 (5)	20:57	34	20:25 (9)	21:39	24	20:54 (10)
11	08:25		07:41			06:39			06:24		19:00 (5)	05:20		19:27 (11)	04:44		20:31 (10)
	16:16		17:13			18:07			20:04	15	19:15 (5)	20:58	35	20:26 (9)	21:40	24	20:55 (10)
12	08:24		07:39			06:37			06:22		19:02 (5)	05:19		19:29 (11)	04:44		20:31 (10)
	16:18		17:15			18:09			20:06	11	19:13 (5)	21:00	34	20:28 (9)	21:41	25	20:56 (10)
13	08:23		07:37			06:34			06:20			05:17		19:31 (11)	04:43		20:30 (10)
	16:19		17:17			18:11			20:08			21:02	30	20:28 (9)	21:41	25	20:55 (10)
14	08:22		07:35			06:32			06:17			05:15		19:34 (11)	04:43		20:31 (10)
	16:21		17:19			18:13			20:10			21:03	24	20:28 (9)	21:42	25	20:56 (10)
15	08:21		07:33			06:29			06:15			05:14		20:08 (9)	04:43		20:31 (10)
	16:22		17:21			18:15			20:12			21:05	21	20:29 (9)	21:43	25	20:56 (10)
16	08:20		07:31			06:27			06:13			05:12		20:07 (9)	04:43		20:31 (10)
	16:24		17:23			18:17			20:13			21:07	21	20:28 (9)	21:43	26	20:57 (10)
17	08:19		07:29			06:25			06:10			05:10		20:08 (9)	04:43		20:31 (10)
	16:26		17:25			18:19			20:15			21:08	21	20:29 (9)	21:44	26	20:57 (10)
18	08:18		07:27			06:22			06:08			05:09		20:08 (9)	04:43		20:31 (10)
	16:27		17:27			18:20			20:17			21:10	21	20:29 (9)	21:44	26	20:57 (10)
19	08:17		07:25			06:20		17:36 (6)	06:06			05:07		20:08 (9)	04:43		20:31 (10)
	16:29		17:29			18:22	13	17:49 (6)	20:19			21:11	21	20:29 (9)	21:44	27	20:58 (10)
20	08:16		07:22			06:17		17:34 (6)	06:03		19:37 (11)	05:06		20:08 (9)	04:43		20:31 (10)
	16:31		17:31			18:24	17	17:51 (6)	20:21	5	19:42 (11)	21:13	21	20:29 (9)	21:45	27	20:58 (10)
21	08:15		07:20			06:15		17:31 (6)	06:01		19:33 (11)	05:04		20:09 (9)	04:43		20:31 (10)
	16:33		17:33			18:26	21	17:52 (6)	20:23	13	19:46 (11)	21:15	20	20:29 (9)	21:45	27	20:58 (10)
22	08:14		07:18		16:54 (2)	06:12		17:30 (6)	05:59		19:29 (11)	05:03		20:08 (9)	04:43		20:32 (10)
	16:35		17:35	8	17:02 (2)	18:28	23	17:53 (6)	20:24	18	19:47 (11)	21:16	20	20:28 (9)	21:45	27	20:59 (10)
23	08:12		07:16		16:51 (2)	06:10		17:29 (6)	05:57		19:28 (11)	05:01		20:09 (9)	04:43		20:32 (10)
	16:36		17:37	14	17:05 (2)	18:30	24	17:53 (6)	20:26	21	19:49 (11)	21:18	19	20:28 (9)	21:45	27	20:59 (10)
24	08:11		07:14		16:48 (2)	06:08		17:28 (6)	05:55		19:26 (11)	05:00		20:10 (9)	04:44		20:32 (10)
	16:38		17:39	18	17:06 (2)	18:32	26	17:54 (6)	20:28	24	19:50 (11)	21:19	18	20:28 (9)	21:45	26	20:58 (10)
25	08:10		07:11		16:47 (2)	06:05		17:27 (6)	05:52		19:25 (11)	04:59		20:10 (9)	04:44		20:33 (10)
	16:40		17:41	20	17:07 (2)	18:33	27	17:54 (6)	20:30	26	19:51 (11)	21:21	18	20:28 (9)	21:46	26	20:59 (10)
26	08:08		07:09		16:46 (2)	06:03		17:27 (6)	05:50		19:25 (11)	04:58		20:11 (9)	04:44		20:33 (10)
	16:42		17:43	22	17:08 (2)	18:35	27	17:54 (6)	20:32	26	19:51 (11)	21:22	17	20:28 (9)	21:46	26	20:59 (10)
27	08:07		07:07		16:45 (2)	06:00		17:27 (6)	05:48		19:24 (11)	04:56		20:12 (9)	04:45		20:34 (10)
	16:44		17:45	23	17:08 (2)	18:37	27	17:54 (6)	20:33	28	19:52 (11)	21:23	15	20:27 (9)	21:45	26	21:00 (10)
28	08:05		07:05		16:45 (2)	05:58		17:26 (6)	05:46		19:23 (11)	04:55		20:13 (9)	04:45		20:34 (10)
	16:46		17:47	24	17:09 (2)	18:39	27	17:53 (6)	20:35	29	19:52 (11)	21:25	13	20:26 (9)	21:45	25	20:59 (10)
29	08:04					06:55		18:27 (6)	05:44		19:23 (11)	04:54		20:14 (9)	04:46		20:34 (10)
	16:48					19:41	26	18:53 (6)	20:37	29	19:52 (11)	21:26	15	20:42 (10)	21:45	26	21:00 (10)
30	08:02					06:53		18:26 (6)	05:42		19:22 (11)	04:53		20:15 (9)	04:47		20:34 (10)
	16:50					19:42	32	19:14 (5)	20:39	30	19:52 (11)	21:27	18	20:45 (10)	21:45	25	20:59 (10)
31	08:01					06:51		18:27 (6)				04:52		20:16 (9)			
	16:52					19:44	36	19:17 (5)				21:29	19	20:47 (10)			
Sonnenscheinstunden	252		274			367			419			492			508		
astr.max.mögl.Beschattung				129			514			535			737			721	
Red.Sonnenscheinwahrsch.				0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer				0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung				0.69			0.69			0.68			0.66			0.64	
Gesamte Reduktion				0.15			0.20			0.26			0.31			0.27	
Met.wahrsch.Beschattung				19			102			137			227			192	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AI - IO35

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		20:35 (10)	05:26		19:39 (11)	06:20		18:59 (5)	07:12		07:10	08:04
	21:45	25	21:00 (10)	21:10	34	20:38 (9)	20:04	15	19:14 (5)	18:51		16:42	15:58
2	04:48		20:36 (10)	05:28		19:37 (11)	06:22		18:58 (5)	07:14		07:12	08:05
	21:44	24	21:00 (10)	21:08	35	20:36 (9)	20:02	17	19:15 (5)	18:49		16:40	15:57
3	04:49		20:35 (10)	05:30		19:36 (11)	06:23		18:56 (5)	07:16		07:14	08:07
	21:44	24	20:59 (10)	21:06	34	20:35 (9)	20:00	19	19:15 (5)	18:47		16:38	15:57
4	04:49		20:36 (10)	05:31		19:35 (11)	06:25		18:55 (5)	07:18	17:29 (2)	07:15	08:08
	21:43	23	20:59 (10)	21:05	32	20:33 (9)	19:57	21	19:16 (5)	18:44	7 17:36 (2)	16:36	15:56
5	04:50		20:37 (10)	05:33		19:34 (11)	06:27		18:55 (5)	07:19	17:26 (2)	07:17	08:10
	21:43	22	20:59 (10)	21:03	25	19:59 (11)	19:55	21	19:16 (5)	18:42	13 17:39 (2)	16:34	15:55
6	04:51		20:37 (10)	05:35		19:33 (11)	06:29		18:54 (5)	07:21	17:24 (2)	07:19	08:11
	21:42	22	20:59 (10)	21:01	26	19:59 (11)	19:52	21	19:15 (5)	18:39	17 17:41 (2)	16:32	15:55
7	04:52		20:38 (10)	05:36		19:33 (11)	06:30		18:54 (5)	07:23	17:21 (2)	07:21	08:12
	21:42	21	20:59 (10)	20:59	27	20:00 (11)	19:50	21	19:15 (5)	18:37	20 17:41 (2)	16:30	15:54
8	04:53		20:39 (10)	05:38		19:32 (11)	06:32		18:28 (6)	07:25	17:20 (2)	07:23	08:14
	21:41	20	20:59 (10)	20:57	29	20:01 (11)	19:48	30	19:15 (5)	18:35	22 17:42 (2)	16:28	15:54
9	04:54		20:40 (10)	05:40		19:31 (11)	06:34		18:24 (6)	07:27	17:19 (2)	07:25	08:15
	21:40	18	20:58 (10)	20:55	30	20:01 (11)	19:45	35	19:13 (5)	18:32	23 17:42 (2)	16:27	15:54
10	04:55		20:40 (10)	05:42		19:31 (11)	06:36		18:22 (6)	07:28	17:18 (2)	07:27	08:16
	21:39	18	20:58 (10)	20:53	30	20:01 (11)	19:43	38	19:13 (5)	18:30	25 17:43 (2)	16:25	15:53
11	04:56		20:41 (10)	05:43		19:31 (11)	06:37		18:21 (6)	07:30	17:18 (2)	07:29	08:17
	21:38	16	20:57 (10)	20:51	29	20:00 (11)	19:40	37	19:11 (5)	18:27	25 17:43 (2)	16:23	15:53
12	04:58		20:26 (9)	05:45		19:31 (11)	06:39		18:19 (6)	07:32	17:18 (2)	07:31	08:18
	21:38	18	20:56 (10)	20:49	30	20:01 (11)	19:38	36	19:09 (5)	18:25	25 17:43 (2)	16:22	15:53
13	04:59		20:24 (9)	05:47		19:31 (11)	06:41		18:18 (6)	07:34	17:18 (2)	07:33	08:19
	21:37	19	20:55 (10)	20:47	30	20:01 (11)	19:35	33	19:06 (5)	18:23	24 17:42 (2)	16:20	15:53
14	05:00		20:23 (9)	05:48		19:30 (11)	06:42		18:17 (6)	07:36	17:16 (2)	07:34	08:20
	21:36	18	20:53 (10)	20:45	30	20:00 (11)	19:33	26	18:43 (6)	18:20	24 17:42 (2)	16:18	15:53
15	05:01		20:22 (9)	05:50		19:31 (11)	06:44		18:17 (6)	07:38	17:18 (2)	07:36	08:21
	21:34	12	20:34 (9)	20:43	29	20:00 (11)	19:30	27	18:44 (6)	18:18	23 17:41 (2)	16:17	15:53
16	05:02		20:21 (9)	05:52		19:32 (11)	06:46		18:15 (6)	07:39	17:19 (2)	07:38	08:22
	21:33	14	20:35 (9)	20:41	27	19:59 (11)	19:28	28	18:43 (6)	18:16	21 17:40 (2)	16:15	15:53
17	05:04		20:21 (9)	05:54		19:31 (11)	06:48		18:15 (6)	07:41	17:20 (2)	07:40	08:23
	21:32	16	20:37 (9)	20:38	27	19:58 (11)	19:26	28	18:43 (6)	18:14	19 17:39 (2)	16:14	15:53
18	05:05		20:20 (9)	05:55		19:32 (11)	06:49		18:15 (6)	07:43	17:20 (2)	07:42	08:24
	21:31	17	20:37 (9)	20:36	25	19:57 (11)	19:23	27	18:42 (6)	18:11	17 17:37 (2)	16:12	15:53
19	05:07		20:19 (9)	05:57		19:32 (11)	06:51		18:15 (6)	07:45	17:22 (2)	07:44	08:25
	21:30	19	20:38 (9)	20:34	23	19:55 (11)	19:21	26	18:41 (6)	18:09	12 17:34 (2)	16:11	15:54
20	05:08		20:19 (9)	05:59		19:34 (11)	06:53		18:15 (6)	07:47	17:26 (2)	07:45	08:25
	21:29	19	20:38 (9)	20:32	20	19:54 (11)	19:18	25	18:40 (6)	18:07	4 17:30 (2)	16:10	15:54
21	05:09		20:19 (9)	06:01		19:35 (11)	06:55		18:16 (6)	07:49		07:47	08:26
	21:27	20	20:39 (9)	20:30	18	19:53 (11)	19:16	23	18:39 (6)	18:05		16:08	15:54
22	05:11		20:19 (9)	06:02		19:37 (11)	06:56		18:17 (6)	07:51		07:49	08:26
	21:26	20	20:39 (9)	20:27	12	19:49 (11)	19:13	21	18:38 (6)	18:02		16:07	15:55
23	05:12		20:18 (9)	06:04			06:58		18:17 (6)	07:53		07:51	08:27
	21:24	21	20:39 (9)	20:25			19:11	19	18:36 (6)	18:00		16:06	15:55
24	05:14		20:18 (9)	06:06			07:00		18:19 (6)	07:54		07:53	08:27
	21:23	22	20:40 (9)	20:23			19:08	14	18:33 (6)	17:58		16:05	15:56
25	05:15		20:18 (9)	06:08			07:02		18:23 (6)	06:56		07:54	08:28
	21:21	21	20:39 (9)	20:21			19:06	6	18:29 (6)	16:56		16:04	15:56
26	05:17		20:19 (9)	06:09			07:03			06:58		07:56	08:28
	21:20	21	20:40 (9)	20:18			19:04			16:54		16:03	15:57
27	05:18		20:18 (9)	06:11			07:05			07:00		07:58	08:28
	21:18	21	20:39 (9)	20:16			19:01			16:52		16:02	15:58
28	05:20		20:19 (9)	06:13			07:07			07:02		07:59	08:28
	21:17	21	20:40 (9)	20:14			18:59			16:50		16:01	15:59
29	05:22		20:19 (9)	06:15			07:09			07:04		08:01	08:29
	21:15	20	20:39 (9)	20:11			18:56			16:48		16:00	16:00
30	05:23		19:44 (11)	06:16		19:07 (5)	07:11			07:06		08:02	08:29
	21:13	26	20:39 (9)	20:09	2	19:09 (5)	18:54			16:46		15:59	16:01
31	05:25		19:40 (11)	06:18		19:01 (5)				07:08			08:29
	21:12	32	20:38 (9)	20:07	11	19:12 (5)				16:44			16:02
Sonnenscheinstunden	510			459			382			329		260	235
astr.max.mögl.Beschattung		630			615			614			321		
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33		
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91		
Reduktion Windrichtung		0.65			0.66			0.69			0.69		
Gesamte Reduktion		0.26			0.30			0.26			0.21		
Met.wahrsch.Beschattung		167			182			157			66		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AJ - IO36

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar			März			April			Mai			Juni		
1	08:29	07:59			07:02		16:48 (2)	06:48		18:29 (6)	05:40		19:26 (11)	04:51		20:17 (9)
	16:03	16:54			17:48	24	17:12 (2)	19:46	36	19:18 (5)	20:41	29	19:55 (11)	21:30	18	20:48 (10)
2	08:28	07:57			07:00		16:47 (2)	06:46		18:30 (6)	05:38		19:25 (11)	04:50		20:19 (9)
	16:04	16:55			17:50	25	17:12 (2)	19:48	38	19:20 (5)	20:42	30	19:55 (11)	21:31	16	20:49 (10)
3	08:28	07:56			06:58		16:47 (2)	06:43		18:32 (6)	05:36		19:25 (11)	04:49		20:36 (10)
	16:05	16:57			17:52	25	17:12 (2)	19:50	38	19:22 (5)	20:44	30	19:55 (11)	21:32	15	20:51 (10)
4	08:28	07:54			06:55		16:48 (2)	06:41		18:32 (6)	05:34		19:25 (11)	04:48		20:35 (10)
	16:06	16:59			17:54	24	17:12 (2)	19:52	38	19:22 (5)	20:46	29	19:54 (11)	21:33	17	20:52 (10)
5	08:28	07:52			06:53		16:47 (2)	06:38		18:35 (6)	05:32		19:26 (11)	04:48		20:34 (10)
	16:08	17:01			17:56	24	17:11 (2)	19:53	33	19:22 (5)	20:48	29	19:55 (11)	21:34	18	20:52 (10)
6	08:27	07:50			06:51		16:48 (2)	06:36		18:40 (6)	05:30		19:26 (11)	04:47		20:35 (10)
	16:09	17:03			17:58	23	17:11 (2)	19:55	25	19:23 (5)	20:50	28	19:54 (11)	21:35	18	20:53 (10)
7	08:27	07:49			06:48		16:48 (2)	06:34		19:00 (5)	05:28		19:26 (11)	04:46		20:34 (10)
	16:10	17:05			18:00	22	17:10 (2)	19:57	22	19:22 (5)	20:51	27	19:53 (11)	21:36	20	20:54 (10)
8	08:26	07:47			06:46		16:49 (2)	06:31		19:00 (5)	05:26		19:26 (11)	04:46		20:34 (10)
	16:12	17:07			18:02	20	17:09 (2)	19:59	22	19:22 (5)	20:53	27	19:53 (11)	21:37	21	20:55 (10)
9	08:26	07:45			06:44		16:50 (2)	06:29		19:01 (5)	05:24		19:28 (11)	04:45		20:33 (10)
	16:13	17:09			18:04	18	17:08 (2)	20:01	20	19:21 (5)	20:55	29	20:23 (9)	21:38	22	20:55 (10)
10	08:25	07:43			06:41		16:52 (2)	06:27		19:00 (5)	05:22		19:28 (11)	04:45		20:34 (10)
	16:15	17:11			18:06	13	17:05 (2)	20:03	20	19:20 (5)	20:57	35	20:26 (9)	21:39	22	20:56 (10)
11	08:25	07:41			06:39		16:56 (2)	06:24		19:01 (5)	05:20		19:28 (11)	04:44		20:34 (10)
	16:16	17:13			18:07	5	17:01 (2)	20:04	18	19:19 (5)	20:58	36	20:27 (9)	21:40	22	20:56 (10)
12	08:24	07:39			06:37			06:22		19:03 (5)	05:19		19:30 (11)	04:44		20:34 (10)
	16:18	17:15			18:09			20:06	15	19:18 (5)	21:00	35	20:28 (9)	21:41	23	20:57 (10)
13	08:23	07:37			06:34			06:20		19:04 (5)	05:17		19:31 (11)	04:43		20:33 (10)
	16:19	17:17			18:11			20:08	11	19:15 (5)	21:02	35	20:29 (9)	21:41	24	20:57 (10)
14	08:22	07:35			06:32			06:17		19:07 (5)	05:15		19:32 (11)	04:43		20:34 (10)
	16:21	17:19			18:13			20:10	4	19:11 (5)	21:03	33	20:29 (9)	21:42	23	20:57 (10)
15	08:21	07:33			06:29			06:15			05:14		19:35 (11)	04:43		20:34 (10)
	16:22	17:21			18:15			20:12			21:05	29	20:30 (9)	21:43	24	20:58 (10)
16	08:20	07:31			06:27			06:13			05:12		20:10 (9)	04:43		20:34 (10)
	16:24	17:23			18:17			20:13			21:07	20	20:30 (9)	21:43	24	20:58 (10)
17	08:19	07:29			06:25			06:10			05:10		20:10 (9)	04:43		20:34 (10)
	16:26	17:25			18:19			20:15			21:08	21	20:31 (9)	21:44	24	20:58 (10)
18	08:18	07:27			06:22			06:08			05:09		20:10 (9)	04:43		20:34 (10)
	16:27	17:27			18:20			20:17			21:10	21	20:31 (9)	21:44	25	20:59 (10)
19	08:17	07:25			06:20			06:06			05:07		20:10 (9)	04:43		20:34 (10)
	16:29	17:29			18:22			20:19			21:11	21	20:31 (9)	21:44	25	20:59 (10)
20	08:16	07:22			06:17		17:42 (6)	06:03			05:06		20:10 (9)	04:43		20:34 (10)
	16:31	17:31			18:24	8	17:50 (6)	20:21			21:13	21	20:31 (9)	21:45	25	20:59 (10)
21	08:15	07:20			06:15		17:38 (6)	06:01			05:04		20:10 (9)	04:43		20:34 (10)
	16:33	17:33			18:26	15	17:53 (6)	20:23			21:15	21	20:31 (9)	21:45	25	20:59 (10)
22	08:14	07:18			06:12		17:36 (6)	05:59		19:36 (11)	05:03		20:10 (9)	04:43		20:35 (10)
	16:35	17:35			18:28	19	17:55 (6)	20:24	11	19:47 (11)	21:16	20	20:30 (9)	21:45	25	21:00 (10)
23	08:12	07:16			06:10		17:34 (6)	05:57		19:33 (11)	05:01		20:10 (9)	04:43		20:35 (10)
	16:36	17:37			18:30	21	17:55 (6)	20:26	16	19:49 (11)	21:18	20	20:30 (9)	21:45	25	21:00 (10)
24	08:11	07:14		16:55 (2)	06:08		17:33 (6)	05:55		19:31 (11)	05:00		20:11 (9)	04:44		20:35 (10)
	16:38	17:39	11	17:06 (2)	18:32	24	17:57 (6)	20:28	20	19:51 (11)	21:19	19	20:30 (9)	21:45	25	21:00 (10)
25	08:10	07:11		16:53 (2)	06:05		17:31 (6)	05:52		19:30 (11)	04:59		20:12 (9)	04:44		20:36 (10)
	16:40	17:41	16	17:09 (2)	18:33	25	17:56 (6)	20:30	22	19:52 (11)	21:21	18	20:30 (9)	21:46	25	21:01 (10)
26	08:08	07:09		16:51 (2)	06:03		17:31 (6)	05:50		19:29 (11)	04:58		20:12 (9)	04:44		20:36 (10)
	16:42	17:43	19	17:10 (2)	18:35	26	17:57 (6)	20:32	24	19:53 (11)	21:22	18	20:30 (9)	21:46	24	21:00 (10)
27	08:07	07:07		16:49 (2)	06:00		17:31 (6)	05:48		19:28 (11)	04:56		20:13 (9)	04:45		20:37 (10)
	16:44	17:45	22	17:11 (2)	18:37	27	17:58 (6)	20:33	26	19:54 (11)	21:23	16	20:29 (9)	21:45	24	21:01 (10)
28	08:05	07:05		16:49 (2)	05:58		17:30 (6)	05:46		19:27 (11)	04:55		20:14 (9)	04:45		20:37 (10)
	16:46	17:47	23	17:12 (2)	18:39	27	17:57 (6)	20:35	27	19:54 (11)	21:25	15	20:29 (9)	21:45	23	21:00 (10)
29	08:04				06:55		18:30 (6)	05:44		19:26 (11)	04:54		20:14 (9)	04:46		20:37 (10)
	16:48				19:41	27	18:57 (6)	20:37	29	19:55 (11)	21:26	14	20:28 (9)	21:45	24	21:01 (10)
30	08:02				06:53		18:29 (6)	05:42		19:26 (11)	04:53		20:15 (9)	04:47		20:37 (10)
	16:50				19:42	27	18:56 (6)	20:39	29	19:55 (11)	21:27	13	20:28 (9)	21:45	23	21:00 (10)
31	08:01				06:51		18:30 (6)				04:52		20:16 (9)			
	16:52				19:44	29	19:15 (5)				21:29	17	20:46 (10)			
Sonnenscheinstunden	252	274			367			419			492			508		
astr.max.mögl.Beschattung			91			498			544			756			669	
Red.Sonnenscheinwahrsch.			0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer			0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung			0.69			0.69			0.68			0.66			0.64	
Gesamte Reduktion			0.15			0.20			0.26			0.31			0.27	
Met.wahrsch.Beschattung			14			99			140			233			177	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AJ - IO36

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1 | 04:47		20:38 (10)	| 05:26		19:40 (11)	| 06:20		19:00 (5)	| 07:12			| 07:10	| 08:04
| 21:45	23	21:01 (10)	| 21:10	35	20:38 (9)	| 20:04	18	19:18 (5)	| 18:51			| 16:42	| 15:58
2 | 04:48		20:39 (10)	| 05:28		19:38 (11)	| 06:22		18:59 (5)	| 07:14			| 07:12	| 08:05
| 21:44	22	21:01 (10)	| 21:08	36	20:37 (9)	| 20:02	20	19:19 (5)	| 18:49			| 16:40	| 15:57
3 | 04:49		20:38 (10)	| 05:30		19:38 (11)	| 06:23		18:58 (5)	| 07:16		17:31 (2)	| 07:14	| 08:07
| 21:44	22	21:00 (10)	| 21:06	33	20:35 (9)	| 20:00	20	19:18 (5)	| 18:47	10	17:41 (2)	| 16:38	| 15:57
4 | 04:49		20:39 (10)	| 05:31		19:37 (11)	| 06:25		18:57 (5)	| 07:18		17:28 (2)	| 07:15	| 08:08
| 21:43	21	21:00 (10)	| 21:05	25	20:02 (11)	| 19:57	22	19:19 (5)	| 18:44	16	17:44 (2)	| 16:36	| 15:56
5 | 04:50		20:40 (10)	| 05:33		19:36 (11)	| 06:27		18:57 (5)	| 07:19		17:26 (2)	| 07:17	| 08:10
| 21:43	20	21:00 (10)	| 21:03	27	20:03 (11)	| 19:55	22	19:19 (5)	| 18:42	19	17:45 (2)	| 16:34	| 15:55
6 | 04:51		20:41 (10)	| 05:35		19:35 (11)	| 06:29		18:36 (6)	| 07:21		17:25 (2)	| 07:19	| 08:11
| 21:42	19	21:00 (10)	| 21:01	28	20:03 (11)	| 19:52	23	19:18 (5)	| 18:39	21	17:46 (2)	| 16:32	| 15:55
7 | 04:52		20:42 (10)	| 05:36		19:35 (11)	| 06:30		18:30 (6)	| 07:23		17:23 (2)	| 07:21	| 08:12
| 21:42	18	21:00 (10)	| 20:59	29	20:04 (11)	| 19:50	32	19:17 (5)	| 18:37	23	17:46 (2)	| 16:30	| 15:54
8 | 04:53		20:42 (10)	| 05:38		19:35 (11)	| 06:32		18:28 (6)	| 07:25		17:22 (2)	| 07:23	| 08:14
| 21:41	17	20:59 (10)	| 20:57	29	20:04 (11)	| 19:48	37	19:17 (5)	| 18:35	24	17:46 (2)	| 16:28	| 15:54
9 | 04:54		20:43 (10)	| 05:40		19:34 (11)	| 06:34		18:25 (6)	| 07:27		17:22 (2)	| 07:25	| 08:15
| 21:40	16	20:59 (10)	| 20:55	30	20:04 (11)	| 19:45	38	19:15 (5)	| 18:32	24	17:46 (2)	| 16:27	| 15:54
10 | 04:55		20:44 (10)	| 05:42		19:35 (11)	| 06:36		18:24 (6)	| 07:28		17:22 (2)	| 07:27	| 08:16
| 21:39	14	20:58 (10)	| 20:53	29	20:04 (11)	| 19:43	38	19:14 (5)	| 18:30	24	17:46 (2)	| 16:25	| 15:53
11 | 04:56		20:27 (9)	| 05:43		19:34 (11)	| 06:37		18:23 (6)	| 07:30		17:21 (2)	| 07:29	| 08:17
| 21:38	17	20:57 (10)	| 20:51	29	20:03 (11)	| 19:40	36	19:12 (5)	| 18:27	25	17:46 (2)	| 16:23	| 15:53
12 | 04:58		20:25 (9)	| 05:45		19:34 (11)	| 06:39		18:21 (6)	| 07:32		17:21 (2)	| 07:31	| 08:18
| 21:38	18	20:55 (10)	| 20:49	29	20:03 (11)	| 19:38	32	19:08 (5)	| 18:25	25	17:46 (2)	| 16:22	| 15:53
13 | 04:59		20:24 (9)	| 05:47		19:35 (11)	| 06:41		18:20 (6)	| 07:34		17:22 (2)	| 07:33	| 08:19
| 21:37	12	20:36 (9)	| 20:47	28	20:03 (11)	| 19:35	27	18:47 (6)	| 18:23	23	17:45 (2)	| 16:20	| 15:53
14 | 05:00		20:23 (9)	| 05:48		19:34 (11)	| 06:42		18:20 (6)	| 07:36		17:22 (2)	| 07:34	| 08:20
| 21:36	14	20:37 (9)	| 20:45	28	20:02 (11)	| 19:33	27	18:47 (6)	| 18:20	22	17:44 (2)	| 16:18	| 15:53
15 | 05:01		20:22 (9)	| 05:50		19:35 (11)	| 06:44		18:20 (6)	| 07:38		17:23 (2)	| 07:36	| 08:21
| 21:34	15	20:37 (9)	| 20:43	27	20:02 (11)	| 19:30	27	18:47 (6)	| 18:18	20	17:43 (2)	| 16:17	| 15:53
16 | 05:02		20:22 (9)	| 05:52		19:36 (11)	| 06:46		18:19 (6)	| 07:39		17:24 (2)	| 07:38	| 08:22
| 21:33	16	20:38 (9)	| 20:41	25	20:01 (11)	| 19:28	27	18:46 (6)	| 18:16	18	17:42 (2)	| 16:15	| 15:53
17 | 05:04		20:22 (9)	| 05:54		19:36 (11)	| 06:48		18:19 (6)	| 07:41		17:26 (2)	| 07:40	| 08:23
| 21:32	17	20:39 (9)	| 20:38	24	20:00 (11)	| 19:26	27	18:46 (6)	| 18:14	14	17:40 (2)	| 16:14	| 15:53
18 | 05:05		20:21 (9)	| 05:55		19:37 (11)	| 06:49		18:19 (6)	| 07:43		17:27 (2)	| 07:42	| 08:24
| 21:31	18	20:39 (9)	| 20:36	22	19:59 (11)	| 19:23	26	18:45 (6)	| 18:11	9	17:36 (2)	| 16:12	| 15:53
19 | 05:07		20:21 (9)	| 05:57		19:37 (11)	| 06:51		18:19 (6)	| 07:45			| 07:44	| 08:25
| 21:30	19	20:40 (9)	| 20:34	19	19:56 (11)	| 19:21	24	18:43 (6)	| 18:09			| 16:11	| 15:54
20 | 05:08		20:20 (9)	| 05:59		19:39 (11)	| 06:53		18:20 (6)	| 07:47			| 07:45	| 08:25
| 21:29	20	20:40 (9)	| 20:32	16	19:55 (11)	| 19:18	22	18:42 (6)	| 18:07			| 16:10	| 15:54
21 | 05:09		20:21 (9)	| 06:01		19:43 (11)	| 06:55		18:21 (6)	| 07:49			| 07:47	| 08:26
| 21:27	20	20:41 (9)	| 20:30	9	19:52 (11)	| 19:16	20	18:41 (6)	| 18:05			| 16:08	| 15:54
22 | 05:11		20:20 (9)	| 06:02			| 06:56		18:23 (6)	| 07:51			| 07:49	| 08:26
| 21:26	21	20:41 (9)	| 20:27			| 19:13	16	18:39 (6)	| 18:02			| 16:07	| 15:55
23 | 05:12		20:20 (9)	| 06:04			| 06:58		18:24 (6)	| 07:53			| 07:51	| 08:27
| 21:24	21	20:41 (9)	| 20:25			| 19:11	11	18:35 (6)	| 18:00			| 16:06	| 15:55
24 | 05:14		20:20 (9)	| 06:06			| 07:00			| 07:54			| 07:53	| 08:27
| 21:23	21	20:41 (9)	| 20:23			| 19:08			| 17:58			| 16:05	| 15:56
25 | 05:15		20:20 (9)	| 06:08			| 07:02			| 06:56			| 07:54	| 08:28
| 21:21	21	20:41 (9)	| 20:21			| 19:06			| 16:56			| 16:04	| 15:56
26 | 05:17		20:21 (9)	| 06:09			| 07:03			| 06:58			| 07:56	| 08:28
| 21:20	20	20:41 (9)	| 20:18			| 19:04			| 16:54			| 16:03	| 15:57
27 | 05:18		20:20 (9)	| 06:11			| 07:05			| 07:00			| 07:58	| 08:28
| 21:18	21	20:41 (9)	| 20:16			| 19:01			| 16:52			| 16:02	| 15:58
28 | 05:20		19:49 (11)	| 06:13			| 07:07			| 07:02			| 07:59	| 08:28
| 21:17	24	20:41 (9)	| 20:14			| 18:59			| 16:50			| 16:01	| 15:59
29 | 05:22		19:44 (11)	| 06:15		19:08 (5)	| 07:09			| 07:04			| 08:01	| 08:29
| 21:15	31	20:40 (9)	| 20:11	4	19:12 (5)	| 18:56			| 16:48			| 16:00	| 16:00
30 | 05:23		19:43 (11)	| 06:16		19:04 (5)	| 07:11			| 07:06			| 08:02	| 08:29
| 21:13	33	20:40 (9)	| 20:09	12	19:16 (5)	| 18:54			| 16:46			| 15:59	| 16:01
31 | 05:25		19:41 (11)	| 06:18		19:02 (5)				| 07:08				| 08:29
| 21:12	35	20:39 (9)	| 20:07	15	19:17 (5)				| 16:44				| 16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung		626		588			592			317			
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91		0.91			0.91			0.91			
Reduktion Windrichtung		0.65		0.67			0.69			0.69			
Gesamte Reduktion		0.26		0.30			0.26			0.21			
Met.wahrsch.Beschattung		166		174			151			65			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AK - IO37

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar			März			April			Mai			Juni		
1	08:29	07:59			07:02		16:47 (2)	06:48		18:29 (6)	05:40		19:23 (11)	04:51		20:31 (10)
	16:03	16:54			17:48	24	17:11 (2)	19:46	37	19:18 (5)	20:41	29	19:52 (11)	21:30	18	20:49 (10)
2	08:28	07:57			07:00		16:46 (2)	06:46		18:30 (6)	05:38		19:23 (11)	04:50		20:30 (10)
	16:04	16:55			17:50	25	17:11 (2)	19:48	37	19:20 (5)	20:42	29	19:52 (11)	21:31	19	20:49 (10)
3	08:28	07:56			06:58		16:46 (2)	06:43		18:32 (6)	05:36		19:23 (11)	04:49		20:30 (10)
	16:05	16:57			17:52	25	17:11 (2)	19:50	36	19:21 (5)	20:44	28	19:51 (11)	21:32	21	20:51 (10)
4	08:28	07:54			06:55		16:47 (2)	06:41		18:34 (6)	05:34		19:23 (11)	04:48		20:30 (10)
	16:06	16:59			17:54	24	17:11 (2)	19:52	30	19:20 (5)	20:46	28	19:51 (11)	21:33	21	20:51 (10)
5	08:28	07:52			06:53		16:46 (2)	06:38		18:59 (5)	05:32		19:24 (11)	04:48		20:29 (10)
	16:08	17:01			17:56	23	17:09 (2)	19:53	22	19:21 (5)	20:48	27	19:51 (11)	21:34	22	20:51 (10)
6	08:27	07:50			06:51		16:47 (2)	06:36		18:59 (5)	05:30		19:24 (11)	04:47		20:29 (10)
	16:09	17:03			17:58	22	17:09 (2)	19:55	22	19:21 (5)	20:50	26	19:50 (11)	21:35	23	20:52 (10)
7	08:27	07:49			06:48		16:47 (2)	06:34		18:59 (5)	05:28		19:25 (11)	04:46		20:29 (10)
	16:10	17:05			18:00	20	17:07 (2)	19:57	21	19:20 (5)	20:51	24	19:49 (11)	21:36	23	20:52 (10)
8	08:26	07:47			06:46		16:49 (2)	06:31		18:59 (5)	05:26		19:25 (11)	04:46		20:29 (10)
	16:12	17:07			18:02	17	17:06 (2)	19:59	20	19:19 (5)	20:53	31	20:22 (9)	21:37	24	20:53 (10)
9	08:26	07:45			06:44		16:51 (2)	06:29		19:00 (5)	05:24		19:27 (11)	04:45		20:28 (10)
	16:13	17:09			18:04	13	17:04 (2)	20:01	19	19:19 (5)	20:55	34	20:25 (9)	21:38	25	20:53 (10)
10	08:25	07:43			06:41		16:54 (2)	06:27		19:00 (5)	05:22		19:28 (11)	04:45		20:29 (10)
	16:15	17:11			18:06	6	17:00 (2)	20:03	17	19:17 (5)	20:57	33	20:26 (9)	21:39	25	20:54 (10)
11	08:25	07:41			06:39			06:24		19:01 (5)	05:20		19:29 (11)	04:44		20:29 (10)
	16:16	17:13			18:07			20:04	15	19:16 (5)	20:58	32	20:26 (9)	21:40	26	20:55 (10)
12	08:24	07:39			06:37			06:22		19:03 (5)	05:19		19:32 (11)	04:44		20:29 (10)
	16:18	17:15			18:09			20:06	10	19:13 (5)	21:00	29	20:27 (9)	21:41	26	20:55 (10)
13	08:23	07:37			06:34			06:20			05:17		19:35 (11)	04:43		20:29 (10)
	16:19	17:17			18:11			20:08			21:02	23	20:27 (9)	21:41	26	20:55 (10)
14	08:22	07:35			06:32			06:17			05:15		20:07 (9)	04:43		20:29 (10)
	16:21	17:19			18:13			20:10			21:03	20	20:27 (9)	21:42	26	20:55 (10)
15	08:21	07:33			06:29			06:15			05:14		20:08 (9)	04:43		20:29 (10)
	16:22	17:21			18:15			20:12			21:05	20	20:28 (9)	21:43	27	20:56 (10)
16	08:20	07:31			06:27			06:13			05:12		20:07 (9)	04:43		20:29 (10)
	16:24	17:23			18:17			20:13			21:07	21	20:28 (9)	21:43	27	20:56 (10)
17	08:19	07:29			06:25			06:10			05:10		20:07 (9)	04:43		20:30 (10)
	16:26	17:25			18:19			20:15			21:08	21	20:28 (9)	21:44	26	20:56 (10)
18	08:18	07:27			06:22			06:08			05:09		20:08 (9)	04:43		20:30 (10)
	16:27	17:27			18:20			20:17			21:10	21	20:29 (9)	21:44	27	20:57 (10)
19	08:17	07:25			06:20		17:39 (6)	06:06			05:07		20:07 (9)	04:43		20:30 (10)
	16:29	17:29			18:22	10	17:49 (6)	20:19			21:11	21	20:28 (9)	21:44	27	20:57 (10)
20	08:16	07:22			06:17		17:36 (6)	06:03		19:36 (11)	05:06		20:08 (9)	04:43		20:30 (10)
	16:31	17:31			18:24	16	17:52 (6)	20:21	8	19:44 (11)	21:13	20	20:28 (9)	21:45	27	20:57 (10)
21	08:15	07:20			06:15		17:34 (6)	06:01		19:32 (11)	05:04		20:09 (9)	04:43		20:30 (10)
	16:33	17:33			18:26	19	17:53 (6)	20:23	15	19:47 (11)	21:15	19	20:28 (9)	21:45	27	20:57 (10)
22	08:14	07:18			06:12		17:32 (6)	05:59		19:29 (11)	05:03		20:08 (9)	04:43		20:31 (10)
	16:35	17:35			18:28	22	17:54 (6)	20:24	19	19:48 (11)	21:16	19	20:27 (9)	21:45	27	20:58 (10)
23	08:12	07:16		16:55 (2)	06:10		17:31 (6)	05:57		19:28 (11)	05:01		20:09 (9)	04:43		20:31 (10)
	16:36	17:37	10	17:05 (2)	18:30	23	17:54 (6)	20:26	21	19:49 (11)	21:18	18	20:27 (9)	21:45	27	20:58 (10)
24	08:11	07:14		16:52 (2)	06:08		17:30 (6)	05:55		19:27 (11)	05:00		20:10 (9)	04:44		20:31 (10)
	16:38	17:39	15	17:07 (2)	18:32	25	17:55 (6)	20:28	23	19:50 (11)	21:19	17	20:27 (9)	21:45	27	20:58 (10)
25	08:10	07:11		16:50 (2)	06:05		17:29 (6)	05:52		19:26 (11)	04:59		20:11 (9)	04:44		20:32 (10)
	16:40	17:41	18	17:08 (2)	18:33	26	17:55 (6)	20:30	25	19:51 (11)	21:21	16	20:27 (9)	21:46	26	20:58 (10)
26	08:08	07:09		16:49 (2)	06:03		17:29 (6)	05:50		19:25 (11)	04:58		20:11 (9)	04:44		20:32 (10)
	16:42	17:43	21	17:10 (2)	18:35	26	17:55 (6)	20:32	27	19:52 (11)	21:22	15	20:26 (9)	21:46	26	20:58 (10)
27	08:07	07:07		16:48 (2)	06:00		17:29 (6)	05:48		19:24 (11)	04:56		20:12 (9)	04:45		20:32 (10)
	16:44	17:45	22	17:10 (2)	18:37	27	17:56 (6)	20:33	28	19:52 (11)	21:23	13	20:25 (9)	21:45	27	20:59 (10)
28	08:05	07:05		16:47 (2)	05:58		17:28 (6)	05:46		19:24 (11)	04:55		20:14 (9)	04:45		20:32 (10)
	16:46	17:47	24	17:11 (2)	18:39	27	17:55 (6)	20:35	28	19:52 (11)	21:25	19	20:44 (10)	21:45	26	20:58 (10)
29	08:04				06:55		18:28 (6)	05:44		19:23 (11)	04:54		20:15 (9)	04:46		20:33 (10)
	16:48				19:41	26	18:54 (6)	20:37	29	19:52 (11)	21:26	20	20:46 (10)	21:45	26	20:59 (10)
30	08:02				06:53		18:28 (6)	05:42		19:23 (11)	04:53		20:17 (9)	04:47		20:33 (10)
	16:50				19:42	30	19:14 (5)	20:39	29	19:52 (11)	21:27	18	20:47 (10)	21:45	25	20:58 (10)
31	08:01				06:51		18:29 (6)				04:52		20:32 (10)			
	16:52				19:44	34	19:17 (5)				21:29	16	20:48 (10)			
Sonnenscheinstunden	252	274			367			419			492			508		
astr.max.mögl.Beschattung			110			510			538			707			750	
Red.Sonnenscheinwahrsch.			0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer			0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung			0.69			0.69			0.68			0.66			0.64	
Gesamte Reduktion			0.15			0.20			0.26			0.31			0.27	
Met.wahrsch.Beschattung			16			101			138			218			200	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AK - IO37

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		20:33 (10)	05:26		19:41 (11)	06:20		19:00 (5)	07:12		07:10	08:04
	21:45	26	20:59 (10)	21:10	31	20:38 (9)	20:04	15	19:15 (5)	18:51		16:42	15:58
2	04:48		20:34 (10)	05:28		19:39 (11)	06:22		18:59 (5)	07:14		07:12	08:05
	21:44	25	20:59 (10)	21:08	32	20:36 (9)	20:02	17	19:16 (5)	18:49		16:40	15:57
3	04:49		20:34 (10)	05:30		19:38 (11)	06:23		18:57 (5)	07:16		07:14	08:07
	21:44	24	20:58 (10)	21:06	32	20:35 (9)	20:00	19	19:16 (5)	18:47		16:38	15:57
4	04:49		20:34 (10)	05:31		19:36 (11)	06:25		18:56 (5)	07:18	17:29 (2)	07:15	08:08
	21:43	25	20:59 (10)	21:05	33	20:33 (9)	19:57	20	19:16 (5)	18:44	11 17:40 (2)	16:36	15:56
5	04:50		20:35 (10)	05:33		19:35 (11)	06:27		18:56 (5)	07:19	17:27 (2)	07:17	08:10
	21:43	24	20:59 (10)	21:03	30	20:31 (9)	19:55	21	19:17 (5)	18:42	15 17:42 (2)	16:34	15:55
6	04:51		20:35 (10)	05:35		19:34 (11)	06:29		18:54 (5)	07:21	17:25 (2)	07:19	08:11
	21:42	24	20:59 (10)	21:01	25	19:59 (11)	19:52	22	19:16 (5)	18:39	19 17:44 (2)	16:32	15:55
7	04:52		20:36 (10)	05:36		19:33 (11)	06:30		18:54 (5)	07:23	17:23 (2)	07:21	08:12
	21:42	23	20:59 (10)	20:59	27	20:00 (11)	19:50	22	19:16 (5)	18:37	21 17:44 (2)	16:30	15:54
8	04:53		20:37 (10)	05:38		19:33 (11)	06:32		18:29 (6)	07:25	17:22 (2)	07:23	08:14
	21:41	22	20:59 (10)	20:57	28	20:01 (11)	19:48	30	19:15 (5)	18:35	22 17:44 (2)	16:28	15:54
9	04:54		20:37 (10)	05:40		19:32 (11)	06:34		18:25 (6)	07:27	17:21 (2)	07:25	08:15
	21:40	21	20:58 (10)	20:55	28	20:00 (11)	19:45	36	19:14 (5)	18:32	24 17:45 (2)	16:27	15:54
10	04:55		20:38 (10)	05:42		19:32 (11)	06:35		18:24 (6)	07:28	17:21 (2)	07:27	08:16
	21:39	20	20:58 (10)	20:53	29	20:01 (11)	19:43	36	19:13 (5)	18:30	24 17:45 (2)	16:25	15:53
11	04:56		20:39 (10)	05:43		19:31 (11)	06:37		18:22 (6)	07:30	17:20 (2)	07:29	08:17
	21:38	18	20:57 (10)	20:51	29	20:00 (11)	19:40	38	19:12 (5)	18:27	25 17:45 (2)	16:23	15:53
12	04:58		20:40 (10)	05:45		19:31 (11)	06:39		18:20 (6)	07:32	17:20 (2)	07:31	08:18
	21:38	17	20:57 (10)	20:49	29	20:00 (11)	19:38	36	19:09 (5)	18:25	25 17:45 (2)	16:22	15:53
13	04:59		20:41 (10)	05:47		19:31 (11)	06:41		18:19 (6)	07:34	17:20 (2)	07:33	08:19
	21:37	15	20:56 (10)	20:47	30	20:01 (11)	19:35	31	19:06 (5)	18:23	24 17:44 (2)	16:20	15:53
14	05:00		20:24 (9)	05:48		19:31 (11)	06:42		18:19 (6)	07:36	17:20 (2)	07:34	08:20
	21:36	20	20:55 (10)	20:45	29	20:00 (11)	19:33	26	18:45 (6)	18:20	24 17:44 (2)	16:18	15:53
15	05:01		20:23 (9)	05:50		19:31 (11)	06:44		18:18 (6)	07:38	17:21 (2)	07:36	08:21
	21:34	19	20:53 (10)	20:43	29	20:00 (11)	19:30	27	18:45 (6)	18:18	22 17:43 (2)	16:17	15:53
16	05:02		20:21 (9)	05:52		19:32 (11)	06:46		18:17 (6)	07:39	17:22 (2)	07:38	08:22
	21:33	17	20:50 (10)	20:41	27	19:59 (11)	19:28	27	18:44 (6)	18:16	20 17:42 (2)	16:15	15:53
17	05:04		20:21 (9)	05:54		19:31 (11)	06:48		18:17 (6)	07:41	17:23 (2)	07:40	08:23
	21:32	14	20:35 (9)	20:38	27	19:58 (11)	19:26	27	18:44 (6)	18:14	17 17:40 (2)	16:14	15:53
18	05:05		20:21 (9)	05:55		19:32 (11)	06:49		18:17 (6)	07:43	17:24 (2)	07:42	08:24
	21:31	15	20:36 (9)	20:36	26	19:58 (11)	19:23	26	18:43 (6)	18:11	13 17:37 (2)	16:12	15:53
19	05:07		20:20 (9)	05:57		19:32 (11)	06:51		18:16 (6)	07:45	17:26 (2)	07:44	08:25
	21:30	16	20:36 (9)	20:34	24	19:56 (11)	19:21	26	18:42 (6)	18:09	8 17:34 (2)	16:11	15:54
20	05:08		20:19 (9)	05:59		19:34 (11)	06:53		18:17 (6)	07:47		07:45	08:25
	21:29	18	20:37 (9)	20:32	21	19:55 (11)	19:18	24	18:41 (6)	18:07		16:10	15:54
21	05:09		20:19 (9)	06:01		19:35 (11)	06:55		18:18 (6)	07:49		07:47	08:26
	21:27	19	20:38 (9)	20:30	18	19:53 (11)	19:16	22	18:40 (6)	18:05		16:08	15:54
22	05:11		20:18 (9)	06:02		19:36 (11)	06:56		18:19 (6)	07:51		07:49	08:26
	21:26	20	20:38 (9)	20:27	14	19:50 (11)	19:13	20	18:39 (6)	18:02		16:07	15:55
23	05:12		20:18 (9)	06:04		19:40 (11)	06:58		18:19 (6)	07:53		07:51	08:27
	21:24	20	20:38 (9)	20:25	7	19:47 (11)	19:11	17	18:36 (6)	18:00		16:06	15:55
24	05:14		20:18 (9)	06:06			07:00		18:22 (6)	07:54		07:53	08:27
	21:23	21	20:39 (9)	20:23			19:08	12	18:34 (6)	17:58		16:05	15:56
25	05:15		20:18 (9)	06:08			07:02			06:56		07:54	08:28
	21:21	21	20:39 (9)	20:21			19:06			16:56		16:04	15:56
26	05:17		20:18 (9)	06:09			07:03			06:58		07:56	08:28
	21:20	21	20:39 (9)	20:18			19:04			16:54		16:03	15:57
27	05:18		20:18 (9)	06:11			07:05			07:00		07:58	08:28
	21:18	21	20:39 (9)	20:16			19:01			16:52		16:02	15:58
28	05:20		20:18 (9)	06:13			07:07			07:02		07:59	08:28
	21:17	21	20:39 (9)	20:14			18:59			16:50		16:01	15:59
29	05:22		20:18 (9)	06:15			07:09			07:04		08:01	08:29
	21:15	20	20:38 (9)	20:11			18:56			16:48		16:00	16:00
30	05:23		20:19 (9)	06:16			07:11			07:06		08:02	08:29
	21:13	20	20:39 (9)	20:09			18:54			16:46		15:59	16:01
31	05:25		19:43 (11)	06:18		19:02 (5)				07:08			08:29
	21:12	27	20:38 (9)	20:07	11	19:13 (5)				16:44			16:02
Sonnenscheinstunden	510			459			382			329		260	235
astr.max.mögl.Beschattung		634			616			597			314		
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33		
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91		
Reduktion Windrichtung		0.65			0.66			0.69			0.69		
Gesamte Reduktion		0.26			0.30			0.26			0.21		
Met.wahrsch.Beschattung		168			182			153			65		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AL - IO38

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar			März			April			Mai			Juni		
1	08:29	07:59			07:02		16:50 (2)	06:48		18:30 (6)	05:40		19:26 (11)	04:51		20:35 (10)
	16:03	16:54			17:48	23	17:13 (2)	19:46	37	19:19 (5)	20:41	29	19:55 (11)	21:30	14	20:49 (10)
2	08:28	07:57			07:00		16:49 (2)	06:46		18:31 (6)	05:38		19:25 (11)	04:50		20:34 (10)
	16:04	16:55			17:50	24	17:13 (2)	19:48	39	19:21 (5)	20:42	29	19:54 (11)	21:31	16	20:50 (10)
3	08:28	07:56			06:58		16:49 (2)	06:43		18:33 (6)	05:36		19:25 (11)	04:49		20:34 (10)
	16:05	16:57			17:52	24	17:13 (2)	19:50	38	19:22 (5)	20:44	29	19:54 (11)	21:32	17	20:51 (10)
4	08:28	07:54			06:55		16:49 (2)	06:41		18:33 (6)	05:34		19:25 (11)	04:48		20:33 (10)
	16:06	16:59			17:54	25	17:14 (2)	19:52	37	19:22 (5)	20:46	29	19:54 (11)	21:33	19	20:52 (10)
5	08:28	07:52			06:53		16:48 (2)	06:38		18:36 (6)	05:32		19:26 (11)	04:48		20:32 (10)
	16:08	17:01			17:56	25	17:13 (2)	19:53	32	19:22 (5)	20:48	28	19:54 (11)	21:34	20	20:52 (10)
6	08:27	07:50			06:51		16:49 (2)	06:36		19:02 (5)	05:30		19:26 (11)	04:47		20:33 (10)
	16:09	17:03			17:58	23	17:12 (2)	19:55	21	19:23 (5)	20:50	28	19:54 (11)	21:35	20	20:53 (10)
7	08:27	07:49			06:48		16:49 (2)	06:34		19:01 (5)	05:28		19:26 (11)	04:46		20:32 (10)
	16:10	17:05			18:00	22	17:11 (2)	19:57	21	19:22 (5)	20:51	27	19:53 (11)	21:36	22	20:54 (10)
8	08:26	07:47			06:46		16:50 (2)	06:31		19:01 (5)	05:26		19:27 (11)	04:46		20:32 (10)
	16:12	17:07			18:02	20	17:10 (2)	19:59	21	19:22 (5)	20:53	25	19:52 (11)	21:37	23	20:55 (10)
9	08:26	07:45			06:44		16:51 (2)	06:29		19:01 (5)	05:24		19:28 (11)	04:45		20:32 (10)
	16:13	17:09			18:04	18	17:09 (2)	20:01	20	19:21 (5)	20:55	32	20:24 (9)	21:38	22	20:54 (10)
10	08:25	07:43			06:41		16:52 (2)	06:27		19:01 (5)	05:22		19:29 (11)	04:45		20:32 (10)
	16:15	17:11			18:06	15	17:07 (2)	20:03	19	19:20 (5)	20:57	34	20:26 (9)	21:39	23	20:55 (10)
11	08:25	07:41			06:39		16:56 (2)	06:24		19:02 (5)	05:20		19:29 (11)	04:44		20:32 (10)
	16:16	17:13			18:07	8	17:04 (2)	20:04	17	19:19 (5)	20:58	35	20:27 (9)	21:40	24	20:56 (10)
12	08:24	07:39			06:37			06:22		19:03 (5)	05:19		19:31 (11)	04:44		20:32 (10)
	16:18	17:15			18:09			20:06	15	19:18 (5)	21:00	34	20:28 (9)	21:41	25	20:57 (10)
13	08:23	07:37			06:34			06:20		19:04 (5)	05:17		19:32 (11)	04:43		20:32 (10)
	16:19	17:17			18:11			20:08	11	19:15 (5)	21:02	32	20:29 (9)	21:41	24	20:56 (10)
14	08:22	07:35			06:32			06:17			05:15		19:34 (11)	04:43		20:32 (10)
	16:21	17:19			18:13			20:10			21:03	29	20:29 (9)	21:42	25	20:57 (10)
15	08:21	07:33			06:29			06:15			05:14		20:10 (9)	04:43		20:32 (10)
	16:22	17:21			18:15			20:12			21:05	20	20:30 (9)	21:43	25	20:57 (10)
16	08:20	07:31			06:27			06:13			05:12		20:09 (9)	04:43		20:32 (10)
	16:24	17:23			18:17			20:13			21:07	20	20:29 (9)	21:43	26	20:58 (10)
17	08:19	07:29			06:25			06:10			05:10		20:09 (9)	04:43		20:32 (10)
	16:26	17:25			18:19			20:15			21:08	21	20:30 (9)	21:44	26	20:58 (10)
18	08:18	07:27			06:22			06:08			05:09		20:10 (9)	04:43		20:33 (10)
	16:27	17:27			18:20			20:17			21:10	20	20:30 (9)	21:44	25	20:58 (10)
19	08:17	07:25			06:20			06:06			05:07		20:09 (9)	04:43		20:33 (10)
	16:29	17:29			18:22			20:19			21:11	21	20:30 (9)	21:44	25	20:58 (10)
20	08:16	07:22			06:17		17:44 (6)	06:03			05:06		20:10 (9)	04:43		20:33 (10)
	16:31	17:31			18:24	6	17:50 (6)	20:21			21:13	20	20:30 (9)	21:45	25	20:58 (10)
21	08:15	07:20			06:15		17:39 (6)	06:01		19:41 (11)	05:04		20:10 (9)	04:43		20:33 (10)
	16:33	17:33			18:26	14	17:53 (6)	20:23	3	19:44 (11)	21:15	20	20:30 (9)	21:45	25	20:58 (10)
22	08:14	07:18			06:12		17:37 (6)	05:59		19:35 (11)	05:03		20:10 (9)	04:43		20:34 (10)
	16:35	17:35			18:28	18	17:55 (6)	20:24	13	19:48 (11)	21:16	19	20:29 (9)	21:45	25	20:59 (10)
23	08:12	07:16			06:10		17:35 (6)	05:57		19:33 (11)	05:01		20:10 (9)	04:43		20:34 (10)
	16:36	17:37			18:30	21	17:56 (6)	20:26	17	19:50 (11)	21:18	19	20:29 (9)	21:45	25	20:59 (10)
24	08:11	07:14		16:58 (2)	06:08		17:34 (6)	05:55		19:31 (11)	05:00		20:11 (9)	04:44		20:34 (10)
	16:38	17:39	8	17:06 (2)	18:32	23	17:57 (6)	20:28	20	19:51 (11)	21:19	18	20:29 (9)	21:45	25	20:59 (10)
25	08:10	07:11		16:55 (2)	06:05		17:32 (6)	05:52		19:30 (11)	04:59		20:12 (9)	04:44		20:35 (10)
	16:40	17:41	14	17:09 (2)	18:33	25	17:57 (6)	20:30	22	19:52 (11)	21:21	17	20:29 (9)	21:46	25	21:00 (10)
26	08:08	07:09		16:53 (2)	06:03		17:32 (6)	05:50		19:29 (11)	04:58		20:12 (9)	04:44		20:34 (10)
	16:42	17:43	18	17:11 (2)	18:35	26	17:58 (6)	20:32	24	19:53 (11)	21:22	17	20:29 (9)	21:46	26	21:00 (10)
27	08:07	07:07		16:51 (2)	06:00		17:32 (6)	05:48		19:28 (11)	04:56		20:13 (9)	04:45		20:35 (10)
	16:44	17:45	20	17:11 (2)	18:37	26	17:58 (6)	20:33	26	19:54 (11)	21:23	15	20:28 (9)	21:45	25	21:00 (10)
28	08:05	07:05		16:51 (2)	05:58		17:31 (6)	05:46		19:27 (11)	04:55		20:14 (9)	04:45		20:35 (10)
	16:46	17:47	21	17:12 (2)	18:39	26	17:57 (6)	20:35	27	19:54 (11)	21:25	14	20:28 (9)	21:45	25	21:00 (10)
29	08:04				06:55		18:31 (6)	05:44		19:26 (11)	04:54		20:15 (9)	04:46		20:36 (10)
	16:48				19:41	26	18:57 (6)	20:37	28	19:54 (11)	21:26	12	20:27 (9)	21:45	24	21:00 (10)
30	08:02				06:53		18:30 (6)	05:42		19:26 (11)	04:53		20:16 (9)	04:47		20:36 (10)
	16:50				19:42	26	18:56 (6)	20:39	29	19:55 (11)	21:27	18	20:46 (10)	21:45	24	21:00 (10)
31	08:01				06:51		18:31 (6)				04:52		20:17 (9)			
	16:52				19:44	29	19:16 (5)				21:29	19	20:48 (10)			
Sonnenscheinstunden	252	274			367			419			492			508		
astr.max.mögl.Beschattung			81			493			537			730			695	
Red.Sonnenscheinwahrsch.			0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer			0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung			0.69			0.69			0.68			0.66			0.64	
Gesamte Reduktion			0.15			0.20			0.26			0.31			0.27	
Met.wahrsch.Beschattung			12			98			138			225			185	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AL - IO38

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		20:36 (10)	05:26		19:41 (11)	06:20		19:01 (5)	07:12			07:10	08:04
	21:45	24	21:00 (10)	21:10	33	20:38 (9)	20:04	17	19:18 (5)	18:51			16:42	15:58
2	04:48		20:37 (10)	05:28		19:39 (11)	06:22		19:00 (5)	07:14			07:12	08:05
	21:44	24	21:01 (10)	21:08	35	20:37 (9)	20:02	19	19:19 (5)	18:49			16:40	15:57
3	04:49		20:37 (10)	05:30		19:39 (11)	06:23		18:58 (5)	07:16		17:32 (2)	07:14	08:07
	21:44	23	21:00 (10)	21:06	33	20:36 (9)	20:00	20	19:18 (5)	18:47	11	17:43 (2)	16:38	15:57
4	04:49		20:37 (10)	05:31		19:37 (11)	06:25		18:58 (5)	07:18		17:29 (2)	07:15	08:08
	21:43	23	21:00 (10)	21:05	30	20:33 (9)	19:57	21	19:19 (5)	18:44	16	17:45 (2)	16:36	15:56
5	04:50		20:38 (10)	05:33		19:37 (11)	06:27		18:58 (5)	07:19		17:28 (2)	07:17	08:10
	21:43	22	21:00 (10)	21:03	26	20:03 (11)	19:55	21	19:19 (5)	18:42	19	17:47 (2)	16:34	15:55
6	04:51		20:39 (10)	05:35		19:36 (11)	06:29		18:57 (5)	07:21		17:26 (2)	07:19	08:11
	21:42	21	21:00 (10)	21:01	26	20:02 (11)	19:52	21	19:18 (5)	18:39	22	17:48 (2)	16:32	15:55
7	04:52		20:39 (10)	05:36		19:36 (11)	06:30		18:31 (6)	07:23		17:24 (2)	07:21	08:12
	21:42	21	21:00 (10)	20:59	27	20:03 (11)	19:50	33	19:18 (5)	18:37	23	17:47 (2)	16:30	15:54
8	04:53		20:40 (10)	05:38		19:36 (11)	06:32		18:29 (6)	07:25		17:24 (2)	07:23	08:14
	21:41	19	20:59 (10)	20:57	28	20:04 (11)	19:48	36	19:17 (5)	18:35	24	17:48 (2)	16:28	15:54
9	04:54		20:41 (10)	05:40		19:35 (11)	06:34		18:26 (6)	07:27		17:23 (2)	07:25	08:15
	21:40	18	20:59 (10)	20:55	28	20:03 (11)	19:45	38	19:15 (5)	18:32	25	17:48 (2)	16:27	15:54
10	04:55		20:42 (10)	05:42		19:35 (11)	06:35		18:25 (6)	07:28		17:23 (2)	07:27	08:16
	21:39	17	20:59 (10)	20:53	29	20:04 (11)	19:43	38	19:14 (5)	18:30	25	17:48 (2)	16:25	15:53
11	04:56		20:43 (10)	05:43		19:34 (11)	06:37		18:24 (6)	07:30		17:23 (2)	07:29	08:17
	21:38	15	20:58 (10)	20:51	29	20:03 (11)	19:40	36	19:12 (5)	18:27	24	17:47 (2)	16:23	15:53
12	04:58		20:27 (9)	05:45		19:34 (11)	06:39		18:22 (6)	07:32		17:23 (2)	07:31	08:18
	21:38	18	20:57 (10)	20:49	29	20:03 (11)	19:38	31	19:08 (5)	18:25	24	17:47 (2)	16:22	15:53
13	04:59		20:25 (9)	05:47		19:35 (11)	06:41		18:21 (6)	07:34		17:23 (2)	07:33	08:19
	21:37	19	20:55 (10)	20:47	28	20:03 (11)	19:35	27	18:48 (6)	18:23	23	17:46 (2)	16:20	15:53
14	05:00		20:24 (9)	05:48		19:34 (11)	06:42		18:21 (6)	07:36		17:24 (2)	07:34	08:20
	21:36	17	20:53 (10)	20:45	28	20:02 (11)	19:33	27	18:48 (6)	18:20	21	17:45 (2)	16:18	15:53
15	05:01		20:23 (9)	05:50		19:35 (11)	06:44		18:21 (6)	07:38		17:25 (2)	07:36	08:21
	21:34	13	20:36 (9)	20:43	27	20:02 (11)	19:30	27	18:48 (6)	18:18	19	17:44 (2)	16:17	15:53
16	05:02		20:22 (9)	05:52		19:35 (11)	06:46		18:20 (6)	07:39		17:26 (2)	07:38	08:22
	21:33	14	20:36 (9)	20:41	26	20:01 (11)	19:28	27	18:47 (6)	18:16	17	17:43 (2)	16:15	15:53
17	05:04		20:22 (9)	05:54		19:35 (11)	06:48		18:20 (6)	07:41		17:28 (2)	07:40	08:23
	21:32	16	20:38 (9)	20:38	25	20:00 (11)	19:26	26	18:46 (6)	18:14	12	17:40 (2)	16:14	15:53
18	05:05		20:21 (9)	05:55		19:36 (11)	06:49		18:21 (6)	07:43		17:31 (2)	07:42	08:24
	21:31	17	20:38 (9)	20:36	23	19:59 (11)	19:23	25	18:46 (6)	18:11	4	17:35 (2)	16:12	15:53
19	05:07		20:21 (9)	05:57		19:37 (11)	06:51		18:20 (6)	07:45			07:44	08:25
	21:30	18	20:39 (9)	20:34	20	19:57 (11)	19:21	24	18:44 (6)	18:09			16:11	15:54
20	05:08		20:20 (9)	05:59		19:39 (11)	06:53		18:21 (6)	07:47			07:45	08:25
	21:29	19	20:39 (9)	20:32	16	19:55 (11)	19:18	22	18:43 (6)	18:07			16:10	15:54
21	05:09		20:20 (9)	06:01		19:41 (11)	06:55		18:22 (6)	07:49			07:47	08:26
	21:27	20	20:40 (9)	20:30	12	19:53 (11)	19:16	19	18:41 (6)	18:05			16:08	15:54
22	05:11		20:20 (9)	06:02			06:56		18:24 (6)	07:51			07:49	08:26
	21:26	20	20:40 (9)	20:27			19:13	15	18:39 (6)	18:02			16:07	15:55
23	05:12		20:19 (9)	06:04			06:58		18:26 (6)	07:53			07:51	08:27
	21:24	21	20:40 (9)	20:25			19:11	9	18:35 (6)	18:00			16:06	15:55
24	05:14		20:20 (9)	06:06			07:00			07:54			07:53	08:27
	21:23	21	20:41 (9)	20:23			19:08			17:58			16:05	15:56
25	05:15		20:19 (9)	06:08			07:02			06:56			07:54	08:28
	21:21	21	20:40 (9)	20:21			19:06			16:56			16:04	15:56
26	05:17		20:20 (9)	06:09			07:03			06:58			07:56	08:28
	21:20	21	20:41 (9)	20:18			19:04			16:54			16:03	15:57
27	05:18		20:20 (9)	06:11			07:05			07:00			07:58	08:28
	21:18	20	20:40 (9)	20:16			19:01			16:52			16:02	15:58
28	05:20		20:20 (9)	06:13			07:07			07:02			07:59	08:28
	21:17	21	20:41 (9)	20:14			18:59			16:50			16:01	15:59
29	05:22		19:48 (11)	06:15			07:09			07:04			08:01	08:29
	21:15	24	20:40 (9)	20:11			18:56			16:48			16:00	16:00
30	05:23		19:45 (11)	06:16		19:05 (5)	07:11			07:06			08:02	08:29
	21:13	30	20:40 (9)	20:09	11	19:16 (5)	18:54			16:46			15:59	16:01
31	05:25		19:42 (11)	06:18		19:02 (5)				07:08				08:29
	21:12	34	20:39 (9)	20:07	15	19:17 (5)				16:44				16:02
Sonnenscheinstunden	510			459			382			329			260	235
astr.max.mögl.Beschattung		631			584			579			309			
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91			
Reduktion Windrichtung		0.65			0.67			0.69			0.69			
Gesamte Reduktion		0.26			0.30			0.26			0.21			
Met.wahrsch.Beschattung		167			173			148			64			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AM - IO39

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar			März			April			Mai			Juni		
1	08:29		07:59			07:02		16:49 (2)	06:48		18:30 (6)	05:40		19:23 (11)	04:51		20:29 (10)
	16:03		16:54			17:48	23	17:12 (2)	19:46	37	19:19 (5)	20:41	29	19:52 (11)	21:30	20	20:49 (10)
2	08:28		07:57			07:00		16:48 (2)	06:46		18:31 (6)	05:38		19:23 (11)	04:50		20:29 (10)
	16:04		16:55			17:50	24	17:12 (2)	19:48	38	19:20 (5)	20:42	29	19:52 (11)	21:31	20	20:49 (10)
3	08:28		07:56			06:58		16:48 (2)	06:43		18:33 (6)	05:36		19:23 (11)	04:49		20:29 (10)
	16:05		16:57			17:52	24	17:12 (2)	19:50	35	19:21 (5)	20:44	28	19:51 (11)	21:32	22	20:51 (10)
4	08:28		07:54			06:55		16:48 (2)	06:41		18:35 (6)	05:34		19:23 (11)	04:48		20:28 (10)
	16:06		16:59			17:54	24	17:12 (2)	19:52	31	19:21 (5)	20:46	28	19:51 (11)	21:33	23	20:51 (10)
5	08:28		07:52			06:53		16:48 (2)	06:38		19:00 (5)	05:32		19:25 (11)	04:48		20:28 (10)
	16:08		17:01			17:56	23	17:11 (2)	19:53	21	19:21 (5)	20:48	26	19:51 (11)	21:34	23	20:51 (10)
6	08:27		07:50			06:51		16:49 (2)	06:36		19:00 (5)	05:30		19:25 (11)	04:47		20:28 (10)
	16:09		17:03			17:58	22	17:11 (2)	19:55	21	19:21 (5)	20:50	25	19:50 (11)	21:35	24	20:52 (10)
7	08:27		07:49			06:48		16:49 (2)	06:34		18:59 (5)	05:28		19:25 (11)	04:46		20:28 (10)
	16:10		17:05			18:00	20	17:09 (2)	19:57	21	19:20 (5)	20:51	24	19:49 (11)	21:36	24	20:52 (10)
8	08:26		07:47			06:46		16:50 (2)	06:31		19:00 (5)	05:26		19:26 (11)	04:46		20:28 (10)
	16:12		17:07			18:02	18	17:08 (2)	19:59	20	19:20 (5)	20:53	31	20:22 (9)	21:37	25	20:53 (10)
9	08:26		07:45			06:44		16:52 (2)	06:29		19:00 (5)	05:24		19:28 (11)	04:45		20:27 (10)
	16:13		17:09			18:04	15	17:07 (2)	20:01	19	19:19 (5)	20:55	32	20:25 (9)	21:38	26	20:53 (10)
10	08:25		07:43			06:41		16:54 (2)	06:27		19:00 (5)	05:22		19:29 (11)	04:45		20:28 (10)
	16:15		17:11			18:06	9	17:03 (2)	20:03	17	19:17 (5)	20:57	33	20:26 (9)	21:39	25	20:53 (10)
11	08:25		07:41			06:39			06:24		19:02 (5)	05:20		19:30 (11)	04:44		20:28 (10)
	16:16		17:13			18:07			20:04	14	19:16 (5)	20:58	31	20:26 (9)	21:40	26	20:54 (10)
12	08:24		07:39			06:37			06:22		19:04 (5)	05:19		19:33 (11)	04:44		20:29 (10)
	16:18		17:15			18:09			20:06	10	19:14 (5)	21:00	26	20:27 (9)	21:41	26	20:55 (10)
13	08:23		07:37			06:34			06:20			05:17		20:08 (9)	04:43		20:28 (10)
	16:19		17:17			18:11			20:08			21:02	19	20:27 (9)	21:41	26	20:54 (10)
14	08:22		07:35			06:32			06:17			05:15		20:07 (9)	04:43		20:28 (10)
	16:21		17:19			18:13			20:10			21:03	20	20:27 (9)	21:42	27	20:55 (10)
15	08:21		07:33			06:29			06:15			05:14		20:07 (9)	04:43		20:28 (10)
	16:22		17:21			18:15			20:12			21:05	21	20:28 (9)	21:43	27	20:55 (10)
16	08:20		07:31			06:27			06:13			05:12		20:07 (9)	04:43		20:29 (10)
	16:24		17:23			18:17			20:13			21:07	21	20:28 (9)	21:43	27	20:56 (10)
17	08:19		07:29			06:25			06:10			05:10		20:07 (9)	04:43		20:29 (10)
	16:26		17:25			18:19			20:15			21:08	21	20:28 (9)	21:44	27	20:56 (10)
18	08:18		07:27			06:22			06:08			05:09		20:08 (9)	04:43		20:29 (10)
	16:27		17:27			18:20			20:17			21:10	20	20:28 (9)	21:44	27	20:56 (10)
19	08:17		07:25			06:20		17:42 (6)	06:06			05:07		20:07 (9)	04:43		20:29 (10)
	16:29		17:29			18:22	6	17:48 (6)	20:19			21:11	21	20:28 (9)	21:44	27	20:56 (10)
20	08:16		07:22			06:17		17:38 (6)	06:03		19:35 (11)	05:06		20:08 (9)	04:43		20:29 (10)
	16:31		17:31			18:24	14	17:52 (6)	20:21	10	19:45 (11)	21:13	20	20:28 (9)	21:45	27	20:56 (10)
21	08:15		07:20			06:15		17:35 (6)	06:01		19:32 (11)	05:04		20:09 (9)	04:43		20:29 (10)
	16:33		17:33			18:26	18	17:53 (6)	20:23	15	19:47 (11)	21:15	19	20:28 (9)	21:45	27	20:56 (10)
22	08:14		07:18			06:12		17:34 (6)	05:59		19:29 (11)	05:03		20:08 (9)	04:43		20:30 (10)
	16:35		17:35			18:28	21	17:55 (6)	20:24	19	19:48 (11)	21:16	19	20:27 (9)	21:45	27	20:57 (10)
23	08:12		07:16		16:59 (2)	06:10		17:32 (6)	05:57		19:28 (11)	05:01		20:09 (9)	04:43		20:30 (10)
	16:36		17:37	5	17:04 (2)	18:30	23	17:55 (6)	20:26	22	19:50 (11)	21:18	18	20:27 (9)	21:45	27	20:57 (10)
24	08:11		07:14		16:54 (2)	06:08		17:31 (6)	05:55		19:27 (11)	05:00		20:10 (9)	04:44		20:30 (10)
	16:38		17:39	13	17:07 (2)	18:32	25	17:56 (6)	20:28	24	19:51 (11)	21:19	16	20:26 (9)	21:45	27	20:57 (10)
25	08:10		07:11		16:53 (2)	06:05		17:30 (6)	05:52		19:26 (11)	04:59		20:11 (9)	04:44		20:31 (10)
	16:40		17:41	16	17:09 (2)	18:33	26	17:56 (6)	20:30	25	19:51 (11)	21:21	15	20:26 (9)	21:46	27	20:58 (10)
26	08:08		07:09		16:51 (2)	06:03		17:30 (6)	05:50		19:25 (11)	04:58		20:12 (9)	04:44		20:31 (10)
	16:42		17:43	20	17:11 (2)	18:35	26	17:56 (6)	20:32	27	19:52 (11)	21:22	13	20:25 (9)	21:46	27	20:58 (10)
27	08:07		07:07		16:50 (2)	06:00		17:30 (6)	05:48		19:24 (11)	04:56		20:13 (9)	04:45		20:32 (10)
	16:44		17:45	21	17:11 (2)	18:37	26	17:56 (6)	20:33	28	19:52 (11)	21:23	19	20:43 (10)	21:45	26	20:58 (10)
28	08:05		07:05		16:49 (2)	05:58		17:29 (6)	05:46		19:24 (11)	04:55		20:14 (9)	04:45		20:31 (10)
	16:46		17:47	23	17:12 (2)	18:39	26	17:55 (6)	20:35	28	19:52 (11)	21:25	21	20:45 (10)	21:45	27	20:58 (10)
29	08:04					06:55		18:29 (6)	05:44		19:24 (11)	04:54		20:16 (9)	04:46		20:32 (10)
	16:48					19:41	26	18:55 (6)	20:37	28	19:52 (11)	21:26	19	20:46 (10)	21:45	27	20:59 (10)
30	08:02					06:53		18:29 (6)	05:42		19:23 (11)	04:53		20:31 (10)	04:47		20:32 (10)
	16:50					19:42	25	18:54 (6)	20:39	29	19:52 (11)	21:27	16	20:47 (10)	21:45	26	20:58 (10)
31	08:01					06:51		18:30 (6)				04:52		20:30 (10)			
	16:52					19:44	34	19:18 (5)				21:29	18	20:48 (10)			
Sonnenscheinstunden	252		274			367			419			492			508		
astr.max.mögl.Beschattung				98			498			539			698			767	
Red.Sonnenscheinwahrsch.				0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer				0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung				0.69			0.69			0.68			0.66			0.64	
Gesamte Reduktion				0.15			0.20			0.26			0.31			0.27	
Met.wahrsch.Beschattung				15			99			138			215			204	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AM - IO39

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		20:32 (10)	05:26		19:43 (11)	06:20		19:01 (5)	07:12		07:10	08:04
	21:45	26	20:58 (10)	21:10	28	20:37 (9)	20:04	14	19:15 (5)	18:51		16:42	15:58
2	04:48		20:33 (10)	05:28		19:40 (11)	06:22		18:59 (5)	07:14		07:12	08:05
	21:44	26	20:59 (10)	21:08	31	20:36 (9)	20:02	17	19:16 (5)	18:49		16:40	15:57
3	04:49		20:33 (10)	05:30		19:39 (11)	06:23		18:57 (5)	07:16		07:14	08:07
	21:44	25	20:58 (10)	21:06	33	20:36 (9)	20:00	19	19:16 (5)	18:47	5	17:39 (2)	16:38	15:57
4	04:49		20:33 (10)	05:31		19:37 (11)	06:25		18:57 (5)	07:18		17:30 (2)	07:15	08:08
	21:43	25	20:58 (10)	21:05	31	20:33 (9)	19:57	20	19:17 (5)	18:44	13	17:43 (2)	16:36	15:56
5	04:50		20:34 (10)	05:33		19:36 (11)	06:27		18:56 (5)	07:19		17:28 (2)	07:17	08:10
	21:43	24	20:58 (10)	21:03	30	20:32 (9)	19:55	21	19:17 (5)	18:42	16	17:44 (2)	16:34	15:55
6	04:51		20:34 (10)	05:35		19:35 (11)	06:29		18:55 (5)	07:21		17:26 (2)	07:19	08:11
	21:42	24	20:58 (10)	21:01	24	19:59 (11)	19:52	21	19:16 (5)	18:39	20	17:46 (2)	16:32	15:55
7	04:52		20:35 (10)	05:36		19:34 (11)	06:30		18:55 (5)	07:23		17:24 (2)	07:21	08:12
	21:42	23	20:58 (10)	20:59	26	20:00 (11)	19:50	21	19:16 (5)	18:37	21	17:45 (2)	16:30	15:54
8	04:53		20:36 (10)	05:38		19:34 (11)	06:32		18:30 (6)	07:25		17:23 (2)	07:23	08:14
	21:41	22	20:58 (10)	20:57	26	20:00 (11)	19:48	31	19:16 (5)	18:35	23	17:46 (2)	16:28	15:54
9	04:54		20:36 (10)	05:40		19:33 (11)	06:34		18:26 (6)	07:27		17:23 (2)	07:25	08:15
	21:40	22	20:58 (10)	20:55	27	20:00 (11)	19:45	35	19:14 (5)	18:32	23	17:46 (2)	16:27	15:54
10	04:55		20:37 (10)	05:42		19:33 (11)	06:35		18:24 (6)	07:28		17:22 (2)	07:27	08:16
	21:39	21	20:58 (10)	20:53	28	20:01 (11)	19:43	37	19:13 (5)	18:30	24	17:46 (2)	16:25	15:53
11	04:56		20:37 (10)	05:43		19:32 (11)	06:37		18:23 (6)	07:30		17:22 (2)	07:29	08:17
	21:38	20	20:57 (10)	20:51	28	20:00 (11)	19:40	37	19:12 (5)	18:27	24	17:46 (2)	16:23	15:53
12	04:58		20:38 (10)	05:45		19:32 (11)	06:39		18:21 (6)	07:32		17:22 (2)	07:31	08:18
	21:38	19	20:57 (10)	20:49	28	20:00 (11)	19:38	36	19:09 (5)	18:25	24	17:46 (2)	16:22	15:53
13	04:59		20:39 (10)	05:47		19:32 (11)	06:41		18:20 (6)	07:34		17:22 (2)	07:33	08:19
	21:37	17	20:56 (10)	20:47	29	20:01 (11)	19:35	30	19:06 (5)	18:23	23	17:45 (2)	16:20	15:53
14	05:00		20:40 (10)	05:48		19:31 (11)	06:42		18:20 (6)	07:36		17:22 (2)	07:34	08:20
	21:36	15	20:55 (10)	20:45	29	20:00 (11)	19:33	26	18:46 (6)	18:20	23	17:45 (2)	16:18	15:53
15	05:01		20:24 (9)	05:50		19:32 (11)	06:44		18:19 (6)	07:38		17:23 (2)	07:36	08:21
	21:34	20	20:54 (10)	20:43	28	20:00 (11)	19:30	27	18:46 (6)	18:18	21	17:44 (2)	16:17	15:53
16	05:02		20:22 (9)	05:52		19:32 (11)	06:46		18:18 (6)	07:39		17:24 (2)	07:38	08:22
	21:33	20	20:52 (10)	20:41	28	20:00 (11)	19:28	27	18:45 (6)	18:16	18	17:42 (2)	16:15	15:53
17	05:04		20:22 (9)	05:54		19:32 (11)	06:48		18:18 (6)	07:41		17:25 (2)	07:40	08:23
	21:32	17	20:51 (10)	20:38	26	19:58 (11)	19:26	27	18:45 (6)	18:14	16	17:41 (2)	16:14	15:53
18	05:05		20:21 (9)	05:55		19:33 (11)	06:49		18:18 (6)	07:43		17:27 (2)	07:42	08:24
	21:31	14	20:35 (9)	20:36	25	19:58 (11)	19:23	26	18:44 (6)	18:11	10	17:37 (2)	16:12	15:53
19	05:07		20:20 (9)	05:57		19:33 (11)	06:51		18:18 (6)	07:45			07:44	08:25
	21:30	16	20:36 (9)	20:34	23	19:56 (11)	19:21	25	18:43 (6)	18:09			16:11	15:54
20	05:08		20:19 (9)	05:59		19:34 (11)	06:53		18:18 (6)	07:47			07:45	08:25
	21:29	17	20:36 (9)	20:32	21	19:55 (11)	19:18	24	18:42 (6)	18:07			16:10	15:54
21	05:09		20:19 (9)	06:01		19:35 (11)	06:55		18:19 (6)	07:49			07:47	08:26
	21:27	18	20:37 (9)	20:30	19	19:54 (11)	19:16	22	18:41 (6)	18:05			16:08	15:54
22	05:11		20:19 (9)	06:02		19:36 (11)	06:56		18:20 (6)	07:51			07:49	08:26
	21:26	18	20:37 (9)	20:27	15	19:51 (11)	19:13	19	18:39 (6)	18:02			16:07	15:55
23	05:12		20:18 (9)	06:04		19:40 (11)	06:58		18:21 (6)	07:53			07:51	08:27
	21:24	19	20:37 (9)	20:25	8	19:48 (11)	19:11	15	18:36 (6)	18:00			16:06	15:55
24	05:14		20:18 (9)	06:06			07:00		18:24 (6)	07:54			07:53	08:27
	21:23	20	20:38 (9)	20:23			19:08	9	18:33 (6)	17:58			16:05	15:56
25	05:15		20:18 (9)	06:08			07:02			06:56			07:54	08:28
	21:21	20	20:38 (9)	20:21			19:06			16:56			16:04	15:56
26	05:17		20:18 (9)	06:09			07:03			06:58			07:56	08:28
	21:20	21	20:39 (9)	20:18			19:04			16:54			16:03	15:57
27	05:18		20:18 (9)	06:11			07:05			07:00			07:58	08:28
	21:18	20	20:38 (9)	20:16			19:01			16:52			16:02	15:58
28	05:20		20:18 (9)	06:13			07:07			07:02			07:59	08:28
	21:17	21	20:39 (9)	20:14			18:59			16:50			16:01	15:59
29	05:22		20:18 (9)	06:15			07:09			07:04			08:01	08:29
	21:15	20	20:38 (9)	20:11			18:56			16:48			16:00	16:00
30	05:23		20:19 (9)	06:16			07:11			07:06			08:02	08:29
	21:13	19	20:38 (9)	20:09			18:54			16:46			15:59	16:01
31	05:25		20:19 (9)	06:18		19:03 (5)				07:08				08:29
	21:12	18	20:37 (9)	20:07	10	19:13 (5)				16:44				16:02
Sonnenscheinstunden	510			459			382			329		260		235
astr.max.mögl.Beschattung		627			601			586			304			
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91			
Reduktion Windrichtung		0.65			0.66			0.69			0.69			
Gesamte Reduktion		0.26			0.30			0.26			0.21			
Met.wahrsch.Beschattung		166			178			150			63			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AN - IO40

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar			März			April			Mai			Juni		
1	08:29	07:59			07:02		16:53 (2)	06:48		18:32 (6)	05:40		19:27 (11)	04:51		20:34 (10)
	16:03	16:54			17:48	22	17:15 (2)	19:46	34	19:19 (5)	20:41	28	19:55 (11)	21:30	15	20:49 (10)
2	08:28	07:57			07:00		16:51 (2)	06:46		18:33 (6)	05:38		19:26 (11)	04:50		20:33 (10)
	16:04	16:55			17:50	24	17:15 (2)	19:48	37	19:21 (5)	20:42	29	19:55 (11)	21:31	17	20:50 (10)
3	08:28	07:56			06:58		16:51 (2)	06:43		18:34 (6)	05:36		19:26 (11)	04:49		20:33 (10)
	16:05	16:57			17:52	24	17:15 (2)	19:50	38	19:22 (5)	20:44	29	19:55 (11)	21:32	19	20:52 (10)
4	08:28	07:54			06:55		16:51 (2)	06:41		18:34 (6)	05:34		19:26 (11)	04:48		20:32 (10)
	16:06	16:59			17:54	25	17:16 (2)	19:52	36	19:22 (5)	20:46	28	19:54 (11)	21:33	20	20:52 (10)
5	08:28	07:52			06:53		16:51 (2)	06:38		18:37 (6)	05:32		19:27 (11)	04:48		20:31 (10)
	16:08	17:01			17:56	24	17:15 (2)	19:53	33	19:23 (5)	20:48	28	19:55 (11)	21:34	21	20:52 (10)
6	08:27	07:50			06:51		16:51 (2)	06:36		18:40 (6)	05:30		19:27 (11)	04:47		20:32 (10)
	16:09	17:03			17:58	24	17:15 (2)	19:55	28	19:24 (5)	20:50	27	19:54 (11)	21:35	21	20:53 (10)
7	08:27	07:49			06:48		16:51 (2)	06:34		19:02 (5)	05:28		19:27 (11)	04:46		20:31 (10)
	16:10	17:05			18:00	22	17:13 (2)	19:57	21	19:23 (5)	20:51	26	19:53 (11)	21:36	22	20:53 (10)
8	08:26	07:47			06:46		16:52 (2)	06:31		19:02 (5)	05:26		19:28 (11)	04:46		20:31 (10)
	16:12	17:07			18:02	21	17:13 (2)	19:59	21	19:23 (5)	20:53	24	19:52 (11)	21:37	23	20:54 (10)
9	08:26	07:45			06:44		16:53 (2)	06:29		19:02 (5)	05:24		19:29 (11)	04:45		20:31 (10)
	16:13	17:09			18:04	19	17:12 (2)	20:01	20	19:22 (5)	20:55	32	20:25 (9)	21:38	23	20:54 (10)
10	08:25	07:43			06:41		16:53 (2)	06:27		19:02 (5)	05:22		19:30 (11)	04:45		20:31 (10)
	16:15	17:11			18:06	17	17:10 (2)	20:03	19	19:21 (5)	20:57	33	20:26 (9)	21:39	24	20:55 (10)
11	08:25	07:41			06:39		16:56 (2)	06:24		19:03 (5)	05:20		19:31 (11)	04:44		20:32 (10)
	16:16	17:13			18:07	12	17:08 (2)	20:04	17	19:20 (5)	20:58	33	20:27 (9)	21:40	24	20:56 (10)
12	08:24	07:39			06:37		17:00 (2)	06:22		19:04 (5)	05:19		19:33 (11)	04:44		20:32 (10)
	16:18	17:15			18:09	2	17:02 (2)	20:06	15	19:19 (5)	21:00	32	20:28 (9)	21:41	24	20:56 (10)
13	08:23	07:37			06:34			06:20		19:05 (5)	05:17		19:34 (11)	04:43		20:31 (10)
	16:19	17:17			18:11			20:08	11	19:16 (5)	21:02	30	20:29 (9)	21:41	25	20:56 (10)
14	08:22	07:35			06:32			06:17		19:09 (5)	05:15		19:36 (11)	04:43		20:31 (10)
	16:21	17:19			18:13			20:10	3	19:12 (5)	21:03	26	20:29 (9)	21:42	26	20:57 (10)
15	08:21	07:33			06:29			06:15			05:14		20:10 (9)	04:43		20:32 (10)
	16:22	17:21			18:15			20:12			21:05	20	20:30 (9)	21:43	25	20:57 (10)
16	08:20	07:31			06:27			06:13			05:12		20:09 (9)	04:43		20:32 (10)
	16:24	17:23			18:17			20:13			21:07	20	20:29 (9)	21:43	25	20:57 (10)
17	08:19	07:29			06:25			06:10			05:10		20:09 (9)	04:43		20:32 (10)
	16:26	17:25			18:19			20:15			21:08	21	20:30 (9)	21:44	26	20:58 (10)
18	08:18	07:27			06:22			06:08			05:09		20:10 (9)	04:43		20:32 (10)
	16:27	17:27			18:20			20:17			21:10	20	20:30 (9)	21:44	26	20:58 (10)
19	08:17	07:25			06:20			06:06			05:07		20:09 (9)	04:43		20:32 (10)
	16:29	17:29			18:22			20:19			21:11	21	20:30 (9)	21:44	26	20:58 (10)
20	08:16	07:22			06:17			06:03			05:06		20:10 (9)	04:43		20:32 (10)
	16:31	17:31			18:24			20:21			21:13	20	20:30 (9)	21:45	26	20:58 (10)
21	08:15	07:20			06:15		17:43 (6)	06:01			05:04		20:10 (9)	04:43		20:32 (10)
	16:33	17:33			18:26	10	17:53 (6)	20:23			21:15	20	20:30 (9)	21:45	26	20:58 (10)
22	08:14	07:18			06:12		17:40 (6)	05:59		19:36 (11)	05:03		20:10 (9)	04:43		20:33 (10)
	16:35	17:35			18:28	16	17:56 (6)	20:24	12	19:48 (11)	21:16	19	20:29 (9)	21:45	26	20:59 (10)
23	08:12	07:16			06:10		17:37 (6)	05:57		19:34 (11)	05:01		20:11 (9)	04:43		20:33 (10)
	16:36	17:37			18:30	20	17:57 (6)	20:26	16	19:50 (11)	21:18	18	20:29 (9)	21:45	26	20:59 (10)
24	08:11	07:14			06:08		17:36 (6)	05:55		19:32 (11)	05:00		20:11 (9)	04:44		20:33 (10)
	16:38	17:39			18:32	22	17:58 (6)	20:28	20	19:52 (11)	21:19	18	20:29 (9)	21:45	26	20:59 (10)
25	08:10	07:11		17:00 (2)	06:05		17:34 (6)	05:52		19:30 (11)	04:59		20:12 (9)	04:44		20:34 (10)
	16:40	17:41	9	17:09 (2)	18:33	24	17:58 (6)	20:30	23	19:53 (11)	21:21	17	20:29 (9)	21:46	26	21:00 (10)
26	08:08	07:09		16:57 (2)	06:03		17:34 (6)	05:50		19:29 (11)	04:58		20:13 (9)	04:44		20:34 (10)
	16:42	17:43	15	17:12 (2)	18:35	25	17:59 (6)	20:32	25	19:54 (11)	21:22	15	20:28 (9)	21:46	25	20:59 (10)
27	08:07	07:07		16:55 (2)	06:00		17:34 (6)	05:48		19:29 (11)	04:56		20:14 (9)	04:45		20:35 (10)
	16:44	17:45	17	17:12 (2)	18:37	25	17:59 (6)	20:33	25	19:54 (11)	21:23	14	20:28 (9)	21:45	25	21:00 (10)
28	08:05	07:05		16:54 (2)	05:58		17:32 (6)	05:46		19:28 (11)	04:55		20:15 (9)	04:45		20:34 (10)
	16:46	17:47	20	17:14 (2)	18:39	27	17:59 (6)	20:35	27	19:55 (11)	21:25	12	20:27 (9)	21:45	26	21:00 (10)
29	08:04				06:55		18:33 (6)	05:44		19:27 (11)	04:54		20:16 (9)	04:46		20:35 (10)
	16:48				19:41	26	18:59 (6)	20:37	28	19:55 (11)	21:26	17	20:45 (10)	21:45	25	21:00 (10)
30	08:02				06:53		18:32 (6)	05:42		19:27 (11)	04:53		20:17 (9)	04:47		20:35 (10)
	16:50				19:42	26	18:58 (6)	20:39	28	19:55 (11)	21:27	19	20:47 (10)	21:45	25	21:00 (10)
31	08:01				06:51		18:32 (6)				04:52		20:19 (9)			
	16:52				19:44	26	18:58 (6)				21:29	16	20:48 (10)			
Sonnenscheinstunden		252	274		367			419			492			508		
astr.max.mögl.Beschattung				61			483			537			712			714
Red.Sonnenscheinwahrsch.				0.24			0.31			0.41			0.51			0.45
Reduktion Betriebsdauer				0.91			0.91			0.91			0.91			0.91
Reduktion Windrichtung				0.69			0.69			0.68			0.66			0.64
Gesamte Reduktion				0.15			0.20			0.26			0.31			0.27
Met.wahrsch.Beschattung				9			96			138			220			190

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AN - IO40

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		20:36 (10)	05:26		19:42 (11)	06:20		19:02 (5)	07:12			07:10	08:04
	21:45	24	21:00 (10)	21:10	34	20:38 (9)	20:04	17	19:19 (5)	18:51			16:42	15:58
2	04:48		20:36 (10)	05:28		19:41 (11)	06:22		19:01 (5)	07:14		17:35 (2)	07:12	08:05
	21:44	24	21:00 (10)	21:08	33	20:37 (9)	20:02	19	19:20 (5)	18:49	10	17:45 (2)	16:40	15:57
3	04:49		20:36 (10)	05:30		19:40 (11)	06:23		18:59 (5)	07:16		17:32 (2)	07:14	08:07
	21:44	24	21:00 (10)	21:06	33	20:36 (9)	20:00	20	19:19 (5)	18:46	15	17:47 (2)	16:38	15:57
4	04:49		20:37 (10)	05:31		19:38 (11)	06:25		18:59 (5)	07:18		17:30 (2)	07:15	08:08
	21:43	23	21:00 (10)	21:05	31	20:33 (9)	19:57	21	19:20 (5)	18:44	19	17:49 (2)	16:36	15:56
5	04:50		20:37 (10)	05:33		19:38 (11)	06:27		18:59 (5)	07:19		17:29 (2)	07:17	08:10
	21:43	23	21:00 (10)	21:03	25	20:03 (11)	19:55	21	19:20 (5)	18:42	21	17:50 (2)	16:34	15:55
6	04:51		20:38 (10)	05:35		19:37 (11)	06:29		18:36 (6)	07:21		17:28 (2)	07:19	08:11
	21:42	22	21:00 (10)	21:01	26	20:03 (11)	19:52	27	19:19 (5)	18:39	22	17:50 (2)	16:32	15:55
7	04:52		20:39 (10)	05:36		19:37 (11)	06:30		18:32 (6)	07:23		17:26 (2)	07:21	08:12
	21:42	21	21:00 (10)	20:59	26	20:03 (11)	19:50	33	19:18 (5)	18:37	24	17:50 (2)	16:30	15:54
8	04:53		20:39 (10)	05:38		19:36 (11)	06:32		18:30 (6)	07:25		17:26 (2)	07:23	08:14
	21:41	21	21:00 (10)	20:57	28	20:04 (11)	19:48	36	19:18 (5)	18:35	24	17:50 (2)	16:28	15:54
9	04:54		20:40 (10)	05:40		19:36 (11)	06:34		18:27 (6)	07:27		17:25 (2)	07:25	08:15
	21:40	19	20:59 (10)	20:55	28	20:04 (11)	19:45	39	19:16 (5)	18:32	25	17:50 (2)	16:27	15:54
10	04:55		20:41 (10)	05:42		19:36 (11)	06:35		18:26 (6)	07:28		17:25 (2)	07:27	08:16
	21:39	18	20:59 (10)	20:53	28	20:04 (11)	19:43	37	19:14 (5)	18:30	25	17:50 (2)	16:25	15:53
11	04:56		20:42 (10)	05:43		19:35 (11)	06:37		18:25 (6)	07:30		17:25 (2)	07:29	08:17
	21:38	16	20:58 (10)	20:51	28	20:03 (11)	19:40	34	19:12 (5)	18:27	24	17:49 (2)	16:23	15:53
12	04:58		20:42 (10)	05:45		19:35 (11)	06:39		18:24 (6)	07:32		17:26 (2)	07:31	08:18
	21:38	15	20:57 (10)	20:49	28	20:03 (11)	19:38	25	18:49 (6)	18:25	22	17:48 (2)	16:22	15:53
13	04:59		20:26 (9)	05:47		19:35 (11)	06:41		18:23 (6)	07:34		17:26 (2)	07:33	08:19
	21:37	18	20:56 (10)	20:47	29	20:04 (11)	19:35	26	18:49 (6)	18:23	22	17:48 (2)	16:20	15:53
14	05:00		20:25 (9)	05:48		19:35 (11)	06:42		18:23 (6)	07:36		17:27 (2)	07:34	08:20
	21:36	19	20:55 (10)	20:45	27	20:02 (11)	19:33	26	18:49 (6)	18:20	20	17:47 (2)	16:18	15:53
15	05:01		20:24 (9)	05:50		19:36 (11)	06:44		18:23 (6)	07:38		17:28 (2)	07:36	08:21
	21:34	16	20:52 (10)	20:43	26	20:02 (11)	19:30	26	18:49 (6)	18:18	17	17:45 (2)	16:17	15:53
16	05:02		20:23 (9)	05:52		19:36 (11)	06:46		18:22 (6)	07:39		17:30 (2)	07:38	08:22
	21:33	13	20:36 (9)	20:41	26	20:02 (11)	19:28	26	18:48 (6)	18:16	13	17:43 (2)	16:15	15:53
17	05:04		20:23 (9)	05:54		19:36 (11)	06:48		18:22 (6)	07:41		17:33 (2)	07:40	08:23
	21:32	14	20:37 (9)	20:38	24	20:00 (11)	19:26	25	18:47 (6)	18:14	6	17:39 (2)	16:14	15:53
18	05:05		20:22 (9)	05:55		19:37 (11)	06:49		18:23 (6)	07:43			07:42	08:24
	21:31	16	20:38 (9)	20:36	22	19:59 (11)	19:23	24	18:47 (6)	18:11			16:12	15:53
19	05:07		20:21 (9)	05:57		19:38 (11)	06:51		18:22 (6)	07:45			07:44	08:25
	21:30	17	20:38 (9)	20:34	19	19:57 (11)	19:21	23	18:45 (6)	18:09			16:11	15:54
20	05:08		20:20 (9)	05:59		19:40 (11)	06:53		18:23 (6)	07:47			07:45	08:25
	21:29	19	20:39 (9)	20:32	16	19:56 (11)	19:18	21	18:44 (6)	18:07			16:10	15:54
21	05:09		20:21 (9)	06:01		19:42 (11)	06:55		18:25 (6)	07:49			07:47	08:26
	21:27	19	20:40 (9)	20:30	11	19:53 (11)	19:16	17	18:42 (6)	18:05			16:08	15:54
22	05:11		20:20 (9)	06:02			06:56		18:27 (6)	07:51			07:49	08:26
	21:26	20	20:40 (9)	20:27			19:13	12	18:39 (6)	18:02			16:07	15:55
23	05:12		20:20 (9)	06:04			06:58			07:53			07:51	08:27
	21:24	20	20:40 (9)	20:25			19:11			18:00			16:06	15:55
24	05:14		20:20 (9)	06:06			07:00			07:54			07:53	08:27
	21:23	20	20:40 (9)	20:23			19:08			17:58			16:05	15:56
25	05:15		20:20 (9)	06:08			07:02			06:56			07:54	08:28
	21:21	20	20:40 (9)	20:21			19:06			16:56			16:04	15:56
26	05:17		20:20 (9)	06:09			07:03			06:58			07:56	08:28
	21:20	21	20:41 (9)	20:18			19:04			16:54			16:03	15:57
27	05:18		20:20 (9)	06:11			07:05			07:00			07:58	08:28
	21:18	20	20:40 (9)	20:16			19:01			16:52			16:02	15:58
28	05:20		20:21 (9)	06:13			07:07			07:02			07:59	08:28
	21:17	20	20:41 (9)	20:14			18:59			16:50			16:01	15:59
29	05:22		20:20 (9)	06:15		19:09 (5)	07:09			07:04			08:01	08:29
	21:15	20	20:40 (9)	20:11	4	19:13 (5)	18:56			16:48			16:00	16:00
30	05:23		19:46 (11)	06:16		19:06 (5)	07:11			07:06			08:02	08:29
	21:13	29	20:40 (9)	20:09	11	19:17 (5)	18:54			16:46			15:59	16:01
31	05:25		19:44 (11)	06:18		19:03 (5)				07:08				08:29
	21:12	32	20:39 (9)	20:07	15	19:18 (5)				16:44				16:02
Sonnenscheinstunden	510			459			382			329			260	235
astr.max.mögl.Beschattung		623			578			555			309			
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91			
Reduktion Windrichtung		0.65			0.67			0.69			0.69			
Gesamte Reduktion		0.26			0.30			0.26			0.21			
Met.wahrsch.Beschattung		165			171			142			64			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AO - IO41

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar			März			April			Mai			Juni		
1	08:29	07:59			07:02		16:51 (2)	06:48		18:31 (6)	05:40		19:23 (11)	04:51		20:27 (10)
	16:03	16:54			17:48	23	17:14 (2)	19:46	36	19:19 (5)	20:41	28	19:51 (11)	21:30	21	20:48 (10)
2	08:28	07:57			07:00		16:49 (2)	06:46		18:32 (6)	05:38		19:23 (11)	04:50		20:27 (10)
	16:04	16:55			17:50	24	17:13 (2)	19:48	36	19:20 (5)	20:42	28	19:51 (11)	21:31	22	20:49 (10)
3	08:28	07:56			06:58		16:49 (2)	06:43		18:34 (6)	05:36		19:24 (11)	04:49		20:27 (10)
	16:05	16:57			17:52	24	17:13 (2)	19:50	35	19:21 (5)	20:44	27	19:51 (11)	21:32	23	20:50 (10)
4	08:28	07:54			06:55		16:50 (2)	06:41		18:36 (6)	05:34		19:24 (11)	04:48		20:27 (10)
	16:06	16:59			17:54	24	17:14 (2)	19:52	30	19:21 (5)	20:46	26	19:50 (11)	21:33	23	20:50 (10)
5	08:28	07:52			06:53		16:49 (2)	06:38		19:00 (5)	05:32		19:25 (11)	04:48		20:26 (10)
	16:08	17:01			17:56	23	17:12 (2)	19:53	21	19:21 (5)	20:48	25	19:50 (11)	21:34	24	20:50 (10)
6	08:27	07:50			06:51		16:50 (2)	06:36		19:00 (5)	05:30		19:25 (11)	04:47		20:27 (10)
	16:09	17:03			17:58	22	17:12 (2)	19:55	21	19:21 (5)	20:50	24	19:49 (11)	21:35	24	20:51 (10)
7	08:27	07:49			06:48		16:50 (2)	06:34		19:00 (5)	05:28		19:26 (11)	04:46		20:26 (10)
	16:10	17:05			18:00	21	17:11 (2)	19:57	20	19:20 (5)	20:51	29	20:21 (9)	21:36	25	20:51 (10)
8	08:26	07:47			06:46		16:51 (2)	06:31		19:00 (5)	05:26		19:27 (11)	04:46		20:26 (10)
	16:12	17:07			18:02	19	17:10 (2)	19:59	20	19:20 (5)	20:53	31	20:22 (9)	21:37	26	20:52 (10)
9	08:26	07:45			06:44		16:53 (2)	06:29		19:01 (5)	05:24		19:29 (11)	04:45		20:26 (10)
	16:13	17:09			18:04	16	17:09 (2)	20:01	18	19:19 (5)	20:55	31	20:25 (9)	21:38	26	20:52 (10)
10	08:25	07:43			06:41		16:54 (2)	06:27		19:01 (5)	05:22		19:30 (11)	04:45		20:26 (10)
	16:15	17:11			18:06	11	17:05 (2)	20:03	16	19:17 (5)	20:57	30	20:25 (9)	21:39	27	20:53 (10)
11	08:25	07:41			06:39			06:24		19:02 (5)	05:20		19:32 (11)	04:44		20:27 (10)
	16:16	17:13			18:07			20:04	14	19:16 (5)	20:58	27	20:26 (9)	21:40	26	20:53 (10)
12	08:24	07:39			06:37			06:22		19:05 (5)	05:19		20:08 (9)	04:44		20:27 (10)
	16:18	17:15			18:09			20:06	9	19:14 (5)	21:00	19	20:27 (9)	21:41	27	20:54 (10)
13	08:23	07:37			06:34			06:20			05:17		20:07 (9)	04:43		20:26 (10)
	16:19	17:17			18:11			20:08			21:02	20	20:27 (9)	21:41	27	20:53 (10)
14	08:22	07:35			06:32			06:17			05:15		20:07 (9)	04:43		20:27 (10)
	16:21	17:19			18:13			20:10			21:03	20	20:27 (9)	21:42	27	20:54 (10)
15	08:21	07:33			06:29			06:15			05:14		20:07 (9)	04:43		20:27 (10)
	16:22	17:21			18:15			20:12			21:05	20	20:27 (9)	21:43	27	20:54 (10)
16	08:20	07:31			06:27			06:13			05:12		20:06 (9)	04:43		20:27 (10)
	16:24	17:23			18:17			20:13			21:07	21	20:27 (9)	21:43	28	20:55 (10)
17	08:19	07:29			06:25			06:10			05:10		20:07 (9)	04:43		20:28 (10)
	16:26	17:25			18:19			20:15			21:08	20	20:27 (9)	21:44	27	20:55 (10)
18	08:18	07:27			06:22			06:08			05:09		20:07 (9)	04:43		20:28 (10)
	16:27	17:27			18:20			20:17			21:10	21	20:28 (9)	21:44	27	20:55 (10)
19	08:17	07:25			06:20		17:45 (6)	06:06			05:07		20:07 (9)	04:43		20:28 (10)
	16:29	17:29			18:22	2	17:47 (6)	20:19			21:11	20	20:27 (9)	21:44	27	20:55 (10)
20	08:16	07:22			06:17		17:40 (6)	06:03		19:34 (11)	05:06		20:08 (9)	04:43		20:28 (10)
	16:31	17:31			18:24	12	17:52 (6)	20:21	12	19:46 (11)	21:13	19	20:27 (9)	21:45	27	20:55 (10)
21	08:15	07:20			06:15		17:37 (6)	06:01		19:32 (11)	05:04		20:08 (9)	04:43		20:28 (10)
	16:33	17:33			18:26	17	17:54 (6)	20:23	16	19:48 (11)	21:15	19	20:27 (9)	21:45	27	20:55 (10)
22	08:14	07:18			06:12		17:35 (6)	05:59		19:29 (11)	05:03		20:08 (9)	04:43		20:29 (10)
	16:35	17:35			18:28	20	17:55 (6)	20:24	20	19:49 (11)	21:16	18	20:26 (9)	21:45	27	20:56 (10)
23	08:12	07:16			06:10		17:33 (6)	05:57		19:27 (11)	05:01		20:09 (9)	04:43		20:29 (10)
	16:36	17:37			18:30	23	17:56 (6)	20:26	23	19:50 (11)	21:18	16	20:25 (9)	21:45	27	20:56 (10)
24	08:11	07:14		16:57 (2)	06:08		17:32 (6)	05:55		19:26 (11)	05:00		20:10 (9)	04:44		20:29 (10)
	16:38	17:39	10	17:07 (2)	18:32	25	17:57 (6)	20:28	25	19:51 (11)	21:19	15	20:25 (9)	21:45	27	20:56 (10)
25	08:10	07:11		16:55 (2)	06:05		17:31 (6)	05:52		19:26 (11)	04:59		20:11 (9)	04:44		20:30 (10)
	16:40	17:41	15	17:10 (2)	18:33	25	17:56 (6)	20:30	25	19:51 (11)	21:21	16	20:39 (10)	21:46	27	20:57 (10)
26	08:08	07:09		16:54 (2)	06:03		17:31 (6)	05:50		19:25 (11)	04:58		20:12 (9)	04:44		20:29 (10)
	16:42	17:43	17	17:11 (2)	18:35	26	17:57 (6)	20:32	27	19:52 (11)	21:22	20	20:42 (10)	21:46	28	20:57 (10)
27	08:07	07:07		16:52 (2)	06:00		17:31 (6)	05:48		19:24 (11)	04:56		20:14 (9)	04:45		20:30 (10)
	16:44	17:45	20	17:12 (2)	18:37	26	17:57 (6)	20:33	28	19:52 (11)	21:23	21	20:44 (10)	21:45	27	20:57 (10)
28	08:05	07:05		16:51 (2)	05:58		17:30 (6)	05:46		19:24 (11)	04:55		20:16 (9)	04:45		20:30 (10)
	16:46	17:47	22	17:13 (2)	18:39	26	17:56 (6)	20:35	28	19:52 (11)	21:25	19	20:45 (10)	21:45	27	20:57 (10)
29	08:04				06:55		18:30 (6)	05:44		19:24 (11)	04:54		20:29 (10)	04:46		20:31 (10)
	16:48				19:41	26	18:56 (6)	20:37	28	19:52 (11)	21:26	17	20:46 (10)	21:45	27	20:58 (10)
30	08:02				06:53		18:30 (6)	05:42		19:23 (11)	04:53		20:28 (10)	04:47		20:30 (10)
	16:50				19:42	25	18:55 (6)	20:39	29	19:52 (11)	21:27	19	20:47 (10)	21:45	27	20:57 (10)
31	08:01				06:51		18:31 (6)				04:52		20:28 (10)			
	16:52				19:44	34	19:18 (5)				21:29	20	20:48 (10)			
Sonnenscheinstunden	252	274			367			419			492			508		
astr.max.mögl.Beschattung			84			494			537			686			782	
Red.Sonnenscheinwahrsch.			0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer			0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung			0.69			0.69			0.68			0.66			0.64	
Gesamte Reduktion			0.15			0.20			0.26			0.31			0.27	
Met.wahrsch.Beschattung			13			98			137			211			209	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AO - IO41

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober			November	Dezember
1 | 04:47		20:31 (10) | 05:26		19:47 (11) | 06:20		19:01 (5) | 07:12		07:10	08:04
| 21:45	27	20:58 (10) | 21:10	20	20:37 (9) | 20:04	14	19:15 (5) | 18:51		16:42	15:58
2 | 04:48		20:32 (10) | 05:28		19:42 (11) | 06:22		19:00 (5) | 07:14		07:12	08:05
| 21:44	26	20:58 (10) | 21:08	28	20:36 (9) | 20:02	16	19:16 (5) | 18:49		16:40	15:57
3 | 04:49		20:31 (10) | 05:30		19:40 (11) | 06:23		18:58 (5) | 07:16	17:34 (2)	07:14	08:07
| 21:44	26	20:57 (10) | 21:06	30	20:35 (9) | 20:00	18	19:16 (5) | 18:46	8 17:42 (2)	16:38	15:57
4 | 04:49		20:32 (10) | 05:31		19:38 (11) | 06:25		18:57 (5) | 07:18	17:31 (2)	07:15	08:08
| 21:43	25	20:57 (10) | 21:05	31	20:33 (9) | 19:57	20	19:17 (5) | 18:44	14 17:45 (2)	16:36	15:56
5 | 04:50		20:32 (10) | 05:33		19:37 (11) | 06:27		18:57 (5) | 07:19	17:29 (2)	07:17	08:10
| 21:43	26	20:58 (10) | 21:03	30	20:32 (9) | 19:55	20	19:17 (5) | 18:42	17 17:46 (2)	16:34	15:55
6 | 04:51		20:33 (10) | 05:35		19:35 (11) | 06:29		18:56 (5) | 07:21	17:27 (2)	07:19	08:11
| 21:42	25	20:58 (10) | 21:01	27	20:29 (9) | 19:52	20	19:16 (5) | 18:39	20 17:47 (2)	16:32	15:55
7 | 04:52		20:33 (10) | 05:36		19:35 (11) | 06:30		18:56 (5) | 07:23	17:25 (2)	07:21	08:12
| 21:42	25	20:58 (10) | 20:59	24	19:59 (11) | 19:50	20	19:16 (5) | 18:37	22 17:47 (2)	16:30	15:54
8 | 04:53		20:34 (10) | 05:38		19:34 (11) | 06:32		18:31 (6) | 07:25	17:24 (2)	07:23	08:14
| 21:41	24	20:58 (10) | 20:57	26	20:00 (11) | 19:48	30	19:16 (5) | 18:35	23 17:47 (2)	16:28	15:54
9 | 04:54		20:34 (10) | 05:40		19:33 (11) | 06:34		18:27 (6) | 07:27	17:24 (2)	07:25	08:15
| 21:40	24	20:58 (10) | 20:55	26	19:59 (11) | 19:45	35	19:14 (5) | 18:32	24 17:48 (2)	16:27	15:54
10 | 04:55		20:35 (10) | 05:42		19:33 (11) | 06:35		18:26 (6) | 07:28	17:24 (2)	07:27	08:16
| 21:39	22	20:57 (10) | 20:53	27	20:00 (11) | 19:43	36	19:14 (5) | 18:30	24 17:48 (2)	16:25	15:53
11 | 04:56		20:35 (10) | 05:43		19:32 (11) | 06:37		18:24 (6) | 07:30	17:23 (2)	07:29	08:17
| 21:38	22	20:57 (10) | 20:51	28	20:00 (11) | 19:40	36	19:12 (5) | 18:27	24 17:47 (2)	16:23	15:53
12 | 04:58		20:36 (10) | 05:45		19:32 (11) | 06:39		18:22 (6) | 07:32	17:24 (2)	07:31	08:18
| 21:38	21	20:57 (10) | 20:49	28	20:00 (11) | 19:38	34	19:09 (5) | 18:25	23 17:47 (2)	16:22	15:53
13 | 04:59		20:37 (10) | 05:47		19:32 (11) | 06:41		18:21 (6) | 07:34	17:24 (2)	07:33	08:19
| 21:37	19	20:56 (10) | 20:47	28	20:00 (11) | 19:35	30	19:06 (5) | 18:23	22 17:46 (2)	16:20	15:53
14 | 05:00		20:37 (10) | 05:48		19:31 (11) | 06:42		18:21 (6) | 07:36	17:24 (2)	07:34	08:20
| 21:36	18	20:55 (10) | 20:45	28	19:59 (11) | 19:33	25	18:46 (6) | 18:20	22 17:46 (2)	16:18	15:53
15 | 05:01		20:38 (10) | 05:50		19:32 (11) | 06:44		18:20 (6) | 07:38	17:25 (2)	07:36	08:21
| 21:34	16	20:54 (10) | 20:43	27	19:59 (11) | 19:30	26	18:46 (6) | 18:18	19 17:44 (2)	16:17	15:53
16 | 05:02		20:23 (9) | 05:52		19:32 (11) | 06:46		18:19 (6) | 07:39	17:26 (2)	07:38	08:22
| 21:33	21	20:53 (10) | 20:41	27	19:59 (11) | 19:28	26	18:45 (6) | 18:16	17 17:43 (2)	16:15	15:53
17 | 05:04		20:23 (9) | 05:54		19:32 (11) | 06:48		18:19 (6) | 07:41	17:28 (2)	07:40	08:23
| 21:32	21	20:53 (10) | 20:38	26	19:58 (11) | 19:26	26	18:45 (6) | 18:14	13 17:41 (2)	16:14	15:53
18 | 05:05		20:21 (9) | 05:55		19:32 (11) | 06:49		18:19 (6) | 07:43	17:30 (2)	07:42	08:24
| 21:31	20	20:51 (10) | 20:36	26	19:58 (11) | 19:23	26	18:45 (6) | 18:11	7 17:37 (2)	16:12	15:53
19 | 05:07		20:20 (9) | 05:57		19:32 (11) | 06:51		18:19 (6) | 07:45		07:44	08:25
| 21:30	14	20:34 (9) | 20:34	24	19:56 (11) | 19:21	24	18:43 (6) | 18:09		16:11	15:54
20 | 05:08		20:19 (9) | 05:59		19:33 (11) | 06:53		18:19 (6) | 07:47		07:45	08:25
| 21:29	16	20:35 (9) | 20:32	22	19:55 (11) | 19:18	23	18:42 (6) | 18:07		16:10	15:54
21 | 05:09		20:19 (9) | 06:01		19:35 (11) | 06:55		18:20 (6) | 07:49		07:47	08:26
| 21:27	17	20:36 (9) | 20:30	19	19:54 (11) | 19:16	21	18:41 (6) | 18:05		16:08	15:54
22 | 05:11		20:18 (9) | 06:02		19:36 (11) | 06:56		18:22 (6) | 07:51		07:49	08:26
| 21:26	18	20:36 (9) | 20:27	15	19:51 (11) | 19:13	18	18:40 (6) | 18:02		16:07	15:55
23 | 05:12		20:18 (9) | 06:04		19:38 (11) | 06:58		18:22 (6) | 07:53		07:51	08:27
| 21:24	18	20:36 (9) | 20:25	11	19:49 (11) | 19:11	15	18:37 (6) | 18:00		16:06	15:55
24 | 05:14		20:18 (9) | 06:06		| 07:00		18:26 (6) | 07:54		07:53	08:27
| 21:23	19	20:37 (9) | 20:23		| 19:08	7	18:33 (6) | 17:58		16:05	15:56
25 | 05:15		20:17 (9) | 06:08		| 07:02		| 06:56		07:54	08:28
| 21:21	20	20:37 (9) | 20:21		| 19:06		| 16:56		16:04	15:56
26 | 05:17		20:18 (9) | 06:09		| 07:03		| 06:58		07:56	08:28
| 21:20	20	20:38 (9) | 20:18		| 19:04		| 16:54		16:03	15:57
27 | 05:18		20:17 (9) | 06:11		| 07:05		| 07:00		07:58	08:28
| 21:18	21	20:38 (9) | 20:16		| 19:01		| 16:52		16:02	15:58
28 | 05:20		20:18 (9) | 06:13		| 07:07		| 07:02		07:59	08:28
| 21:17	20	20:38 (9) | 20:14		| 18:59		| 16:50		16:01	15:59
29 | 05:22		20:17 (9) | 06:15		| 07:09		| 07:04		08:01	08:29
| 21:15	21	20:38 (9) | 20:11		| 18:56		| 16:48		16:00	16:00
30 | 05:23		20:18 (9) | 06:16		| 07:11		| 07:06		08:02	08:29
| 21:13	20	20:38 (9) | 20:09		| 18:54		| 16:46		15:59	16:01
31 | 05:25		20:18 (9) | 06:18		19:03 (5) |		| 07:08			08:29
| 21:12	19	20:37 (9) | 20:07	10	19:13 (5) |		| 16:44			16:02
Sonnenscheinstunden |	510	|	459	|	382	|	329	|	260	235
astr.max.mögl.Beschattung |	651	|	588	|	566	|	299	|	|
Red.Sonnenscheinwahrsch. |	0.45	|	0.49	|	0.40	|	0.33	|	|
Reduktion Betriebsdauer |	0.91	|	0.91	|	0.91	|	0.91	|	|
Reduktion Windrichtung |	0.65	|	0.66	|	0.69	|	0.69	|	|
Gesamte Reduktion |	0.26	|	0.30	|	0.26	|	0.21	|	|
Met.wahrsch.Beschattung |	172	|	174	|	145	|	62	|	|

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AP - IO42

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar			März			April			Mai			Juni		
1	08:29	07:59			07:02		16:52 (2)	06:48		18:31 (6)	05:40		19:24 (11)	04:51		20:26 (10)
	16:03	16:54			17:48	22	17:14 (2)	19:46	37	19:19 (5)	20:41	27	19:51 (11)	21:30	22	20:48 (10)
2	08:28	07:57			07:00		16:50 (2)	06:46		18:33 (6)	05:38		19:24 (11)	04:50		20:26 (10)
	16:04	16:55			17:50	34	17:14 (2)	19:48	36	19:20 (5)	20:42	27	19:51 (11)	21:31	23	20:49 (10)
3	08:28	07:56			06:58		16:50 (2)	06:43		18:35 (6)	05:36		19:24 (11)	04:49		20:26 (10)
	16:05	16:57			17:52	24	17:14 (2)	19:50	34	19:21 (5)	20:44	26	19:50 (11)	21:32	24	20:50 (10)
4	08:28	07:54			06:55		16:51 (2)	06:41		18:36 (6)	05:34		19:24 (11)	04:48		20:26 (10)
	16:06	16:59			17:54	23	17:14 (2)	19:52	30	19:21 (5)	20:46	25	19:49 (11)	21:33	24	20:50 (10)
5	08:28	07:52			06:53		16:50 (2)	06:38		19:01 (5)	05:32		19:25 (11)	04:48		20:25 (10)
	16:08	17:01			17:56	23	17:13 (2)	19:53	20	19:21 (5)	20:48	25	19:50 (11)	21:34	25	20:50 (10)
6	08:27	07:50			06:51		16:51 (2)	06:36		19:01 (5)	05:30		19:26 (11)	04:47		20:26 (10)
	16:09	17:03			17:58	22	17:13 (2)	19:55	20	19:21 (5)	20:50	23	19:49 (11)	21:35	25	20:51 (10)
7	08:27	07:49			06:48		16:51 (2)	06:34		19:00 (5)	05:28		19:27 (11)	04:46		20:25 (10)
	16:10	17:05			18:00	21	17:12 (2)	19:57	20	19:20 (5)	20:51	28	20:21 (9)	21:36	26	20:51 (10)
8	08:26	07:47			06:46		16:52 (2)	06:31		19:00 (5)	05:26		19:27 (11)	04:46		20:26 (10)
	16:12	17:07			18:02	19	17:11 (2)	19:59	20	19:20 (5)	20:53	31	20:22 (9)	21:37	26	20:52 (10)
9	08:26	07:45			06:44		16:53 (2)	06:29		19:01 (5)	05:24		19:30 (11)	04:45		20:25 (10)
	16:13	17:09			18:04	17	17:10 (2)	20:01	18	19:19 (5)	20:55	30	20:25 (9)	21:38	26	20:51 (10)
10	08:25	07:43			06:41		16:55 (2)	06:27		19:01 (5)	05:22		19:31 (11)	04:45		20:26 (10)
	16:15	17:11			18:06	12	17:07 (2)	20:03	16	19:17 (5)	20:57	28	20:25 (9)	21:39	26	20:52 (10)
11	08:25	07:41			06:39		17:00 (2)	06:24		19:03 (5)	05:20		19:35 (11)	04:44		20:26 (10)
	16:16	17:13			18:07	2	17:02 (2)	20:04	13	19:16 (5)	20:58	22	20:26 (9)	21:40	27	20:53 (10)
12	08:24	07:39			06:37			06:22		19:05 (5)	05:19		20:08 (9)	04:44		20:26 (10)
	16:18	17:15			18:09			20:06	9	19:14 (5)	21:00	19	20:27 (9)	21:41	27	20:53 (10)
13	08:23	07:37			06:34			06:20			05:17		20:07 (9)	04:43		20:26 (10)
	16:19	17:17			18:11			20:08			21:02	19	20:26 (9)	21:41	27	20:53 (10)
14	08:22	07:35			06:32			06:17			05:15		20:06 (9)	04:43		20:26 (10)
	16:21	17:19			18:13			20:10			21:03	20	20:26 (9)	21:42	27	20:53 (10)
15	08:21	07:33			06:29			06:15			05:14		20:07 (9)	04:43		20:26 (10)
	16:22	17:21			18:15			20:12			21:05	20	20:27 (9)	21:43	28	20:54 (10)
16	08:20	07:31			06:27			06:13			05:12		20:06 (9)	04:43		20:27 (10)
	16:24	17:23			18:17			20:13			21:07	20	20:26 (9)	21:43	27	20:54 (10)
17	08:19	07:29			06:24			06:10			05:10		20:07 (9)	04:43		20:27 (10)
	16:26	17:25			18:19			20:15			21:08	20	20:27 (9)	21:44	27	20:54 (10)
18	08:18	07:27			06:22			06:08			05:09		20:07 (9)	04:43		20:27 (10)
	16:27	17:27			18:20			20:17			21:10	20	20:27 (9)	21:44	27	20:54 (10)
19	08:17	07:25			06:20			06:06		19:38 (11)	05:07		20:07 (9)	04:43		20:27 (10)
	16:29	17:29			18:22			20:19	3	19:41 (11)	21:11	19	20:26 (9)	21:44	28	20:55 (10)
20	08:16	07:22			06:17		17:41 (6)	06:03		19:33 (11)	05:06		20:08 (9)	04:43		20:27 (10)
	16:31	17:31			18:24	12	17:53 (6)	20:21	13	19:46 (11)	21:13	18	20:26 (9)	21:45	28	20:55 (10)
21	08:15	07:20			06:15		17:37 (6)	06:01		19:31 (11)	05:04		20:08 (9)	04:43		20:27 (10)
	16:33	17:33			18:26	17	17:54 (6)	20:23	17	19:48 (11)	21:15	18	20:26 (9)	21:45	28	20:55 (10)
22	08:14	07:18			06:12		17:36 (6)	05:59		19:29 (11)	05:03		20:08 (9)	04:43		20:28 (10)
	16:35	17:35			18:28	20	17:56 (6)	20:24	20	19:49 (11)	21:16	17	20:25 (9)	21:45	28	20:56 (10)
23	08:12	07:16			06:10		17:34 (6)	05:57		19:27 (11)	05:01		20:09 (9)	04:43		20:28 (10)
	16:36	17:37			18:30	22	17:56 (6)	20:26	23	19:50 (11)	21:18	16	20:25 (9)	21:45	28	20:56 (10)
24	08:11	07:14		16:59 (2)	06:08		17:33 (6)	05:55		19:26 (11)	05:00		20:10 (9)	04:44		20:28 (10)
	16:38	17:39	7	17:06 (2)	18:32	24	17:57 (6)	20:28	25	19:51 (11)	21:19	14	20:24 (9)	21:45	27	20:55 (10)
25	08:10	07:11		16:56 (2)	06:05		17:32 (6)	05:52		19:25 (11)	04:59		20:12 (9)	04:44		20:29 (10)
	16:40	17:41	14	17:10 (2)	18:33	25	17:57 (6)	20:30	26	19:51 (11)	21:21	20	20:41 (10)	21:46	27	20:56 (10)
26	08:08	07:09		16:55 (2)	06:03		17:31 (6)	05:50		19:25 (11)	04:58		20:13 (9)	04:44		20:29 (10)
	16:42	17:43	17	17:12 (2)	18:35	26	17:57 (6)	20:32	27	19:52 (11)	21:22	21	20:43 (10)	21:46	27	20:56 (10)
27	08:07	07:07		16:53 (2)	06:00		17:31 (6)	05:48		19:24 (11)	04:56		20:15 (9)	04:45		20:29 (10)
	16:44	17:45	19	17:12 (2)	18:37	26	17:57 (6)	20:33	28	19:52 (11)	21:23	20	20:44 (10)	21:45	28	20:57 (10)
28	08:05	07:05		16:52 (2)	05:58		17:31 (6)	05:46		19:24 (11)	04:55		20:29 (10)	04:45		20:29 (10)
	16:46	17:47	21	17:13 (2)	18:39	26	17:57 (6)	20:35	28	19:52 (11)	21:25	17	20:46 (10)	21:45	27	20:56 (10)
29	08:04				06:55		18:31 (6)	05:44		19:24 (11)	04:54		20:28 (10)	04:46		20:30 (10)
	16:48				19:41	25	18:56 (6)	20:37	28	19:52 (11)	21:26	18	20:46 (10)	21:45	27	20:57 (10)
30	08:02				06:53		18:31 (6)	05:42		19:24 (11)	04:53		20:27 (10)	04:47		20:30 (10)
	16:50				19:42	24	18:55 (6)	20:39	28	19:52 (11)	21:27	20	20:47 (10)	21:45	26	20:56 (10)
31	08:01				06:51		18:31 (6)				04:52		20:27 (10)			
	16:52				19:44	35	19:18 (5)				21:29	21	20:48 (10)			
Sonnenscheinstunden	252	274			367			419			492			508		
astr.max.mögl.Beschattung			78			491			539			669			793	
Red.Sonnenscheinwahrsch.			0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer			0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung			0.69			0.69			0.68			0.66			0.64	
Gesamte Reduktion			0.15			0.20			0.26			0.31			0.27	
Met.wahrsch.Beschattung			12			97			138			206			212	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AP - IO42

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		20:30 (10)	05:26		20:18 (9)	06:20		19:02 (5)	07:12		07:10	08:04
	21:45	27	20:57 (10)	21:10	19	20:37 (9)	20:04	13	19:15 (5)	18:51		16:42	15:58
2	04:48		20:31 (10)	05:28		19:43 (11)	06:22		19:00 (5)	07:14		07:12	08:05
	21:44	26	20:57 (10)	21:08	26	20:36 (9)	20:02	16	19:16 (5)	18:49		16:40	15:57
3	04:49		20:30 (10)	05:30		19:41 (11)	06:23		18:58 (5)	07:16	17:34 (2)	07:14	08:07
	21:44	27	20:57 (10)	21:06	29	20:35 (9)	20:00	18	19:16 (5)	18:46	9 17:43 (2)	16:38	15:57
4	04:49		20:31 (10)	05:31		19:38 (11)	06:25		18:57 (5)	07:18	17:31 (2)	07:15	08:08
	21:43	26	20:57 (10)	21:05	30	20:33 (9)	19:57	20	19:17 (5)	18:44	15 17:46 (2)	16:36	15:56
5	04:50		20:31 (10)	05:33		19:37 (11)	06:27		18:57 (5)	07:19	17:29 (2)	07:17	08:10
	21:43	26	20:57 (10)	21:03	31	20:32 (9)	19:55	20	19:17 (5)	18:42	18 17:47 (2)	16:34	15:55
6	04:51		20:32 (10)	05:35		19:36 (11)	06:29		18:56 (5)	07:21	17:28 (2)	07:19	08:11
	21:42	25	20:57 (10)	21:01	28	20:30 (9)	19:52	20	19:16 (5)	18:39	20 17:48 (2)	16:32	15:55
7	04:52		20:32 (10)	05:36		19:35 (11)	06:30		18:56 (5)	07:23	17:26 (2)	07:21	08:12
	21:42	25	20:57 (10)	20:59	23	19:58 (11)	19:50	20	19:16 (5)	18:37	22 17:48 (2)	16:30	15:54
8	04:53		20:33 (10)	05:38		19:35 (11)	06:32		18:32 (6)	07:25	17:25 (2)	07:23	08:14
	21:41	24	20:57 (10)	20:57	24	19:59 (11)	19:48	29	19:16 (5)	18:35	23 17:48 (2)	16:28	15:54
9	04:54		20:33 (10)	05:40		19:33 (11)	06:34		18:28 (6)	07:27	17:25 (2)	07:25	08:15
	21:40	24	20:57 (10)	20:55	26	19:59 (11)	19:45	35	19:15 (5)	18:32	23 17:48 (2)	16:27	15:54
10	04:55		20:34 (10)	05:42		19:33 (11)	06:35		18:26 (6)	07:28	17:25 (2)	07:27	08:16
	21:39	23	20:57 (10)	20:53	27	20:00 (11)	19:43	37	19:14 (5)	18:30	23 17:48 (2)	16:25	15:53
11	04:56		20:34 (10)	05:43		19:32 (11)	06:37		18:25 (6)	07:30	17:24 (2)	07:29	08:17
	21:38	23	20:57 (10)	20:51	27	19:59 (11)	19:40	36	19:12 (5)	18:27	24 17:48 (2)	16:23	15:53
12	04:58		20:35 (10)	05:45		19:32 (11)	06:39		18:23 (6)	07:32	17:25 (2)	07:31	08:18
	21:38	21	20:56 (10)	20:49	28	20:00 (11)	19:38	34	19:09 (5)	18:25	23 17:48 (2)	16:22	15:53
13	04:59		20:35 (10)	05:47		19:32 (11)	06:41		18:22 (6)	07:34	17:25 (2)	07:33	08:19
	21:37	21	20:56 (10)	20:47	28	20:00 (11)	19:35	28	19:06 (5)	18:23	22 17:47 (2)	16:20	15:53
14	05:00		20:36 (10)	05:48		19:31 (11)	06:42		18:21 (6)	07:36	17:25 (2)	07:34	08:20
	21:36	19	20:55 (10)	20:45	28	19:59 (11)	19:33	26	18:47 (6)	18:20	21 17:46 (2)	16:18	15:53
15	05:01		20:37 (10)	05:50		19:32 (11)	06:44		18:21 (6)	07:38	17:26 (2)	07:36	08:21
	21:34	18	20:55 (10)	20:43	27	19:59 (11)	19:30	26	18:47 (6)	18:18	19 17:45 (2)	16:17	15:53
16	05:02		20:25 (9)	05:52		19:32 (11)	06:46		18:20 (6)	07:39	17:28 (2)	07:38	08:22
	21:33	19	20:54 (10)	20:41	27	19:59 (11)	19:28	26	18:46 (6)	18:16	15 17:43 (2)	16:15	15:53
17	05:04		20:23 (9)	05:54		19:32 (11)	06:48		18:20 (6)	07:41	17:30 (2)	07:40	08:23
	21:32	22	20:53 (10)	20:38	26	19:58 (11)	19:26	26	18:46 (6)	18:14	11 17:41 (2)	16:14	15:53
18	05:05		20:22 (9)	05:55		19:32 (11)	06:49		18:20 (6)	07:43	17:34 (2)	07:42	08:24
	21:31	21	20:52 (10)	20:36	26	19:58 (11)	19:23	25	18:45 (6)	18:11	1 17:35 (2)	16:12	15:53
19	05:07		20:20 (9)	05:57		19:32 (11)	06:51		18:20 (6)	07:45		07:44	08:25
	21:30	19	20:49 (10)	20:34	24	19:56 (11)	19:21	24	18:44 (6)	18:09		16:11	15:54
20	05:08		20:19 (9)	05:59		19:33 (11)	06:53		18:20 (6)	07:47		07:45	08:25
	21:29	15	20:34 (9)	20:32	22	19:55 (11)	19:18	23	18:43 (6)	18:07		16:10	15:54
21	05:09		20:19 (9)	06:01		19:34 (11)	06:55		18:21 (6)	07:49		07:47	08:26
	21:27	16	20:35 (9)	20:30	20	19:54 (11)	19:16	21	18:42 (6)	18:05		16:08	15:54
22	05:11		20:18 (9)	06:02		19:35 (11)	06:56		18:22 (6)	07:51		07:49	08:26
	21:26	18	20:36 (9)	20:27	17	19:52 (11)	19:13	18	18:40 (6)	18:02		16:07	15:55
23	05:12		20:18 (9)	06:04		19:38 (11)	06:58		18:23 (6)	07:53		07:51	08:27
	21:24	18	20:36 (9)	20:25	11	19:49 (11)	19:11	14	18:37 (6)	18:00		16:06	15:55
24	05:14		20:18 (9)	06:06			07:00		18:27 (6)	07:54		07:53	08:27
	21:23	19	20:37 (9)	20:23			19:08	6	18:33 (6)	17:58		16:05	15:56
25	05:15		20:17 (9)	06:08			07:02			06:56		07:54	08:28
	21:21	20	20:37 (9)	20:21			19:06			16:56		16:04	15:56
26	05:17		20:18 (9)	06:09			07:03			06:58		07:56	08:28
	21:20	19	20:37 (9)	20:18			19:04			16:54		16:03	15:57
27	05:18		20:17 (9)	06:11			07:05			07:00		07:58	08:28
	21:18	20	20:37 (9)	20:16			19:01			16:52		16:02	15:58
28	05:20		20:17 (9)	06:13			07:07			07:02		07:59	08:28
	21:17	21	20:38 (9)	20:14			18:59			16:50		16:01	15:59
29	05:22		20:17 (9)	06:15			07:09			07:04		08:01	08:29
	21:15	20	20:37 (9)	20:11			18:56			16:48		16:00	16:00
30	05:23		20:18 (9)	06:16			07:11			07:06		08:02	08:29
	21:13	20	20:38 (9)	20:09			18:54			16:46		15:59	16:01
31	05:25		20:17 (9)	06:18		19:04 (5)				07:08			08:29
	21:12	20	20:37 (9)	20:07	9	19:13 (5)				16:44			16:02
Sonnenscheinstunden	510			459			382			329		260	235
astr.max.mögl.Beschattung		662			583			561			289		
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33		
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91		
Reduktion Windrichtung		0.65			0.66			0.69			0.69		
Gesamte Reduktion		0.26			0.30			0.26			0.21		
Met.wahrsch.Beschattung		175			172			143			60		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AQ - IO43

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar			März			April			Mai			Juni		
1	08:29		07:59			07:02			16:54 (2)	06:48		18:33 (6)	05:40		19:26 (11)	04:51		20:30 (10)
	16:03		16:54			17:48	22		17:16 (2)	19:46	34	19:19 (5)	20:41	28	19:54 (11)	21:30	19	20:49 (10)
2	08:28		07:57			07:00			16:53 (2)	06:46		18:34 (6)	05:38		19:26 (11)	04:50		20:29 (10)
	16:04		16:55			17:50	22		17:15 (2)	19:48	37	19:21 (5)	20:42	28	19:54 (11)	21:31	21	20:50 (10)
3	08:28		07:56			06:58			16:53 (2)	06:43		18:35 (6)	05:36		19:26 (11)	04:49		20:30 (10)
	16:05		16:57			17:52	23		17:16 (2)	19:50	37	19:22 (5)	20:44	27	19:53 (11)	21:32	21	20:51 (10)
4	08:28		07:54			06:55			16:53 (2)	06:41		18:36 (6)	05:34		19:26 (11)	04:48		20:29 (10)
	16:06		16:59			17:54	23		17:16 (2)	19:52	35	19:22 (5)	20:46	27	19:53 (11)	21:33	22	20:51 (10)
5	08:28		07:52			06:53			16:52 (2)	06:38		18:38 (6)	05:32		19:27 (11)	04:48		20:29 (10)
	16:08		17:01			17:56	24		17:16 (2)	19:53	32	19:23 (5)	20:48	26	19:53 (11)	21:34	23	20:52 (10)
6	08:27		07:50			06:51			16:52 (2)	06:36		19:03 (5)	05:30		19:27 (11)	04:47		20:29 (10)
	16:09		17:03			17:58	24		17:16 (2)	19:55	20	19:23 (5)	20:50	25	19:52 (11)	21:35	24	20:53 (10)
7	08:27		07:49			06:48			16:52 (2)	06:34		19:02 (5)	05:28		19:28 (11)	04:46		20:29 (10)
	16:10		17:05			18:00	22		17:14 (2)	19:57	20	19:22 (5)	20:51	23	19:51 (11)	21:36	24	20:53 (10)
8	08:26		07:47			06:46			16:53 (2)	06:31		19:02 (5)	05:26		19:28 (11)	04:46		20:29 (10)
	16:12		17:07			18:02	21		17:14 (2)	19:59	20	19:22 (5)	20:53	29	20:22 (9)	21:37	24	20:53 (10)
9	08:26		07:45			06:44			16:54 (2)	06:29		19:02 (5)	05:24		19:30 (11)	04:45		20:28 (10)
	16:13		17:09			18:04	19		17:13 (2)	20:01	20	19:22 (5)	20:55	32	20:25 (9)	21:38	25	20:53 (10)
10	08:25		07:43			06:41			16:54 (2)	06:27		19:02 (5)	05:22		19:31 (11)	04:45		20:29 (10)
	16:15		17:11			18:06	17		17:11 (2)	20:03	18	19:20 (5)	20:57	32	20:26 (9)	21:39	25	20:54 (10)
11	08:25		07:41			06:39			16:57 (2)	06:24		19:03 (5)	05:20		19:32 (11)	04:44		20:29 (10)
	16:16		17:13			18:07	12		17:09 (2)	20:04	16	19:19 (5)	20:58	32	20:27 (9)	21:40	26	20:55 (10)
12	08:24		07:39			06:37			17:00 (2)	06:22		19:05 (5)	05:19		19:35 (11)	04:44		20:30 (10)
	16:18		17:15			18:09	4		17:04 (2)	20:06	13	19:18 (5)	21:00	28	20:28 (9)	21:41	25	20:55 (10)
13	08:23		07:37			06:34				06:20		19:06 (5)	05:17		20:09 (9)	04:43		20:29 (10)
	16:19		17:17			18:11				20:08	9	19:15 (5)	21:02	19	20:28 (9)	21:41	26	20:55 (10)
14	08:22		07:35			06:32				06:17			05:15		20:08 (9)	04:43		20:29 (10)
	16:21		17:19			18:13				20:10			21:03	20	20:28 (9)	21:42	26	20:55 (10)
15	08:21		07:33			06:29				06:15			05:14		20:09 (9)	04:43		20:29 (10)
	16:22		17:21			18:15				20:12			21:05	20	20:29 (9)	21:43	27	20:56 (10)
16	08:20		07:31			06:27				06:13			05:12		20:08 (9)	04:43		20:30 (10)
	16:24		17:23			18:17				20:13			21:07	20	20:28 (9)	21:43	26	20:56 (10)
17	08:19		07:29			06:24				06:10			05:10		20:08 (9)	04:43		20:30 (10)
	16:26		17:25			18:19				20:15			21:08	21	20:29 (9)	21:44	26	20:56 (10)
18	08:18		07:27			06:22				06:08			05:09		20:09 (9)	04:43		20:30 (10)
	16:27		17:27			18:20				20:17			21:10	20	20:29 (9)	21:44	26	20:56 (10)
19	08:17		07:25			06:20				06:06			05:07		20:08 (9)	04:43		20:30 (10)
	16:29		17:29			18:22				20:19			21:11	20	20:28 (9)	21:44	27	20:57 (10)
20	08:16		07:22			06:17				06:03			05:06		20:09 (9)	04:43		20:30 (10)
	16:31		17:31			18:24				20:21			21:13	20	20:29 (9)	21:45	27	20:57 (10)
21	08:15		07:20			06:15			17:43 (6)	06:01		19:37 (11)	05:04		20:10 (9)	04:43		20:30 (10)
	16:33		17:33			18:26	10		17:53 (6)	20:23	10	19:47 (11)	21:15	19	20:29 (9)	21:45	27	20:57 (10)
22	08:14		07:18			06:12			17:40 (6)	05:59		19:34 (11)	05:03		20:09 (9)	04:43		20:31 (10)
	16:35		17:35			18:28	16		17:56 (6)	20:24	15	19:49 (11)	21:16	19	20:28 (9)	21:45	27	20:58 (10)
23	08:12		07:16			06:10			17:38 (6)	05:57		19:32 (11)	05:01		20:10 (9)	04:43		20:31 (10)
	16:36		17:37			18:30	19		17:57 (6)	20:26	19	19:51 (11)	21:18	17	20:27 (9)	21:45	27	20:58 (10)
24	08:11		07:14			06:08			17:37 (6)	05:55		19:30 (11)	05:00		20:11 (9)	04:44		20:31 (10)
	16:38		17:39			18:32	21		17:58 (6)	20:28	22	19:52 (11)	21:19	16	20:27 (9)	21:45	27	20:58 (10)
25	08:10		07:11		17:02 (2)	06:05			17:35 (6)	05:52		19:29 (11)	04:59		20:12 (9)	04:44		20:32 (10)
	16:40		17:41	6	17:08 (2)	18:33	23		17:58 (6)	20:30	24	19:53 (11)	21:21	15	20:27 (9)	21:46	26	20:58 (10)
26	08:08		07:09		16:59 (2)	06:03			17:34 (6)	05:50		19:28 (11)	04:58		20:13 (9)	04:44		20:32 (10)
	16:42		17:43	13	17:12 (2)	18:35	25		17:59 (6)	20:32	25	19:53 (11)	21:22	13	20:26 (9)	21:46	26	20:58 (10)
27	08:07		07:07		16:56 (2)	06:00			17:34 (6)	05:48		19:28 (11)	04:56		20:14 (9)	04:45		20:33 (10)
	16:44		17:45	17	17:13 (2)	18:37	26		18:00 (6)	20:33	26	19:54 (11)	21:23	19	20:44 (10)	21:45	26	20:59 (10)
28	08:05		07:05		16:55 (2)	05:58			17:33 (6)	05:46		19:27 (11)	04:55		20:15 (9)	04:45		20:32 (10)
	16:46		17:47	20	17:15 (2)	18:39	26		17:59 (6)	20:35	27	19:54 (11)	21:25	21	20:46 (10)	21:45	26	20:58 (10)
29	08:04					06:55			18:33 (6)	05:44		19:27 (11)	04:54		20:18 (9)	04:46		20:33 (10)
	16:48					19:41	26		18:59 (6)	20:37	27	19:54 (11)	21:26	18	20:47 (10)	21:45	26	20:59 (10)
30	08:02					06:53			18:32 (6)	05:42		19:26 (11)	04:53		20:32 (10)	04:47		20:33 (10)
	16:50					19:42	26		18:58 (6)	20:39	28	19:54 (11)	21:27	16	20:48 (10)	21:45	25	20:58 (10)
31	08:01					06:51			18:33 (6)				04:52		20:31 (10)			
	16:52					19:44	25		18:58 (6)				21:29	18	20:49 (10)			
Sonnenscheinstunden	252		274			367				419			492			508		
astr.max.mögl.Beschattung				56			476				534			688			753	
Red.Sonnenscheinwahrsch.				0.24			0.31				0.41			0.51			0.45	
Reduktion Betriebsdauer				0.91			0.91				0.91			0.91			0.91	
Reduktion Windrichtung				0.69			0.69				0.68			0.66			0.64	
Gesamte Reduktion				0.15			0.20				0.26			0.31			0.27	
Met.wahrsch.Beschattung				8			94				137			212			201	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AQ - IO43

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November	Dezember
1	04:47	20:33 (10)	05:26	19:44 (11)	06:20	19:02 (5)	07:12		07:10	08:04
	21:45	26 20:59 (10)	21:10	29 20:38 (9)	20:04	16 19:18 (5)	18:51		16:42	15:58
2	04:48	20:34 (10)	05:28	19:42 (11)	06:22	19:01 (5)	07:14	17:36 (2)	07:12	08:05
	21:44	25 20:59 (10)	21:08	32 20:37 (9)	20:02	18 19:19 (5)	18:49	10 17:46 (2)	16:40	15:57
3	04:49	20:34 (10)	05:30	19:41 (11)	06:23	18:59 (5)	07:16	17:33 (2)	07:14	08:07
	21:44	25 20:59 (10)	21:06	32 20:36 (9)	20:00	20 19:19 (5)	18:46	15 17:48 (2)	16:38	15:57
4	04:49	20:34 (10)	05:31	19:39 (11)	06:25	18:59 (5)	07:18	17:31 (2)	07:15	08:08
	21:43	25 20:59 (10)	21:05	31 20:33 (9)	19:57	20 19:19 (5)	18:44	19 17:50 (2)	16:36	15:56
5	04:50	20:35 (10)	05:33	19:38 (11)	06:27	18:59 (5)	07:19	17:30 (2)	07:17	08:10
	21:43	24 20:59 (10)	21:03	29 20:32 (9)	19:55	21 19:20 (5)	18:42	21 17:51 (2)	16:34	15:55
6	04:51	20:35 (10)	05:35	19:37 (11)	06:29	18:58 (5)	07:21	17:29 (2)	07:19	08:11
	21:42	24 20:59 (10)	21:01	24 20:01 (11)	19:52	20 19:18 (5)	18:39	22 17:51 (2)	16:32	15:55
7	04:52	20:36 (10)	05:36	19:37 (11)	06:30	18:33 (6)	07:23	17:27 (2)	07:21	08:12
	21:42	23 20:59 (10)	20:59	25 20:02 (11)	19:50	32 19:18 (5)	18:37	24 17:51 (2)	16:30	15:54
8	04:53	20:36 (10)	05:38	19:36 (11)	06:32	18:31 (6)	07:25	17:27 (2)	07:23	08:14
	21:41	23 20:59 (10)	20:57	27 20:03 (11)	19:48	35 19:18 (5)	18:35	24 17:51 (2)	16:28	15:54
9	04:54	20:37 (10)	05:40	19:35 (11)	06:34	18:28 (6)	07:27	17:27 (2)	07:25	08:15
	21:40	22 20:59 (10)	20:55	27 20:02 (11)	19:45	38 19:16 (5)	18:32	24 17:51 (2)	16:27	15:54
10	04:55	20:38 (10)	05:42	19:35 (11)	06:35	18:27 (6)	07:28	17:27 (2)	07:27	08:16
	21:39	20 20:58 (10)	20:53	28 20:03 (11)	19:43	38 19:15 (5)	18:30	23 17:50 (2)	16:25	15:53
11	04:56	20:38 (10)	05:43	19:34 (11)	06:37	18:26 (6)	07:30	17:27 (2)	07:29	08:17
	21:38	20 20:58 (10)	20:51	28 20:02 (11)	19:40	35 19:13 (5)	18:27	23 17:50 (2)	16:23	15:53
12	04:58	20:39 (10)	05:45	19:35 (11)	06:39	18:24 (6)	07:32	17:27 (2)	07:31	08:18
	21:38	18 20:57 (10)	20:49	28 20:03 (11)	19:38	29 19:08 (5)	18:25	22 17:49 (2)	16:22	15:53
13	04:59	20:40 (10)	05:47	19:35 (11)	06:41	18:24 (6)	07:34	17:28 (2)	07:33	08:19
	21:37	17 20:57 (10)	20:47	28 20:03 (11)	19:35	25 18:49 (6)	18:23	20 17:48 (2)	16:20	15:53
14	05:00	20:41 (10)	05:48	19:34 (11)	06:42	18:23 (6)	07:36	17:29 (2)	07:34	08:20
	21:36	15 20:56 (10)	20:45	28 20:02 (11)	19:33	26 18:49 (6)	18:20	18 17:47 (2)	16:18	15:53
15	05:01	20:25 (9)	05:50	19:35 (11)	06:44	18:23 (6)	07:38	17:30 (2)	07:36	08:21
	21:34	20 20:55 (10)	20:43	27 20:02 (11)	19:30	26 18:49 (6)	18:18	16 17:46 (2)	16:17	15:53
16	05:02	20:23 (9)	05:52	19:35 (11)	06:46	18:22 (6)	07:39	17:32 (2)	07:38	08:22
	21:33	20 20:53 (10)	20:41	26 20:01 (11)	19:28	26 18:48 (6)	18:16	11 17:43 (2)	16:15	15:53
17	05:04	20:23 (9)	05:54	19:35 (11)	06:48	18:23 (6)	07:41		07:40	08:23
	21:32	17 20:51 (10)	20:38	25 20:00 (11)	19:26	25 18:48 (6)	18:14		16:14	15:53
18	05:05	20:22 (9)	05:55	19:36 (11)	06:49	18:23 (6)	07:43		07:42	08:24
	21:31	14 20:36 (9)	20:36	23 19:59 (11)	19:23	24 18:47 (6)	18:11		16:12	15:53
19	05:07	20:21 (9)	05:57	19:36 (11)	06:51	18:23 (6)	07:45		07:44	08:25
	21:30	15 20:36 (9)	20:34	21 19:57 (11)	19:21	22 18:45 (6)	18:09		16:11	15:54
20	05:08	20:20 (9)	05:59	19:38 (11)	06:53	18:24 (6)	07:47		07:45	08:25
	21:29	17 20:37 (9)	20:32	18 19:56 (11)	19:18	20 18:44 (6)	18:07		16:10	15:54
21	05:09	20:20 (9)	06:01	19:40 (11)	06:55	18:25 (6)	07:49		07:47	08:26
	21:27	18 20:38 (9)	20:30	14 19:54 (11)	19:16	17 18:42 (6)	18:05		16:08	15:54
22	05:11	20:20 (9)	06:02	19:42 (11)	06:56	18:28 (6)	07:51		07:49	08:26
	21:26	18 20:38 (9)	20:27	8 19:50 (11)	19:13	12 18:40 (6)	18:02		16:07	15:55
23	05:12	20:19 (9)	06:04		06:58	18:32 (6)	07:53		07:51	08:27
	21:24	19 20:38 (9)	20:25		19:11	1 18:33 (6)	18:00		16:06	15:55
24	05:14	20:19 (9)	06:06		07:00		07:54		07:53	08:27
	21:23	20 20:39 (9)	20:23		19:08		17:58		16:05	15:56
25	05:15	20:19 (9)	06:08		07:02		06:56		07:54	08:28
	21:21	20 20:39 (9)	20:21		19:06		16:56		16:04	15:56
26	05:17	20:19 (9)	06:09		07:03		06:58		07:56	08:28
	21:20	21 20:40 (9)	20:18		19:04		16:54		16:03	15:57
27	05:18	20:19 (9)	06:11		07:05		07:00		07:58	08:28
	21:18	20 20:39 (9)	20:16		19:01		16:52		16:02	15:58
28	05:20	20:19 (9)	06:13		07:07		07:02		07:59	08:28
	21:17	21 20:40 (9)	20:14		18:59		16:50		16:01	15:59
29	05:22	20:19 (9)	06:15		07:09		07:04		08:01	08:29
	21:15	20 20:39 (9)	20:11		18:56		16:48		16:00	16:00
30	05:23	20:20 (9)	06:16	19:07 (5)	07:11		07:06		08:02	08:29
	21:13	19 20:39 (9)	20:09	9 19:16 (5)	18:54		16:46		15:59	16:01
31	05:25	19:46 (11)	06:18	19:03 (5)			07:08			08:29
	21:12	25 20:38 (9)	20:07	14 19:17 (5)			16:44			16:02
Sonnenscheinstunden	510		459		382		329		260	235
astr.max.mögl.Beschattung		631		581		546		292		
Red.Sonnenscheinwahrsch.		0.45		0.49		0.40		0.33		
Reduktion Betriebsdauer		0.91		0.91		0.91		0.91		
Reduktion Windrichtung		0.65		0.66		0.69		0.69		
Gesamte Reduktion		0.26		0.30		0.26		0.21		
Met.wahrsch.Beschattung		167		172		139		60		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AR - IO44

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April		Mai		Juni	
1	08:29		07:59		07:02		16:54 (2)	06:48	18:33 (6)	05:40	19:24 (11)	04:51	20:22 (10)
	16:03		16:54		17:48	22	17:16 (2)	19:46	35	19:19 (5)	20:41	26	19:50 (11)	21:30	25	20:47 (10)
2	08:28		07:57		07:00		16:53 (2)	06:46	18:35 (6)	05:38	19:24 (11)	04:50	20:22 (10)
	16:04		16:55		17:50	23	17:16 (2)	19:48	35	19:21 (5)	20:42	25	19:49 (11)	21:31	25	20:47 (10)
3	08:28		07:56		06:58		16:53 (2)	06:43	18:37 (6)	05:36	19:24 (11)	04:49	20:23 (10)
	16:05		16:57		17:52	23	17:16 (2)	19:50	31	19:21 (5)	20:44	24	19:48 (11)	21:32	25	20:48 (10)
4	08:28		07:54		06:55		16:53 (2)	06:41	18:39 (6)	05:34	19:25 (11)	04:48	20:22 (10)
	16:06		16:59		17:54	23	17:16 (2)	19:52	27	19:21 (5)	20:46	22	19:47 (11)	21:33	26	20:48 (10)
5	08:28		07:52		06:53		16:52 (2)	06:38	19:01 (5)	05:32	19:26 (11)	04:48	20:22 (10)
	16:08		17:01		17:56	23	17:15 (2)	19:53	20	19:21 (5)	20:48	21	19:47 (11)	21:34	26	20:48 (10)
6	08:27		07:50		06:51		16:53 (2)	06:36	19:01 (5)	05:30	19:27 (11)	04:47	20:23 (10)
	16:09		17:03		17:58	22	17:15 (2)	19:55	20	19:21 (5)	20:50	27	20:19 (9)	21:35	26	20:49 (10)
7	08:27		07:49		06:48		16:53 (2)	06:34	19:00 (5)	05:28	19:28 (11)	04:46	20:22 (10)
	16:10		17:05		18:00	21	17:14 (2)	19:57	20	19:20 (5)	20:51	28	20:21 (9)	21:36	27	20:49 (10)
8	08:26		07:47		06:46		16:54 (2)	06:31	19:01 (5)	05:26	19:30 (11)	04:46	20:23 (10)
	16:12		17:07		18:02	19	17:13 (2)	19:59	19	19:20 (5)	20:53	26	20:22 (9)	21:37	26	20:49 (10)
9	08:26		07:45		06:44		16:55 (2)	06:29	19:01 (5)	05:24	19:34 (11)	04:45	20:22 (10)
	16:13		17:09		18:04	17	17:12 (2)	20:01	17	19:18 (5)	20:55	21	20:24 (9)	21:38	27	20:49 (10)
10	08:25		07:43		06:41		16:56 (2)	06:27	19:02 (5)	05:22	20:07 (9)	04:45	20:23 (10)
	16:15		17:11		18:06	14	17:10 (2)	20:03	15	19:17 (5)	20:57	17	20:24 (9)	21:39	27	20:50 (10)
11	08:25		07:41		06:39		16:59 (2)	06:24	19:04 (5)	05:20	20:06 (9)	04:44	20:23 (10)
	16:16		17:13		18:07	8	17:07 (2)	20:04	11	19:15 (5)	20:58	18	20:24 (9)	21:40	27	20:50 (10)
12	08:24		07:39		06:37			06:22	19:07 (5)	05:19	20:06 (9)	04:44	20:24 (10)
	16:18		17:15		18:09			20:06	5	19:12 (5)	21:00	19	20:25 (9)	21:41	27	20:51 (10)
13	08:23		07:37		06:34			06:20			05:17		20:05 (9)	04:43		20:23 (10)
	16:19		17:17		18:11			20:08			21:02	20	20:25 (9)	21:41	27	20:50 (10)
14	08:22		07:35		06:32			06:17			05:15		20:05 (9)	04:43		20:24 (10)
	16:21		17:19		18:13			20:10			21:03	20	20:25 (9)	21:42	27	20:51 (10)
15	08:21		07:33		06:29			06:15			05:14		20:05 (9)	04:43		20:24 (10)
	16:22		17:21		18:15			20:12			21:05	20	20:25 (9)	21:43	27	20:51 (10)
16	08:20		07:31		06:27			06:13			05:12		20:05 (9)	04:43		20:24 (10)
	16:24		17:23		18:17			20:13			21:07	20	20:25 (9)	21:43	27	20:51 (10)
17	08:19		07:29		06:24			06:10			05:10		20:06 (9)	04:43		20:24 (10)
	16:26		17:25		18:19			20:15			21:08	19	20:25 (9)	21:44	28	20:52 (10)
18	08:18		07:27		06:22			06:08			05:09		20:07 (9)	04:43		20:25 (10)
	16:27		17:27		18:20			20:17			21:10	18	20:25 (9)	21:44	27	20:52 (10)
19	08:17		07:25		06:20			06:06	19:33 (11)	05:07	20:06 (9)	04:43		20:25 (10)
	16:29		17:29		18:22			20:19	12	19:45 (11)	21:11	18	20:24 (9)	21:44	27	20:52 (10)
20	08:16		07:22		06:17		17:42 (6)	06:03	19:31 (11)	05:06	20:07 (9)	04:43		20:25 (10)
	16:31		17:31		18:24	11	17:53 (6)	20:21	16	19:47 (11)	21:13	17	20:24 (9)	21:45	27	20:52 (10)
21	08:15		07:20		06:15		17:39 (6)	06:01	19:29 (11)	05:04	20:08 (9)	04:43		20:25 (10)
	16:33		17:33		18:26	16	17:55 (6)	20:23	20	19:49 (11)	21:15	15	20:23 (9)	21:45	27	20:52 (10)
22	08:14		07:18		06:12		17:37 (6)	05:59	19:27 (11)	05:03	20:09 (9)	04:43		20:26 (10)
	16:35		17:35		18:28	20	17:57 (6)	20:24	22	19:49 (11)	21:16	20	20:37 (10)	21:45	27	20:53 (10)
23	08:12		07:16		06:10		17:35 (6)	05:57	19:26 (11)	05:01	20:10 (9)	04:43		20:26 (10)
	16:36		17:37		18:30	22	17:57 (6)	20:26	24	19:50 (11)	21:18	22	20:39 (10)	21:45	27	20:53 (10)
24	08:11		07:14		06:08		17:35 (6)	05:55	19:25 (11)	05:00	20:12 (9)	04:44		20:26 (10)
	16:38		17:39		18:32	23	17:58 (6)	20:28	25	19:50 (11)	21:19	22	20:41 (10)	21:45	27	20:53 (10)
25	08:10		07:11	17:01 (2)	06:05		17:33 (6)	05:52	19:25 (11)	04:59	20:14 (9)	04:44		20:27 (10)
	16:40		17:41	9	17:10 (2)	18:33	24	17:57 (6)	20:30	26	19:51 (11)	21:21	20	20:42 (10)	21:46	27	20:54 (10)
26	08:08		07:09		16:58 (2)	06:03		17:33 (6)	05:50	19:24 (11)	04:58		20:25 (10)	21:44		20:26 (10)
	16:42		17:43	15	17:13 (2)	18:35	25	17:58 (6)	20:32	27	19:51 (11)	21:22	19	20:44 (10)	21:46	27	20:53 (10)
27	08:07		07:07		16:56 (2)	06:00		17:33 (6)	05:48	19:24 (11)	04:56		20:25 (10)	21:45		20:27 (10)
	16:44		17:45	18	17:14 (2)	18:37	25	17:58 (6)	20:33	27	19:51 (11)	21:23	19	20:44 (10)	21:45	27	20:54 (10)
28	08:05		07:05		16:55 (2)	05:58		17:32 (6)	05:46	19:24 (11)	04:55		20:24 (10)	21:45		20:27 (10)
	16:46		17:47	20	17:15 (2)	18:39	25	17:57 (6)	20:35	27	19:51 (11)	21:25	21	20:45 (10)	21:45	27	20:54 (10)
29	08:04					06:55		18:33 (6)	05:44	19:23 (11)	04:54		20:24 (10)	21:46		20:27 (10)
	16:48					19:41	24	18:57 (6)	20:37	28	19:51 (11)	21:26	22	20:46 (10)	21:45	27	20:54 (10)
30	08:02					06:53		18:32 (6)	05:42	19:23 (11)	04:53		20:23 (10)	21:47		20:27 (10)
	16:50					19:42	28	19:15 (5)	20:39	27	19:50 (11)	21:27	23	20:46 (10)	21:45	27	20:54 (10)
31	08:01					06:51		18:33 (6)				04:52		20:23 (10)			
	16:52					19:44	33	19:18 (5)				21:29	24	20:47 (10)			
Sonnenscheinstunden	252		274			367			419			492			508		
astr.max.mögl.Beschattung				62			491			536			653			801	
Red.Sonnenscheinwahrsch.				0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer				0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung				0.69			0.69			0.68			0.66			0.64	
Gesamte Reduktion				0.15			0.20			0.25			0.31			0.27	
Met.wahrsch.Beschattung				9			97			137			201			215	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AR - IO44

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		20:28 (10)	05:26		20:16 (9)	06:20		19:03 (5)	07:12		07:10	08:04
	21:45	27	20:55 (10)	21:10	20	20:36 (9)	20:04	11	19:14 (5)	18:51		16:42	15:58
2	04:48		20:28 (10)	05:28		20:16 (9)	06:22		19:01 (5)	07:14		07:12	08:05
	21:44	27	20:55 (10)	21:08	19	20:35 (9)	20:02	15	19:16 (5)	18:49		16:40	15:57
3	04:49		20:28 (10)	05:30		20:17 (9)	06:23		18:59 (5)	07:16		07:14	08:07
	21:44	26	20:54 (10)	21:06	18	20:35 (9)	20:00	17	19:16 (5)	18:46	12	17:47 (2)	16:38	15:57
4	04:49		20:28 (10)	05:31		19:42 (11)	06:25		18:58 (5)	07:18		17:33 (2)	07:15	08:08
	21:43	27	20:55 (10)	21:05	24	20:33 (9)	19:57	19	19:17 (5)	18:44	16	17:49 (2)	16:36	15:56
5	04:50		20:29 (10)	05:33		19:40 (11)	06:27		18:58 (5)	07:19		17:31 (2)	07:17	08:10
	21:43	26	20:55 (10)	21:03	26	20:32 (9)	19:55	19	19:17 (5)	18:42	19	17:50 (2)	16:34	15:55
6	04:51		20:29 (10)	05:35		19:37 (11)	06:29		18:56 (5)	07:21		17:30 (2)	07:19	08:11
	21:42	26	20:55 (10)	21:01	28	20:30 (9)	19:52	20	19:16 (5)	18:39	21	17:51 (2)	16:32	15:55
7	04:52		20:29 (10)	05:36		19:36 (11)	06:30		18:56 (5)	07:23		17:28 (2)	07:21	08:12
	21:42	26	20:55 (10)	20:59	26	20:28 (9)	19:50	20	19:16 (5)	18:37	22	17:50 (2)	16:30	15:54
8	04:53		20:30 (10)	05:38		19:35 (11)	06:32		18:35 (6)	07:25		17:28 (2)	07:23	08:14
	21:41	26	20:56 (10)	20:57	22	19:57 (11)	19:48	26	19:16 (5)	18:35	22	17:50 (2)	16:28	15:54
9	04:54		20:30 (10)	05:40		19:34 (11)	06:34		18:30 (6)	07:27		17:27 (2)	07:25	08:15
	21:40	26	20:56 (10)	20:55	23	19:57 (11)	19:45	32	19:15 (5)	18:32	23	17:50 (2)	16:27	15:54
10	04:55		20:30 (10)	05:42		19:33 (11)	06:35		18:28 (6)	07:28		17:27 (2)	07:27	08:16
	21:39	25	20:55 (10)	20:53	25	19:58 (11)	19:43	35	19:14 (5)	18:30	23	17:50 (2)	16:25	15:53
11	04:56		20:31 (10)	05:43		19:32 (11)	06:37		18:26 (6)	07:30		17:27 (2)	07:29	08:17
	21:38	24	20:55 (10)	20:51	26	19:58 (11)	19:40	36	19:13 (5)	18:27	23	17:50 (2)	16:23	15:53
12	04:58		20:31 (10)	05:45		19:32 (11)	06:39		18:24 (6)	07:32		17:27 (2)	07:31	08:18
	21:38	24	20:55 (10)	20:49	26	19:58 (11)	19:38	33	19:09 (5)	18:25	22	17:49 (2)	16:22	15:53
13	04:59		20:31 (10)	05:47		19:32 (11)	06:41		18:24 (6)	07:34		17:28 (2)	07:33	08:19
	21:37	24	20:55 (10)	20:47	27	19:59 (11)	19:35	29	19:07 (5)	18:23	21	17:49 (2)	16:20	15:53
14	05:00		20:32 (10)	05:48		19:31 (11)	06:42		18:23 (6)	07:36		17:29 (2)	07:34	08:20
	21:36	22	20:54 (10)	20:45	27	19:58 (11)	19:33	24	18:47 (6)	18:20	19	17:48 (2)	16:18	15:53
15	05:01		20:32 (10)	05:50		19:31 (11)	06:44		18:23 (6)	07:38		17:30 (2)	07:36	08:21
	21:34	22	20:54 (10)	20:43	27	19:58 (11)	19:30	25	18:48 (6)	18:18	16	17:46 (2)	16:17	15:53
16	05:02		20:33 (10)	05:52		19:31 (11)	06:46		18:21 (6)	07:39		17:31 (2)	07:38	08:22
	21:33	20	20:53 (10)	20:41	27	19:58 (11)	19:28	26	18:47 (6)	18:16	13	17:44 (2)	16:15	15:53
17	05:04		20:34 (10)	05:54		19:31 (11)	06:48		18:21 (6)	07:41		17:35 (2)	07:40	08:23
	21:32	19	20:53 (10)	20:38	26	19:57 (11)	19:26	25	18:46 (6)	18:14	6	17:41 (2)	16:14	15:53
18	05:05		20:35 (10)	05:55		19:31 (11)	06:49		18:22 (6)	07:43			07:42	08:24
	21:31	18	20:53 (10)	20:36	26	19:57 (11)	19:23	24	18:46 (6)	18:11			16:12	15:53
19	05:07		20:22 (9)	05:57		19:31 (11)	06:51		18:21 (6)	07:45			07:44	08:25
	21:30	22	20:51 (10)	20:34	25	19:56 (11)	19:21	23	18:44 (6)	18:09			16:11	15:54
20	05:08		20:20 (9)	05:59		19:32 (11)	06:53		18:22 (6)	07:47			07:45	08:25
	21:29	23	20:50 (10)	20:32	23	19:55 (11)	19:18	22	18:44 (6)	18:07			16:10	15:54
21	05:09		20:20 (9)	06:01		19:33 (11)	06:55		18:23 (6)	07:49			07:47	08:26
	21:27	22	20:49 (10)	20:30	21	19:54 (11)	19:16	19	18:42 (6)	18:05			16:08	15:54
22	05:11		20:19 (9)	06:02		19:33 (11)	06:56		18:24 (6)	07:51			07:49	08:26
	21:26	16	20:45 (10)	20:27	19	19:52 (11)	19:13	17	18:41 (6)	18:02			16:07	15:55
23	05:12		20:17 (9)	06:04		19:35 (11)	06:58		18:25 (6)	07:53			07:51	08:27
	21:24	16	20:33 (9)	20:25	16	19:51 (11)	19:11	13	18:38 (6)	18:00			16:06	15:55
24	05:14		20:17 (9)	06:06		19:38 (11)	07:00		18:29 (6)	07:54			07:53	08:27
	21:23	17	20:34 (9)	20:23	10	19:48 (11)	19:08	4	18:33 (6)	17:58			16:05	15:56
25	05:15		20:17 (9)	06:08			07:02			06:56			07:54	08:28
	21:21	17	20:34 (9)	20:21			19:06			16:56			16:04	15:56
26	05:17		20:17 (9)	06:09			07:03			06:58			07:56	08:28
	21:20	18	20:35 (9)	20:18			19:04			16:54			16:03	15:57
27	05:18		20:16 (9)	06:11			07:05			07:00			07:58	08:28
	21:18	19	20:35 (9)	20:16			19:01			16:52			16:02	15:58
28	05:20		20:16 (9)	06:13			07:07			07:02			07:59	08:28
	21:17	20	20:36 (9)	20:14			18:59			16:50			16:01	15:59
29	05:22		20:16 (9)	06:15			07:09			07:04			08:01	08:29
	21:15	20	20:36 (9)	20:11			18:56			16:48			16:00	16:00
30	05:23		20:16 (9)	06:16			07:11			07:06			08:02	08:29
	21:13	20	20:36 (9)	20:09			18:54			16:46			15:59	16:01
31	05:25		20:16 (9)	06:18		19:06 (5)				07:08				08:29
	21:12	19	20:35 (9)	20:07	5	19:11 (5)				16:44				16:02
Sonnenscheinstunden	510			459			382			329			260	235
astr.max.mögl.Beschattung		684			562			534			278			
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91			
Reduktion Windrichtung		0.65			0.66			0.69			0.69			
Gesamte Reduktion		0.26			0.30			0.26			0.21			
Met.wahrsch.Beschattung		181			166			136			57			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AS - IO45

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar			März			April			Mai			Juni		
1	08:29	07:59			07:02		16:59 (2)	06:48		18:35 (6)	05:40		19:26 (11)	04:51		20:24 (10)
	16:03	16:54			17:48	19	17:18 (2)	19:46	34	19:19 (5)	20:41	26	19:52 (11)	21:30	24	20:48 (10)
2	08:28	07:57			07:00		16:58 (2)	06:46		18:36 (6)	05:38		19:26 (11)	04:50		20:24 (10)
	16:04	16:55			17:50	20	17:18 (2)	19:48	35	19:21 (5)	20:42	26	19:52 (11)	21:31	24	20:48 (10)
3	08:28	07:56			06:58		16:57 (2)	06:43		18:38 (6)	05:36		19:26 (11)	04:49		20:25 (10)
	16:05	16:57			17:52	22	17:19 (2)	19:50	35	19:23 (5)	20:44	25	19:51 (11)	21:32	24	20:49 (10)
4	08:28	07:54			06:55		16:57 (2)	06:41		18:39 (6)	05:34		19:27 (11)	04:48		20:24 (10)
	16:06	16:59			17:54	23	17:20 (2)	19:52	33	19:23 (5)	20:46	23	19:50 (11)	21:33	25	20:49 (10)
5	08:28	07:52			06:53		16:56 (2)	06:38		18:42 (6)	05:32		19:28 (11)	04:48		20:24 (10)
	16:08	17:01			17:56	23	17:19 (2)	19:53	27	19:23 (5)	20:48	22	19:50 (11)	21:34	25	20:49 (10)
6	08:27	07:50			06:51		16:56 (2)	06:36		19:04 (5)	05:30		19:29 (11)	04:47		20:24 (10)
	16:09	17:03			17:58	23	17:19 (2)	19:55	20	19:24 (5)	20:50	20	19:49 (11)	21:35	26	20:50 (10)
7	08:27	07:49			06:48		16:56 (2)	06:34		19:03 (5)	05:28		19:30 (11)	04:46		20:24 (10)
	16:10	17:05			18:00	22	17:18 (2)	19:57	20	19:23 (5)	20:51	18	19:48 (11)	21:36	26	20:50 (10)
8	08:26	07:47			06:46		16:56 (2)	06:31		19:03 (5)	05:26		19:31 (11)	04:46		20:25 (10)
	16:12	17:07			18:02	22	17:18 (2)	19:59	19	19:22 (5)	20:53	15	19:46 (11)	21:37	26	20:51 (10)
9	08:26	07:45			06:44		16:57 (2)	06:29		19:03 (5)	05:24		19:33 (11)	04:45		20:24 (10)
	16:13	17:09			18:04	20	17:17 (2)	20:01	18	19:21 (5)	20:55	12	19:45 (11)	21:38	26	20:50 (10)
10	08:25	07:43			06:41		16:58 (2)	06:27		19:03 (5)	05:22		19:37 (11)	04:45		20:25 (10)
	16:15	17:11			18:06	17	17:15 (2)	20:03	17	19:20 (5)	20:57	4	19:41 (11)	21:39	26	20:51 (10)
11	08:25	07:41			06:39		16:59 (2)	06:24		19:05 (5)	05:20			04:44		20:25 (10)
	16:16	17:13			18:07	15	17:14 (2)	20:04	14	19:19 (5)	20:58			21:40	26	20:51 (10)
12	08:24	07:39			06:37		17:01 (2)	06:22		19:07 (5)	05:19			04:44		20:26 (10)
	16:18	17:15			18:09	10	17:11 (2)	20:06	10	19:17 (5)	21:00			21:41	26	20:52 (10)
13	08:23	07:37			06:34			06:20		19:10 (5)	05:17			04:43		20:25 (10)
	16:19	17:17			18:11			20:08	2	19:12 (5)	21:02			21:41	26	20:51 (10)
14	08:22	07:35			06:32			06:17			05:15			04:43		20:25 (10)
	16:21	17:19			18:13			20:10			21:03			21:42	27	20:52 (10)
15	08:21	07:33			06:29			06:15			05:14			04:43		20:26 (10)
	16:22	17:21			18:15			20:12			21:05			21:43	26	20:52 (10)
16	08:20	07:31			06:27			06:13			05:12			04:43		20:26 (10)
	16:24	17:23			18:17			20:13			21:07			21:43	26	20:52 (10)
17	08:19	07:29			06:24			06:10			05:10			04:43		20:26 (10)
	16:26	17:25			18:19			20:15			21:08			21:44	27	20:53 (10)
18	08:18	07:27			06:22			06:08			05:09			04:43		20:26 (10)
	16:27	17:27			18:20			20:17			21:10			21:44	27	20:53 (10)
19	08:17	07:25			06:20			06:06			05:07			04:43		20:27 (10)
	16:29	17:29			18:22			20:19			21:11			21:44	26	20:53 (10)
20	08:16	07:22			06:17			06:03		19:36 (11)	05:06			04:43		20:27 (10)
	16:31	17:31			18:24			20:21	11	19:47 (11)	21:13			21:45	26	20:53 (10)
21	08:15	07:20			06:15		17:46 (6)	06:01		19:34 (11)	05:04			04:43		20:27 (10)
	16:33	17:33			18:26	8	17:54 (6)	20:23	15	19:49 (11)	21:15			21:45	26	20:53 (10)
22	08:14	07:18			06:12		17:43 (6)	05:59		19:31 (11)	05:03			04:43		20:28 (10)
	16:35	17:35			18:28	14	17:57 (6)	20:24	19	19:50 (11)	21:16			21:45	26	20:54 (10)
23	08:12	07:16			06:10		17:40 (6)	05:57		19:30 (11)	05:01		20:31 (10)	04:43		20:28 (10)
	16:36	17:37			18:30	18	17:58 (6)	20:26	21	19:51 (11)	21:18	9	20:40 (10)	21:45	26	20:54 (10)
24	08:11	07:14			06:08		17:39 (6)	05:55		19:29 (11)	05:00		20:29 (10)	04:44		20:27 (10)
	16:38	17:39			18:32	21	18:00 (6)	20:28	23	19:52 (11)	21:19	13	20:42 (10)	21:45	27	20:54 (10)
25	08:10	07:11			06:05		17:37 (6)	05:52		19:28 (11)	04:59		20:28 (10)	04:44		20:28 (10)
	16:40	17:41			18:33	23	18:00 (6)	20:30	24	19:52 (11)	21:21	15	20:43 (10)	21:46	27	20:55 (10)
26	08:08	07:09		17:07 (2)	06:03		17:37 (6)	05:50		19:27 (11)	04:58		20:27 (10)	04:44		20:28 (10)
	16:42	17:43	4	17:11 (2)	18:35	24	18:01 (6)	20:32	26	19:53 (11)	21:22	17	20:44 (10)	21:46	27	20:55 (10)
27	08:07	07:07		17:02 (2)	06:00		17:37 (6)	05:48		19:27 (11)	04:56		20:27 (10)	04:45		20:29 (10)
	16:44	17:45	12	17:14 (2)	18:37	24	18:01 (6)	20:33	26	19:53 (11)	21:23	18	20:45 (10)	21:45	26	20:55 (10)
28	08:05	07:05		17:01 (2)	05:58		17:36 (6)	05:46		19:26 (11)	04:55		20:26 (10)	04:45		20:29 (10)
	16:46	17:47	15	17:16 (2)	18:39	24	18:00 (6)	20:35	27	19:53 (11)	21:25	20	20:46 (10)	21:45	26	20:55 (10)
29	08:04				06:55		18:36 (6)	05:44		19:26 (11)	04:54		20:26 (10)	04:46		20:29 (10)
	16:48				19:41	25	19:01 (6)	20:37	27	19:53 (11)	21:26	21	20:47 (10)	21:45	27	20:56 (10)
30	08:02				06:53		18:35 (6)	05:42		19:26 (11)	04:53		20:25 (10)	04:47		20:29 (10)
	16:50				19:42	24	18:59 (6)	20:39	27	19:53 (11)	21:27	22	20:47 (10)	21:45	26	20:55 (10)
31	08:01				06:51		18:36 (6)				04:52		20:25 (10)			
	16:52				19:44	27	19:17 (5)				21:29	23	20:48 (10)			
Sonnenscheinstunden	252	274			367			419			492			508		
astr.max.mögl.Beschattung			31			468			530			349			779	
Red.Sonnenscheinwahrsch.			0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer			0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung			0.69			0.69			0.68			0.66			0.64	
Gesamte Reduktion			0.15			0.20			0.26			0.31			0.27	
Met.wahrsch.Beschattung			5			93			135			107			209	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AS - IO45

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		20:29 (10)	05:26			06:20		19:04 (5)	07:12		17:42 (2)	07:10	08:04
	21:45	27	20:56 (10)	21:10			20:04	14	19:18 (5)	18:51	6	17:48 (2)	16:42	15:58
2	04:48		20:30 (10)	05:28			06:22		19:02 (5)	07:14		17:38 (2)	07:12	08:05
	21:44	26	20:56 (10)	21:08			20:02	17	19:19 (5)	18:49	13	17:51 (2)	16:40	15:57
3	04:49		20:29 (10)	05:30		19:45 (11)	06:23		19:01 (5)	07:16		17:36 (2)	07:14	08:07
	21:44	27	20:56 (10)	21:06	8	19:53 (11)	20:00	18	19:19 (5)	18:46	17	17:53 (2)	16:38	15:57
4	04:49		20:30 (10)	05:31		19:42 (11)	06:25		19:00 (5)	07:18		17:35 (2)	07:15	08:08
	21:43	26	20:56 (10)	21:05	13	19:55 (11)	19:57	19	19:19 (5)	18:44	19	17:54 (2)	16:36	15:56
5	04:50		20:30 (10)	05:33		19:41 (11)	06:27		19:00 (5)	07:19		17:34 (2)	07:17	08:10
	21:43	26	20:56 (10)	21:03	16	19:57 (11)	19:55	20	19:20 (5)	18:42	21	17:55 (2)	16:34	15:55
6	04:51		20:31 (10)	05:35		19:39 (11)	06:29		18:59 (5)	07:21		17:33 (2)	07:19	08:11
	21:42	25	20:56 (10)	21:01	19	19:58 (11)	19:52	20	19:19 (5)	18:39	22	17:55 (2)	16:32	15:55
7	04:52		20:31 (10)	05:36		19:38 (11)	06:30		18:37 (6)	07:23		17:31 (2)	07:21	08:12
	21:42	26	20:57 (10)	20:59	21	19:59 (11)	19:50	27	19:18 (5)	18:37	23	17:54 (2)	16:30	15:54
8	04:53		20:32 (10)	05:38		19:37 (11)	06:32		18:34 (6)	07:25		17:31 (2)	07:23	08:14
	21:41	25	20:57 (10)	20:57	23	20:00 (11)	19:48	33	19:18 (5)	18:35	23	17:54 (2)	16:28	15:54
9	04:54		20:32 (10)	05:40		19:36 (11)	06:34		18:31 (6)	07:27		17:31 (2)	07:25	08:15
	21:40	25	20:57 (10)	20:55	24	20:00 (11)	19:45	35	19:16 (5)	18:32	23	17:54 (2)	16:27	15:54
10	04:55		20:32 (10)	05:42		19:36 (11)	06:35		18:30 (6)	07:28		17:31 (2)	07:27	08:16
	21:39	25	20:57 (10)	20:53	25	20:01 (11)	19:43	35	19:15 (5)	18:30	22	17:53 (2)	16:25	15:53
11	04:56		20:33 (10)	05:43		19:35 (11)	06:37		18:29 (6)	07:30		17:31 (2)	07:29	08:17
	21:38	23	20:56 (10)	20:51	25	20:00 (11)	19:40	34	19:13 (5)	18:27	22	17:53 (2)	16:23	15:53
12	04:58		20:33 (10)	05:45		19:35 (11)	06:39		18:27 (6)	07:32		17:32 (2)	07:31	08:18
	21:38	23	20:56 (10)	20:49	26	20:01 (11)	19:38	29	19:09 (5)	18:25	20	17:52 (2)	16:22	15:53
13	04:59		20:33 (10)	05:47		19:35 (11)	06:41		18:26 (6)	07:34		17:33 (2)	07:33	08:19
	21:37	23	20:56 (10)	20:47	26	20:01 (11)	19:35	25	18:51 (6)	18:23	18	17:51 (2)	16:20	15:53
14	05:00		20:34 (10)	05:48		19:34 (11)	06:42		18:26 (6)	07:36		17:34 (2)	07:34	08:20
	21:36	21	20:55 (10)	20:45	26	20:00 (11)	19:33	25	18:51 (6)	18:20	15	17:49 (2)	16:18	15:53
15	05:01		20:34 (10)	05:50		19:34 (11)	06:44		18:26 (6)	07:38		17:37 (2)	07:36	08:21
	21:34	21	20:55 (10)	20:43	27	20:01 (11)	19:30	25	18:51 (6)	18:18	9	17:46 (2)	16:17	15:53
16	05:02		20:35 (10)	05:52		19:34 (11)	06:46		18:25 (6)	07:39			07:38	08:22
	21:33	19	20:54 (10)	20:41	26	20:00 (11)	19:28	25	18:50 (6)	18:16			16:15	15:53
17	05:04		20:36 (10)	05:54		19:34 (11)	06:48		18:25 (6)	07:41			07:40	08:23
	21:32	18	20:54 (10)	20:38	25	19:59 (11)	19:26	24	18:49 (6)	18:14			16:14	15:53
18	05:05		20:37 (10)	05:55		19:35 (11)	06:49		18:26 (6)	07:43			07:42	08:24
	21:31	16	20:53 (10)	20:36	24	19:59 (11)	19:23	22	18:48 (6)	18:11			16:12	15:53
19	05:07		20:38 (10)	05:57		19:34 (11)	06:51		18:25 (6)	07:45			07:44	08:25
	21:30	14	20:52 (10)	20:34	23	19:57 (11)	19:21	22	18:47 (6)	18:09			16:11	15:54
20	05:08		20:39 (10)	05:59		19:35 (11)	06:53		18:27 (6)	07:47			07:45	08:25
	21:29	11	20:50 (10)	20:32	22	19:57 (11)	19:18	18	18:45 (6)	18:07			16:10	15:54
21	05:09		20:42 (10)	06:01		19:37 (11)	06:55		18:28 (6)	07:49			07:47	08:26
	21:27	7	20:49 (10)	20:30	18	19:55 (11)	19:16	16	18:44 (6)	18:05			16:08	15:54
22	05:11			06:02		19:38 (11)	06:56		18:31 (6)	07:51			07:49	08:26
	21:26			20:27	15	19:53 (11)	19:13	10	18:41 (6)	18:02			16:07	15:55
23	05:12			06:04		19:40 (11)	06:58			07:53			07:51	08:27
	21:24			20:25	10	19:50 (11)	19:11			18:00			16:06	15:55
24	05:14			06:06			07:00			07:54			07:53	08:27
	21:23			20:23			19:08			17:58			16:05	15:56
25	05:15			06:08			07:02			06:56			07:54	08:28
	21:21			20:21			19:06			16:56			16:04	15:56
26	05:17			06:09			07:03			06:58			07:56	08:28
	21:20			20:18			19:03			16:54			16:03	15:57
27	05:18			06:11			07:05			07:00			07:58	08:28
	21:18			20:16			19:01			16:52			16:02	15:58
28	05:20			06:13			07:07			07:02			07:59	08:28
	21:17			20:14			18:59			16:50			16:01	15:59
29	05:22			06:15			07:09			07:04			08:01	08:29
	21:15			20:11			18:56			16:48			16:00	16:00
30	05:23			06:16		19:10 (5)	07:11			07:06			08:02	08:29
	21:13			20:09	3	19:13 (5)	18:54			16:46			15:59	16:01
31	05:25			06:18		19:05 (5)				07:08				08:29
	21:12			20:07	11	19:16 (5)				16:44				16:02
Sonnenscheinstunden	510			459			382			329			260	235
astr.max.mögl.Beschattung		454			456			513			273			
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91			
Reduktion Windrichtung		0.64			0.67			0.69			0.69			
Gesamte Reduktion		0.26			0.30			0.26			0.21			
Met.wahrsch.Beschattung		119			135			131			56			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AT - IO46

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar			Februar			März			April			Mai			Juni		
1	08:29		07:59			07:02		16:56 (2)	06:48		18:34 (6)	05:40		19:24 (11)	04:51		20:19 (10)
	16:03		16:54			17:48	21	17:17 (2)	19:46	34	19:19 (5)	20:41	23	19:47 (11)	21:30	26	20:45 (10)
2	08:28		07:57			07:00		16:55 (2)	06:46		18:36 (6)	05:38		19:24 (11)	04:50		20:19 (10)
	16:04		16:55			17:50	22	17:17 (2)	19:48	33	19:21 (5)	20:42	22	19:46 (11)	21:31	26	20:45 (10)
3	08:28		07:56			06:58		16:55 (2)	06:43		18:39 (6)	05:36		19:25 (11)	04:49		20:20 (10)
	16:05		16:57			17:52	22	17:17 (2)	19:50	28	19:21 (5)	20:44	20	19:45 (11)	21:32	26	20:46 (10)
4	08:28		07:54			06:55		16:55 (2)	06:41		19:01 (5)	05:34		19:26 (11)	04:48		20:19 (10)
	16:06		16:59			17:54	22	17:17 (2)	19:52	20	19:21 (5)	20:46	18	19:44 (11)	21:33	27	20:46 (10)
5	08:28		07:52			06:53		16:54 (2)	06:38		19:01 (5)	05:32		19:28 (11)	04:48		20:19 (10)
	16:08		17:01			17:56	23	17:17 (2)	19:53	20	19:21 (5)	20:48	15	19:43 (11)	21:34	26	20:45 (10)
6	08:27		07:50			06:51		16:55 (2)	06:36		19:01 (5)	05:30		19:30 (11)	04:47		20:20 (10)
	16:09		17:03			17:58	21	17:16 (2)	19:55	20	19:21 (5)	20:50	11	19:41 (11)	21:35	26	20:46 (10)
7	08:27		07:49			06:48		16:54 (2)	06:34		19:01 (5)	05:28		19:33 (11)	04:46		20:20 (10)
	16:10		17:05			18:00	21	17:15 (2)	19:57	18	19:19 (5)	20:51	4	19:37 (11)	21:36	26	20:46 (10)
8	08:26		07:47			06:46		16:55 (2)	06:31		19:01 (5)	05:26			04:46		20:20 (10)
	16:12		17:07			18:02	19	17:14 (2)	19:59	18	19:19 (5)	20:53			21:37	27	20:47 (10)
9	08:26		07:45			06:44		16:57 (2)	06:29		19:02 (5)	05:24			04:45		20:20 (10)
	16:13		17:09			18:04	16	17:13 (2)	20:01	15	19:17 (5)	20:55			21:38	26	20:46 (10)
10	08:25		07:43			06:41		16:58 (2)	06:27		19:03 (5)	05:22			04:45		20:20 (10)
	16:15		17:11			18:06	13	17:11 (2)	20:03	12	19:15 (5)	20:57			21:39	27	20:47 (10)
11	08:25		07:41			06:39		17:01 (2)	06:24		19:06 (5)	05:20			04:44		20:21 (10)
	16:16		17:13			18:07	7	17:08 (2)	20:04	7	19:13 (5)	20:58			21:40	26	20:47 (10)
12	08:24		07:39			06:37			06:22			05:19			04:44		20:21 (10)
	16:18		17:15			18:09			20:06			21:00			21:41	27	20:48 (10)
13	08:23		07:37			06:34			06:20			05:17			04:43		20:21 (10)
	16:19		17:17			18:11			20:08			21:02			21:41	26	20:47 (10)
14	08:22		07:35			06:32			06:17			05:15			04:43		20:21 (10)
	16:21		17:19			18:13			20:10			21:03			21:42	26	20:47 (10)
15	08:21		07:33			06:29			06:15			05:14			04:43		20:22 (10)
	16:22		17:21			18:15			20:12			21:05			21:43	26	20:48 (10)
16	08:20		07:31			06:27			06:13			05:12			04:43		20:22 (10)
	16:24		17:23			18:17			20:13			21:07			21:43	26	20:48 (10)
17	08:19		07:29			06:24			06:10		19:36 (11)	05:10			04:43		20:22 (10)
	16:26		17:25			18:19			20:15	4	19:40 (11)	21:08			21:44	26	20:48 (10)
18	08:18		07:27			06:22			06:08		19:32 (11)	05:09			04:43		20:22 (10)
	16:27		17:27			18:20			20:17	12	19:44 (11)	21:10			21:44	26	20:48 (10)
19	08:17		07:25			06:20		17:46 (6)	06:06		19:29 (11)	05:07		20:28 (10)	04:43		20:23 (10)
	16:29		17:29			18:22	4	17:50 (6)	20:19	17	19:46 (11)	21:11	5	20:33 (10)	21:44	25	20:48 (10)
20	08:16		07:22			06:17		17:42 (6)	06:03		19:28 (11)	05:06		20:25 (10)	04:43		20:23 (10)
	16:31		17:31			18:24	12	17:54 (6)	20:21	20	19:48 (11)	21:13	11	20:36 (10)	21:45	25	20:48 (10)
21	08:15		07:20			06:15		17:39 (6)	06:01		19:27 (11)	05:04		20:24 (10)	04:43		20:23 (10)
	16:33		17:33			18:26	16	17:55 (6)	20:23	22	19:49 (11)	21:15	14	20:38 (10)	21:45	25	20:48 (10)
22	08:14		07:18			06:12		17:37 (6)	05:59		19:25 (11)	05:03		20:22 (10)	04:43		20:24 (10)
	16:35		17:35			18:28	20	17:57 (6)	20:24	23	19:48 (11)	21:16	17	20:39 (10)	21:45	25	20:49 (10)
23	08:12		07:16			06:10		17:36 (6)	05:57		19:24 (11)	05:01		20:22 (10)	04:43		20:24 (10)
	16:36		17:37			18:30	21	17:57 (6)	20:26	25	19:49 (11)	21:18	18	20:40 (10)	21:45	25	20:49 (10)
24	08:11		07:14			06:08		17:35 (6)	05:55		19:24 (11)	05:00		20:21 (10)	04:44		20:24 (10)
	16:38		17:39			18:32	23	17:58 (6)	20:28	25	19:49 (11)	21:19	20	20:41 (10)	21:45	25	20:49 (10)
25	08:10		07:11		17:03 (2)	06:05		17:34 (6)	05:52		19:23 (11)	04:59		20:21 (10)	04:44		20:24 (10)
	16:40		17:41	7	17:10 (2)	18:33	24	17:58 (6)	20:30	26	19:49 (11)	21:21	21	20:42 (10)	21:46	26	20:50 (10)
26	08:08		07:09		17:00 (2)	06:03		17:34 (6)	05:50		19:23 (11)	04:58		20:20 (10)	04:44		20:24 (10)
	16:42		17:43	14	17:14 (2)	18:35	24	17:58 (6)	20:32	26	19:49 (11)	21:22	23	20:43 (10)	21:46	26	20:50 (10)
27	08:07		07:07		16:58 (2)	06:00		17:34 (6)	05:48		19:23 (11)	04:56		20:20 (10)	04:45		20:25 (10)
	16:44		17:45	16	17:14 (2)	18:37	24	17:58 (6)	20:33	26	19:49 (11)	21:23	23	20:43 (10)	21:45	26	20:51 (10)
28	08:05		07:05		16:57 (2)	05:58		17:33 (6)	05:46		19:23 (11)	04:55		20:20 (10)	04:45		20:24 (10)
	16:46		17:47	19	17:16 (2)	18:39	24	17:57 (6)	20:35	26	19:49 (11)	21:25	24	20:44 (10)	21:45	26	20:50 (10)
29	08:04					06:55		18:33 (6)	05:44		19:23 (11)	04:54		20:20 (10)	04:46		20:25 (10)
	16:48					19:41	24	18:57 (6)	20:37	25	19:48 (11)	21:26	24	20:44 (10)	21:45	26	20:51 (10)
30	08:02					06:53		18:33 (6)	05:42		19:23 (11)	04:53		20:19 (10)	04:47		20:25 (10)
	16:50					19:42	30	19:16 (5)	20:39	25	19:48 (11)	21:27	25	20:44 (10)	21:45	26	20:51 (10)
31	08:01					06:51		18:34 (6)				04:52		20:19 (10)			
	16:52					19:44	33	19:18 (5)				21:29	25	20:44 (10)			
Sonnenscheinstunden		252		274			367			419			492			508	
astr.max.mögl.Beschattung					56			486			527			363			778
Red.Sonnenscheinwahrsch.					0.24			0.31			0.41			0.51			0.45
Reduktion Betriebsdauer					0.91			0.91			0.91			0.91			0.91
Reduktion Windrichtung					0.69			0.69			0.68			0.65			0.65
Gesamte Reduktion					0.15			0.20			0.25			0.31			0.27
Met.wahrsch.Beschattung					8			96			134			111			210

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AT - IO46

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47	20:25 (10)	05:26			06:20		19:05 (5)	07:12			07:10	08:04
	21:45	26	20:51 (10)	21:10			20:04	7	19:12 (5)	18:51			16:42	15:58
2	04:48	20:26 (10)	05:28			06:22		19:02 (5)	07:14			07:12	08:05
	21:44	26	20:52 (10)	21:08			20:02	12	19:14 (5)	18:49			16:40	15:57
3	04:49	20:25 (10)	05:30			06:23		19:00 (5)	07:16		17:37 (2)	07:14	08:07
	21:44	26	20:51 (10)	21:06			20:00	15	19:15 (5)	18:46	11	17:48 (2)	16:38	15:57
4	04:49	20:25 (10)	05:31			06:25		18:58 (5)	07:18			17:35 (2)	07:15	08:08
	21:43	27	20:52 (10)	21:05			19:57	18	19:16 (5)	18:44	15	17:50 (2)	16:36	15:56
5	04:50	20:26 (10)	05:33			06:27		18:58 (5)	07:19			17:33 (2)	07:17	08:10
	21:43	26	20:52 (10)	21:03			19:55	18	19:16 (5)	18:42	18	17:51 (2)	16:34	15:55
6	04:51	20:26 (10)	05:35		19:41 (11)	06:29		18:56 (5)	07:21			17:32 (2)	07:19	08:11
	21:42	26	20:52 (10)	21:01	7 19:48 (11)	19:52	20	19:16 (5)	18:39	20		17:52 (2)	16:32	15:55
7	04:52	20:26 (10)	05:36		19:38 (11)	06:30		18:56 (5)	07:23			17:30 (2)	07:21	08:12
	21:42	27	20:53 (10)	20:59	13 19:51 (11)	19:50	20	19:16 (5)	18:37	21		17:51 (2)	16:30	15:54
8	04:53	20:27 (10)	05:38		19:37 (11)	06:32		18:56 (5)	07:25			17:29 (2)	07:23	08:14
	21:41	26	20:53 (10)	20:57	16 19:53 (11)	19:48	20	19:16 (5)	18:35	23		17:52 (2)	16:28	15:54
9	04:54	20:27 (10)	05:40		19:35 (11)	06:34		18:33 (6)	07:27			17:29 (2)	07:25	08:15
	21:40	26	20:53 (10)	20:55	19 19:54 (11)	19:45	27	19:14 (5)	18:32	23		17:52 (2)	16:27	15:54
10	04:55	20:27 (10)	05:42		19:34 (11)	06:35		18:30 (6)	07:28			17:29 (2)	07:27	08:16
	21:39	26	20:53 (10)	20:53	21 19:55 (11)	19:43	32	19:14 (5)	18:30	22		17:51 (2)	16:25	15:53
11	04:56	20:27 (10)	05:43		19:32 (11)	06:37		18:28 (6)	07:30			17:29 (2)	07:29	08:17
	21:38	26	20:53 (10)	20:51	23 19:55 (11)	19:40	34	19:13 (5)	18:27	22		17:51 (2)	16:23	15:53
12	04:58	20:28 (10)	05:45		19:32 (11)	06:39		18:26 (6)	07:32			17:29 (2)	07:31	08:18
	21:38	25	20:53 (10)	20:49	24 19:56 (11)	19:38	32	19:09 (5)	18:25	21		17:50 (2)	16:22	15:53
13	04:59	20:28 (10)	05:47		19:32 (11)	06:41		18:25 (6)	07:34			17:30 (2)	07:33	08:19
	21:37	25	20:53 (10)	20:47	25 19:57 (11)	19:35	30	19:07 (5)	18:23	20		17:50 (2)	16:20	15:53
14	05:00	20:28 (10)	05:48		19:30 (11)	06:42		18:24 (6)	07:36			17:30 (2)	07:34	08:20
	21:36	25	20:53 (10)	20:45	26 19:56 (11)	19:33	23	18:47 (6)	18:20	19		17:49 (2)	16:18	15:53
15	05:01	20:28 (10)	05:50		19:30 (11)	06:44		18:23 (6)	07:38			17:32 (2)	07:36	08:21
	21:34	24	20:52 (10)	20:43	27 19:57 (11)	19:30	24	18:47 (6)	18:18	15		17:47 (2)	16:17	15:53
16	05:02	20:28 (10)	05:52		19:30 (11)	06:46		18:22 (6)	07:39			17:34 (2)	07:38	08:22
	21:33	24	20:52 (10)	20:41	27 19:57 (11)	19:28	25	18:47 (6)	18:16	11		17:45 (2)	16:15	15:53
17	05:04	20:30 (10)	05:54		19:30 (11)	06:48		18:22 (6)	07:41				07:40	08:23
	21:32	22	20:52 (10)	20:38	26 19:56 (11)	19:26	24	18:46 (6)	18:14				16:14	15:53
18	05:05	20:30 (10)	05:55		19:30 (11)	06:49		18:22 (6)	07:43				07:42	08:24
	21:31	22	20:52 (10)	20:36	26 19:56 (11)	19:23	24	18:46 (6)	18:11				16:12	15:53
19	05:07	20:30 (10)	05:57		19:29 (11)	06:51		18:21 (6)	07:45				07:44	08:25
	21:30	21	20:51 (10)	20:34	26 19:55 (11)	19:21	24	18:45 (6)	18:09				16:11	15:54
20	05:08	20:31 (10)	05:59		19:30 (11)	06:53		18:22 (6)	07:47				07:45	08:25
	21:29	19	20:50 (10)	20:32	24 19:54 (11)	19:18	22	18:44 (6)	18:07				16:10	15:54
21	05:09	20:32 (10)	06:01		19:31 (11)	06:55		18:23 (6)	07:49				07:47	08:26
	21:27	18	20:50 (10)	20:30	23 19:54 (11)	19:16	20	18:43 (6)	18:05				16:08	15:54
22	05:11	20:33 (10)	06:02		19:31 (11)	06:56		18:24 (6)	07:51				07:49	08:26
	21:26	16	20:49 (10)	20:27	21 19:52 (11)	19:13	18	18:42 (6)	18:02				16:07	15:55
23	05:12	20:34 (10)	06:04		19:32 (11)	06:58		18:25 (6)	07:53				07:51	08:27
	21:24	13	20:47 (10)	20:25	19 19:51 (11)	19:11	14	18:39 (6)	18:00				16:06	15:55
24	05:14	20:37 (10)	06:06		19:33 (11)	07:00		18:28 (6)	07:54				07:53	08:27
	21:23	9	20:46 (10)	20:23	17 19:50 (11)	19:08	7	18:35 (6)	17:58				16:05	15:56
25	05:15			06:08	19:35 (11)	07:02			06:56				07:54	08:28
	21:21			20:21	11 19:46 (11)	19:06			16:56				16:04	15:56
26	05:17			06:09	19:40 (11)	07:03			06:58				07:56	08:28
	21:20			20:18	1 19:41 (11)	19:03			16:54				16:03	15:57
27	05:18			06:11		07:05			07:00				07:58	08:28
	21:18			20:16		19:01			16:52				16:02	15:58
28	05:20			06:13		07:07			07:02				07:59	08:28
	21:17			20:14		18:59			16:50				16:01	15:59
29	05:22			06:15		07:09			07:04				08:01	08:29
	21:15			20:11		18:56			16:48				16:00	16:00
30	05:23			06:16		07:11			07:06				08:02	08:29
	21:13			20:09		18:54			16:46				15:59	16:01
31	05:25			06:18					07:08					08:29
	21:12			20:07					16:44					16:02
Sonnenscheinstunden	510			459		382			329			260		235
astr.max.mögl.Beschattung		551			422			510			261			
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91			
Reduktion Windrichtung		0.65			0.66			0.69			0.69			
Gesamte Reduktion		0.26			0.30			0.26			0.21			
Met.wahrsch.Beschattung		145			125			130			54			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AU - IO47

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar			März			April			Mai			Juni		
1	08:29	07:59			07:02		17:05 (2)	06:48		18:38 (6)	05:40		19:27 (11)	04:51		20:23 (10)
	16:03	16:54			17:48	15	17:20 (2)	19:46	31	19:19 (5)	20:41	25	19:52 (11)	21:30	24	20:47 (10)
2	08:28	07:57			07:00		17:02 (2)	06:46		18:39 (6)	05:38		19:28 (11)	04:50		20:23 (10)
	16:04	16:55			17:50	18	17:20 (2)	19:48	32	19:21 (5)	20:42	24	19:52 (11)	21:31	24	20:47 (10)
3	08:28	07:56			06:58		17:02 (2)	06:43		18:40 (6)	05:36		19:28 (11)	04:49		20:23 (10)
	16:05	16:57			17:52	19	17:21 (2)	19:50	34	19:23 (5)	20:44	23	19:51 (11)	21:32	25	20:48 (10)
4	08:28	07:54			06:55		17:01 (2)	06:41		18:41 (6)	05:34		19:28 (11)	04:48		20:23 (10)
	16:06	16:59			17:54	21	17:22 (2)	19:52	33	19:24 (5)	20:46	22	19:50 (11)	21:33	25	20:48 (10)
5	08:28	07:52			06:53		17:00 (2)	06:38		18:43 (6)	05:32		19:30 (11)	04:48		20:23 (10)
	16:08	17:01			17:56	22	17:22 (2)	19:53	29	19:24 (5)	20:48	20	19:50 (11)	21:34	25	20:48 (10)
6	08:27	07:50			06:51		17:00 (2)	06:36		19:05 (5)	05:30		19:31 (11)	04:47		20:23 (10)
	16:09	17:03			17:58	22	17:22 (2)	19:55	20	19:25 (5)	20:50	17	19:48 (11)	21:35	26	20:49 (10)
7	08:27	07:49			06:48		16:59 (2)	06:34		19:04 (5)	05:28		19:32 (11)	04:46		20:23 (10)
	16:10	17:05			18:00	22	17:21 (2)	19:57	20	19:24 (5)	20:51	15	19:47 (11)	21:36	26	20:49 (10)
8	08:26	07:47			06:46		17:00 (2)	06:31		19:04 (5)	05:26		19:34 (11)	04:46		20:24 (10)
	16:12	17:07			18:02	21	17:21 (2)	19:59	19	19:23 (5)	20:53	10	19:44 (11)	21:37	25	20:49 (10)
9	08:26	07:45			06:44		17:00 (2)	06:29		19:04 (5)	05:24		19:39 (11)	04:45		20:23 (10)
	16:13	17:09			18:04	21	17:21 (2)	20:01	18	19:22 (5)	20:55	2	19:41 (11)	21:38	26	20:49 (10)
10	08:25	07:43			06:41		17:00 (2)	06:27		19:05 (5)	05:22			04:45		20:24 (10)
	16:15	17:11			18:06	19	17:19 (2)	20:03	16	19:21 (5)	20:57			21:39	25	20:49 (10)
11	08:25	07:41			06:39		17:02 (2)	06:24		19:06 (5)	05:20			04:44		20:24 (10)
	16:16	17:13			18:07	17	17:19 (2)	20:04	14	19:20 (5)	20:58			21:40	26	20:50 (10)
12	08:24	07:39			06:37		17:02 (2)	06:22		19:08 (5)	05:19			04:44		20:25 (10)
	16:18	17:15			18:09	14	17:16 (2)	20:06	10	19:18 (5)	21:00			21:41	25	20:50 (10)
13	08:23	07:37			06:34		17:05 (2)	06:20			05:17			04:43		20:24 (10)
	16:19	17:17			18:11	8	17:13 (2)	20:08			21:02			21:41	26	20:50 (10)
14	08:22	07:35			06:32			06:17			05:15			04:43		20:25 (10)
	16:21	17:19			18:13			20:10			21:03			21:42	25	20:50 (10)
15	08:21	07:33			06:29			06:15			05:14			04:43		20:25 (10)
	16:22	17:21			18:15			20:12			21:05			21:43	26	20:51 (10)
16	08:20	07:31			06:27			06:13			05:12			04:43		20:25 (10)
	16:24	17:23			18:17			20:13			21:07			21:43	26	20:51 (10)
17	08:19	07:29			06:24			06:10			05:10			04:43		20:26 (10)
	16:26	17:25			18:19			20:15			21:08			21:44	25	20:51 (10)
18	08:18	07:27			06:22			06:08			05:09			04:43		20:26 (10)
	16:27	17:27			18:20			20:17			21:10			21:44	25	20:51 (10)
19	08:17	07:25			06:20			06:06		19:40 (11)	05:07			04:43		20:26 (10)
	16:29	17:29			18:22			20:19	5	19:45 (11)	21:11			21:44	25	20:51 (10)
20	08:16	07:22			06:17			06:03		19:36 (11)	05:06			04:43		20:26 (10)
	16:31	17:31			18:24			20:21	12	19:48 (11)	21:13			21:45	25	20:51 (10)
21	08:15	07:20			06:15			06:01		19:34 (11)	05:04		20:31 (10)	04:43		20:26 (10)
	16:33	17:33			18:26			20:23	16	19:50 (11)	21:15	7	20:38 (10)	21:45	25	20:51 (10)
22	08:14	07:18			06:12		17:47 (6)	05:59		19:31 (11)	05:03		20:28 (10)	04:43		20:27 (10)
	16:35	17:35			18:28	11	17:58 (6)	20:24	20	19:51 (11)	21:16	12	20:40 (10)	21:45	25	20:52 (10)
23	08:12	07:16			06:10		17:44 (6)	05:57		19:30 (11)	05:01		20:27 (10)	04:43		20:27 (10)
	16:36	17:37			18:30	16	18:00 (6)	20:26	22	19:52 (11)	21:18	14	20:41 (10)	21:45	25	20:52 (10)
24	08:11	07:14			06:08		17:43 (6)	05:55		19:29 (11)	05:00		20:26 (10)	04:44		20:27 (10)
	16:38	17:39			18:32	18	18:01 (6)	20:28	23	19:52 (11)	21:19	17	20:43 (10)	21:45	25	20:52 (10)
25	08:10	07:11			06:05		17:41 (6)	05:52		19:29 (11)	04:59		20:25 (10)	04:44		20:28 (10)
	16:40	17:41			18:33	20	18:01 (6)	20:30	24	19:53 (11)	21:21	19	20:44 (10)	21:46	25	20:53 (10)
26	08:08	07:09			06:03		17:40 (6)	05:50		19:28 (11)	04:58		20:25 (10)	04:44		20:27 (10)
	16:42	17:43			18:35	22	18:02 (6)	20:32	25	19:53 (11)	21:22	19	20:44 (10)	21:45	26	20:53 (10)
27	08:07	07:07			06:00		17:40 (6)	05:48		19:28 (11)	04:56		20:24 (10)	04:45		20:28 (10)
	16:44	17:45			18:37	23	18:03 (6)	20:33	25	19:53 (11)	21:23	21	20:45 (10)	21:45	26	20:54 (10)
28	08:05	07:05		17:06 (2)	05:58		17:38 (6)	05:46		19:27 (11)	04:55		20:24 (10)	04:45		20:28 (10)
	16:46	17:47	11	17:17 (2)	18:39	24	18:02 (6)	20:35	26	19:53 (11)	21:25	22	20:46 (10)	21:45	25	20:53 (10)
29	08:04				06:55		18:38 (6)	05:44		19:27 (11)	04:54		20:24 (10)	04:46		20:28 (10)
	16:48				19:41	25	19:03 (6)	20:37	26	19:53 (11)	21:26	22	20:46 (10)	21:45	26	20:54 (10)
30	08:02				06:53		18:38 (6)	05:42		19:27 (11)	04:53		20:23 (10)	04:47		20:28 (10)
	16:50				19:42	24	19:02 (6)	20:39	26	19:53 (11)	21:27	24	20:47 (10)	21:45	26	20:54 (10)
31	08:01				06:51		18:38 (6)				04:52		20:23 (10)			
	16:52				19:44	23	19:01 (6)				21:29	24	20:47 (10)			
Sonnenscheinstunden	252	274			367			419			492			508		
astr.max.mögl.Beschattung			11			445			526			359			759	
Red.Sonnenscheinwahrsch.			0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer			0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung			0.68			0.69			0.68			0.65			0.65	
Gesamte Reduktion			0.15			0.20			0.26			0.31			0.27	
Met.wahrsch.Beschattung			2			88			134			110			204	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AU - IO47

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1 | 04:47		20:29 (10)	05:26			06:20		19:05 (5)	07:12		17:42 (2)	07:10	08:04
| 21:45	25	20:54 (10)	21:10			20:04	14	19:19 (5)	18:51	12	17:54 (2)	16:42	15:58
2 | 04:48		20:29 (10)	05:28			06:22		19:04 (5)	07:14		17:40 (2)	07:12	08:05
| 21:44	26	20:55 (10)	21:08			20:02	16	19:20 (5)	18:49	16	17:56 (2)	16:40	15:57
3 | 04:49		20:29 (10)	05:30			06:23		19:02 (5)	07:16		17:39 (2)	07:14	08:07
| 21:44	25	20:54 (10)	21:06			20:00	18	19:20 (5)	18:46	18	17:57 (2)	16:38	15:57
4 | 04:49		20:29 (10)	05:31		19:46 (11)	06:25		19:02 (5)	07:18		17:38 (2)	07:15	08:08
| 21:43	26	20:55 (10)	21:05	7	19:53 (11)	19:57	18	19:20 (5)	18:44	20	17:58 (2)	16:36	15:56
5 | 04:50		20:29 (10)	05:33		19:43 (11)	06:27		19:01 (5)	07:19		17:37 (2)	07:17	08:10
| 21:43	26	20:55 (10)	21:03	13	19:56 (11)	19:55	20	19:21 (5)	18:42	21	17:58 (2)	16:34	15:55
6 | 04:51		20:30 (10)	05:35		19:41 (11)	06:29		19:00 (5)	07:21		17:36 (2)	07:19	08:11
| 21:42	25	20:55 (10)	21:01	16	19:57 (11)	19:52	20	19:20 (5)	18:39	22	17:58 (2)	16:32	15:55
7 | 04:52		20:30 (10)	05:36		19:40 (11)	06:30		18:39 (6)	07:23		17:35 (2)	07:21	08:12
| 21:42	25	20:55 (10)	20:59	18	19:58 (11)	19:50	28	19:19 (5)	18:37	22	17:57 (2)	16:30	15:54
8 | 04:53		20:30 (10)	05:38		19:39 (11)	06:32		18:36 (6)	07:25		17:35 (2)	07:23	08:14
| 21:41	26	20:56 (10)	20:57	21	20:00 (11)	19:48	33	19:19 (5)	18:35	22	17:57 (2)	16:28	15:54
9 | 04:54		20:31 (10)	05:40		19:38 (11)	06:34		18:33 (6)	07:27		17:35 (2)	07:25	08:15
| 21:40	25	20:56 (10)	20:55	22	20:00 (11)	19:45	34	19:17 (5)	18:32	22	17:57 (2)	16:27	15:54
10 | 04:55		20:31 (10)	05:42		19:37 (11)	06:35		18:32 (6)	07:28		17:35 (2)	07:27	08:16
| 21:39	25	20:56 (10)	20:53	24	20:01 (11)	19:43	33	19:15 (5)	18:30	21	17:56 (2)	16:25	15:53
11 | 04:56		20:31 (10)	05:43		19:36 (11)	06:37		18:31 (6)	07:30		17:36 (2)	07:29	08:17
| 21:38	25	20:56 (10)	20:51	24	20:00 (11)	19:40	32	19:13 (5)	18:27	19	17:55 (2)	16:23	15:53
12 | 04:58		20:31 (10)	05:45		19:36 (11)	06:39		18:29 (6)	07:32		17:37 (2)	07:31	08:18
| 21:38	24	20:55 (10)	20:49	25	20:01 (11)	19:38	25	19:08 (5)	18:25	17	17:54 (2)	16:22	15:53
13 | 04:59		20:32 (10)	05:47		19:36 (11)	06:41		18:29 (6)	07:34		17:38 (2)	07:33	08:19
| 21:37	23	20:55 (10)	20:47	25	20:01 (11)	19:35	24	18:53 (6)	18:23	14	17:52 (2)	16:20	15:53
14 | 05:00		20:32 (10)	05:48		19:35 (11)	06:42		18:29 (6)	07:36		17:41 (2)	07:34	08:20
| 21:36	23	20:55 (10)	20:45	26	20:01 (11)	19:33	24	18:53 (6)	18:20	8	17:49 (2)	16:18	15:53
15 | 05:01		20:32 (10)	05:50		19:35 (11)	06:44		18:29 (6)	07:38			07:36	08:21
| 21:34	22	20:54 (10)	20:43	26	20:01 (11)	19:30	24	18:53 (6)	18:18			16:17	15:53
16 | 05:02		20:33 (10)	05:52		19:35 (11)	06:46		18:28 (6)	07:39			07:38	08:22
| 21:33	21	20:54 (10)	20:41	26	20:01 (11)	19:28	23	18:51 (6)	18:16			16:15	15:53
17 | 05:04		20:34 (10)	05:54		19:35 (11)	06:48		18:28 (6)	07:41			07:40	08:23
| 21:32	20	20:54 (10)	20:38	25	20:00 (11)	19:26	23	18:51 (6)	18:14			16:14	15:53
18 | 05:05		20:35 (10)	05:55		19:35 (11)	06:49		18:29 (6)	07:43			07:42	08:24
| 21:31	19	20:54 (10)	20:36	24	19:59 (11)	19:23	21	18:50 (6)	18:11			16:12	15:53
19 | 05:07		20:35 (10)	05:57		19:35 (11)	06:51		18:29 (6)	07:45			07:44	08:25
| 21:30	18	20:53 (10)	20:34	23	19:58 (11)	19:21	19	18:48 (6)	18:09			16:11	15:54
20 | 05:08		20:36 (10)	05:59		19:36 (11)	06:53		18:30 (6)	07:47			07:45	08:25
| 21:28	15	20:51 (10)	20:32	21	19:57 (11)	19:18	17	18:47 (6)	18:07			16:10	15:54
21 | 05:09		20:38 (10)	06:01		19:37 (11)	06:55		18:32 (6)	07:49			07:47	08:26
| 21:27	13	20:51 (10)	20:30	19	19:56 (11)	19:16	12	18:44 (6)	18:05			16:08	15:54
22 | 05:11		20:39 (10)	06:02		19:38 (11)	06:56		18:36 (6)	07:51			07:49	08:26
| 21:26	10	20:49 (10)	20:27	16	19:54 (11)	19:13	4	18:40 (6)	18:02			16:07	15:55
23 | 05:12		20:42 (10)	06:04		19:40 (11)	06:58			07:53			07:51	08:27
| 21:24	4	20:46 (10)	20:25	12	19:52 (11)	19:11			18:00			16:06	15:55
24 | 05:14			06:06		19:45 (11)	07:00			07:54			07:53	08:27
| 21:23			20:23	2	19:47 (11)	19:08			17:58			16:05	15:56
25 | 05:15			06:08			07:02			06:56			07:54	08:28
| 21:21			20:21			19:06			16:56			16:04	15:56
26 | 05:17			06:09			07:03			06:58			07:56	08:28
| 21:20			20:18			19:03			16:54			16:03	15:57
27 | 05:18			06:11			07:05			07:00			07:58	08:28
| 21:18			20:16			19:01			16:52			16:02	15:58
28 | 05:20			06:13			07:07			07:02			07:59	08:28
| 21:17			20:14			18:59			16:50			16:01	15:59
29 | 05:22			06:15			07:09			07:04			08:01	08:29
| 21:15			20:11			18:56			16:48			16:00	16:00
30 | 05:23			06:16		19:12 (5)	07:11		17:48 (2)	07:06			08:02	08:29
| 21:13			20:09	2	19:14 (5)	18:54	3	17:51 (2)	16:46			15:59	16:01
31 | 05:25			06:18		19:07 (5)				07:08				08:29
| 21:12			20:07	10	19:17 (5)				16:44				16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung		491		427			485			254			
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91		0.91			0.91			0.91			
Reduktion Windrichtung		0.65		0.67			0.69			0.68			
Gesamte Reduktion		0.26		0.30			0.26			0.21			
Met.wahrsch.Beschattung		129		126			124			52			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AV - IO48

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar			März			April			Mai			Juni		
1	08:29	07:59			07:02		16:55 (2)	06:48		18:36 (6)	05:40		19:23 (11)	04:51		20:14 (10)
	16:03	16:54			17:48	21	17:16 (2)	19:46	29	19:18 (5)	20:41	18	19:41 (11)	21:30	26	20:40 (10)
2	08:28	07:57			07:00		16:54 (2)	06:46		19:00 (5)	05:38		19:24 (11)	04:50		20:14 (10)
	16:04	16:55			17:50	22	17:16 (2)	19:48	19	19:19 (5)	20:42	15	19:39 (11)	21:31	26	20:40 (10)
3	08:28	07:56			06:58		16:54 (2)	06:43		19:00 (5)	05:36		19:26 (11)	04:49		20:15 (10)
	16:05	16:57			17:52	22	17:16 (2)	19:50	19	19:19 (5)	20:44	11	19:37 (11)	21:32	26	20:41 (10)
4	08:28	07:54			06:55		16:54 (2)	06:41		18:59 (5)	05:34			04:48		20:15 (10)
	16:06	16:59			17:54	22	17:16 (2)	19:52	19	19:18 (5)	20:46			21:33	26	20:41 (10)
5	08:28	07:52			06:53		16:54 (2)	06:38		18:59 (5)	05:32			04:48		20:15 (10)
	16:08	17:01			17:56	21	17:15 (2)	19:53	19	19:18 (5)	20:48			21:34	25	20:40 (10)
6	08:27	07:50			06:51		16:55 (2)	06:36		19:00 (5)	05:30			04:47		20:16 (10)
	16:09	17:03			17:58	20	17:15 (2)	19:55	18	19:18 (5)	20:50			21:35	25	20:41 (10)
7	08:27	07:49			06:48		16:55 (2)	06:34		19:00 (5)	05:28			04:46		20:16 (10)
	16:10	17:05			18:00	18	17:13 (2)	19:57	16	19:16 (5)	20:51			21:36	25	20:41 (10)
8	08:26	07:47			06:46		16:56 (2)	06:31		19:01 (5)	05:26			04:46		20:16 (10)
	16:12	17:07			18:02	16	17:12 (2)	19:59	14	19:15 (5)	20:53			21:37	25	20:41 (10)
9	08:26	07:45			06:44		16:58 (2)	06:29		19:02 (5)	05:24			04:45		20:16 (10)
	16:13	17:09			18:04	13	17:11 (2)	20:01	10	19:12 (5)	20:55			21:38	25	20:41 (10)
10	08:25	07:43			06:41		17:01 (2)	06:27			05:22			04:45		20:17 (10)
	16:15	17:11			18:06	5	17:06 (2)	20:03			20:57			21:39	24	20:41 (10)
11	08:25	07:41			06:39			06:24			05:20			04:44		20:18 (10)
	16:16	17:13			18:07			20:04			20:58			21:40	23	20:41 (10)
12	08:24	07:39			06:37			06:22			05:19			04:44		20:18 (10)
	16:18	17:15			18:09			20:06			21:00			21:41	24	20:42 (10)
13	08:23	07:37			06:34			06:20			05:17			04:43		20:18 (10)
	16:19	17:17			18:11			20:08			21:02			21:41	23	20:41 (10)
14	08:22	07:35			06:32			06:17			05:15			04:43		20:18 (10)
	16:21	17:19			18:13			20:10			21:03			21:42	23	20:41 (10)
15	08:21	07:33			06:29			06:15		19:32 (11)	05:14			04:43		20:19 (10)
	16:22	17:21			18:15			20:12	6	19:38 (11)	21:05			21:43	23	20:42 (10)
16	08:20	07:31			06:27			06:13		19:28 (11)	05:12		20:21 (10)	04:43		20:19 (10)
	16:24	17:23			18:17			20:13	13	19:41 (11)	21:07	9	20:30 (10)	21:43	23	20:42 (10)
17	08:19	07:29			06:24			06:10		19:26 (11)	05:10		20:19 (10)	04:43		20:19 (10)
	16:26	17:25			18:19			20:15	17	19:43 (11)	21:08	14	20:33 (10)	21:44	23	20:42 (10)
18	08:18	07:27			06:22		17:43 (6)	06:08		19:24 (11)	05:09		20:18 (10)	04:43		20:20 (10)
	16:27	17:27			18:20	7	17:50 (6)	20:17	20	19:44 (11)	21:10	17	20:35 (10)	21:44	22	20:42 (10)
19	08:17	07:25			06:20		17:39 (6)	06:06		19:23 (11)	05:07		20:17 (10)	04:43		20:20 (10)
	16:29	17:29			18:22	14	17:53 (6)	20:19	22	19:45 (11)	21:11	18	20:35 (10)	21:44	22	20:42 (10)
20	08:16	07:22			06:17		17:37 (6)	06:03		19:22 (11)	05:06		20:16 (10)	04:43		20:20 (10)
	16:31	17:31			18:24	18	17:55 (6)	20:21	24	19:46 (11)	21:13	20	20:36 (10)	21:45	22	20:42 (10)
21	08:15	07:20			06:15		17:35 (6)	06:01		19:22 (11)	05:04		20:16 (10)	04:43		20:20 (10)
	16:33	17:33			18:26	20	17:55 (6)	20:23	24	19:46 (11)	21:15	21	20:37 (10)	21:45	22	20:42 (10)
22	08:14	07:18			06:12		17:34 (6)	05:59		19:20 (11)	05:03		20:15 (10)	04:43		20:21 (10)
	16:35	17:35			18:28	22	17:56 (6)	20:24	26	19:46 (11)	21:16	22	20:37 (10)	21:45	22	20:43 (10)
23	08:12	07:16			06:10		17:33 (6)	05:57		19:20 (11)	05:01		20:15 (10)	04:43		20:21 (10)
	16:36	17:37			18:30	23	17:56 (6)	20:26	26	19:46 (11)	21:18	23	20:38 (10)	21:45	22	20:43 (10)
24	08:11	07:14		17:04 (2)	06:08		17:33 (6)	05:55		19:20 (11)	05:00		20:15 (10)	04:44		20:21 (10)
	16:38	17:39	4	17:08 (2)	18:32	23	17:56 (6)	20:28	26	19:46 (11)	21:19	23	20:38 (10)	21:45	22	20:43 (10)
25	08:10	07:11		17:00 (2)	06:05		17:32 (6)	05:52		19:20 (11)	04:59		20:14 (10)	04:44		20:21 (10)
	16:40	17:41	12	17:12 (2)	18:33	24	17:56 (6)	20:30	26	19:46 (11)	21:21	25	20:39 (10)	21:46	23	20:44 (10)
26	08:08	07:09		16:58 (2)	06:03		17:32 (6)	05:50		19:20 (11)	04:58		20:14 (10)	04:44		20:21 (10)
	16:42	17:43	16	17:14 (2)	18:35	24	17:56 (6)	20:32	25	19:45 (11)	21:22	25	20:39 (10)	21:46	23	20:44 (10)
27	08:07	07:07		16:56 (2)	06:00		17:32 (6)	05:48		19:20 (11)	04:56		20:14 (10)	04:45		20:21 (10)
	16:44	17:45	18	17:14 (2)	18:37	24	17:56 (6)	20:33	25	19:45 (11)	21:23	26	20:40 (10)	21:45	23	20:44 (10)
28	08:05	07:05		16:56 (2)	05:58		17:32 (6)	05:46		19:21 (11)	04:55		20:14 (10)	04:45		20:21 (10)
	16:46	17:47	20	17:16 (2)	18:39	22	17:54 (6)	20:35	23	19:44 (11)	21:25	26	20:40 (10)	21:45	23	20:44 (10)
29	08:04				06:55		18:33 (6)	05:44		19:21 (11)	04:54		20:14 (10)	04:46		20:22 (10)
	16:48				19:41	30	19:15 (5)	20:37	22	19:43 (11)	21:26	26	20:40 (10)	21:45	23	20:45 (10)
30	08:02				06:53		18:33 (6)	05:42		19:22 (11)	04:53		20:14 (10)	04:47		20:21 (10)
	16:50				19:42	32	19:16 (5)	20:39	20	19:42 (11)	21:27	26	20:40 (10)	21:45	24	20:45 (10)
31	08:01				06:51		18:35 (6)				04:52		20:14 (10)			
	16:52				19:44	31	19:18 (5)				21:29	26	20:40 (10)			
Sonnenscheinstunden	252	274			367			419			492			508		
astr.max.mögl.Beschattung			70			494			508			391			708	
Red.Sonnenscheinwahrsch.			0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer			0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung			0.69			0.69			0.67			0.65			0.65	
Gesamte Reduktion			0.15			0.20			0.25			0.31			0.27	
Met.wahrsch.Beschattung			10			98			129			119			192	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AV - IO48

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		20:22 (10)	05:26			06:20			07:12			07:10	08:04
	21:45	24	20:46 (10)	21:10			20:04			18:51			16:42	15:58
2	04:48		20:22 (10)	05:28			06:22			07:14			07:12	08:05
	21:44	24	20:46 (10)	21:08			20:02			18:49			16:40	15:57
3	04:49		20:22 (10)	05:30			06:23		19:00 (5)	07:16			07:14	08:07
	21:44	24	20:46 (10)	21:06			20:00	10	19:10 (5)	18:46			16:38	15:57
4	04:49		20:22 (10)	05:31			06:25		18:58 (5)	07:18		17:36 (2)	07:15	08:08
	21:43	24	20:46 (10)	21:05			19:57	14	19:12 (5)	18:44	10	17:46 (2)	16:36	15:56
5	04:50		20:22 (10)	05:33			06:27		18:57 (5)	07:19		17:34 (2)	07:17	08:10
	21:43	25	20:47 (10)	21:03			19:55	16	19:13 (5)	18:42	14	17:48 (2)	16:34	15:55
6	04:51		20:22 (10)	05:35			06:29		18:55 (5)	07:21		17:32 (2)	07:19	08:11
	21:42	25	20:47 (10)	21:01			19:52	18	19:13 (5)	18:39	18	17:50 (2)	16:32	15:55
7	04:52		20:22 (10)	05:36			06:30		18:54 (5)	07:23		17:30 (2)	07:21	08:12
	21:42	26	20:48 (10)	20:59			19:50	19	19:13 (5)	18:37	20	17:50 (2)	16:30	15:54
8	04:53		20:23 (10)	05:38			06:32		18:54 (5)	07:25		17:29 (2)	07:23	08:14
	21:41	25	20:48 (10)	20:57			19:48	20	19:14 (5)	18:35	21	17:50 (2)	16:28	15:54
9	04:54		20:23 (10)	05:40		19:38 (11)	06:34		18:53 (5)	07:27		17:29 (2)	07:25	08:15
	21:40	25	20:48 (10)	20:55	6	19:44 (11)	19:45	19	19:12 (5)	18:32	21	17:50 (2)	16:27	15:54
10	04:55		20:23 (10)	05:42		19:35 (11)	06:35		18:53 (5)	07:28		17:28 (2)	07:27	08:16
	21:39	25	20:48 (10)	20:53	12	19:47 (11)	19:43	19	19:12 (5)	18:30	22	17:50 (2)	16:25	15:53
11	04:56		20:23 (10)	05:43		19:32 (11)	06:37		18:30 (6)	07:30		17:28 (2)	07:29	08:17
	21:38	26	20:49 (10)	20:51	16	19:48 (11)	19:40	28	19:12 (5)	18:27	22	17:50 (2)	16:23	15:53
12	04:58		20:23 (10)	05:45		19:31 (11)	06:39		18:26 (6)	07:32		17:28 (2)	07:31	08:18
	21:38	26	20:49 (10)	20:49	19	19:50 (11)	19:38	31	19:09 (5)	18:25	22	17:50 (2)	16:22	15:53
13	04:59		20:23 (10)	05:47		19:30 (11)	06:41		18:24 (6)	07:34		17:28 (2)	07:33	08:19
	21:37	26	20:49 (10)	20:47	21	19:51 (11)	19:35	32	19:07 (5)	18:23	21	17:49 (2)	16:20	15:53
14	05:00		20:23 (10)	05:48		19:29 (11)	06:42		18:23 (6)	07:36		17:29 (2)	07:34	08:20
	21:36	26	20:49 (10)	20:45	22	19:51 (11)	19:33	30	19:05 (5)	18:20	19	17:48 (2)	16:18	15:53
15	05:01		20:23 (10)	05:50		19:28 (11)	06:44		18:22 (6)	07:38		17:30 (2)	07:36	08:21
	21:34	26	20:49 (10)	20:43	24	19:52 (11)	19:30	24	19:02 (5)	18:18	17	17:47 (2)	16:17	15:53
16	05:02		20:23 (10)	05:52		19:28 (11)	06:46		18:21 (6)	07:39		17:31 (2)	07:38	08:22
	21:33	25	20:48 (10)	20:41	24	19:52 (11)	19:28	23	18:44 (6)	18:16	14	17:45 (2)	16:15	15:53
17	05:04		20:24 (10)	05:54		19:27 (11)	06:48		18:20 (6)	07:41		17:32 (2)	07:40	08:23
	21:32	25	20:49 (10)	20:38	25	19:52 (11)	19:26	24	18:44 (6)	18:14	10	17:42 (2)	16:14	15:53
18	05:05		20:24 (10)	05:55		19:26 (11)	06:49		18:20 (6)	07:43			07:42	08:24
	21:31	25	20:49 (10)	20:36	26	19:52 (11)	19:23	24	18:44 (6)	18:11			16:12	15:53
19	05:07		20:24 (10)	05:57		19:26 (11)	06:51		18:19 (6)	07:45			07:44	08:25
	21:30	24	20:48 (10)	20:34	25	19:51 (11)	19:21	24	18:43 (6)	18:09			16:11	15:54
20	05:08		20:24 (10)	05:59		19:26 (11)	06:53		18:19 (6)	07:47			07:45	08:25
	21:29	24	20:48 (10)	20:32	25	19:51 (11)	19:18	24	18:43 (6)	18:07			16:10	15:54
21	05:09		20:25 (10)	06:01		19:26 (11)	06:55		18:20 (6)	07:49			07:47	08:26
	21:27	23	20:48 (10)	20:30	25	19:51 (11)	19:16	22	18:42 (6)	18:05			16:08	15:54
22	05:11		20:25 (10)	06:02		19:26 (11)	06:56		18:20 (6)	07:51			07:49	08:26
	21:26	22	20:47 (10)	20:27	24	19:50 (11)	19:13	21	18:41 (6)	18:02			16:07	15:55
23	05:12		20:26 (10)	06:04		19:26 (11)	06:58		18:20 (6)	07:53			07:51	08:27
	21:24	20	20:46 (10)	20:25	24	19:50 (11)	19:11	19	18:39 (6)	18:00			16:06	15:55
24	05:14		20:27 (10)	06:06		19:27 (11)	07:00		18:22 (6)	07:54			07:53	08:27
	21:23	19	20:46 (10)	20:23	22	19:49 (11)	19:08	15	18:37 (6)	17:58			16:05	15:56
25	05:15		20:28 (10)	06:08		19:27 (11)	07:02		18:24 (6)	06:56			07:54	08:28
	21:21	17	20:45 (10)	20:21	20	19:47 (11)	19:06	10	18:34 (6)	16:56			16:04	15:56
26	05:17		20:29 (10)	06:09		19:29 (11)	07:03			06:58			07:56	08:28
	21:20	15	20:44 (10)	20:18	17	19:46 (11)	19:03			16:54			16:03	15:57
27	05:18		20:31 (10)	06:11		19:31 (11)	07:05			07:00			07:58	08:28
	21:18	11	20:42 (10)	20:16	13	19:44 (11)	19:01			16:52			16:02	15:58
28	05:20		20:34 (10)	06:13		19:34 (11)	07:07			07:02			07:59	08:28
	21:17	6	20:40 (10)	20:14	5	19:39 (11)	18:59			16:50			16:01	15:59
29	05:22			06:15			07:09			07:04			08:01	08:29
	21:15			20:11			18:56			16:48			16:00	16:00
30	05:23			06:16			07:11			07:06			08:02	08:29
	21:13			20:09			18:54			16:46			15:59	16:01
31	05:25			06:18						07:08				08:29
	21:12			20:07						16:44				16:02
Sonnenscheinstunden	510			459			382			329			260	235
astr.max.mögl.Beschattung		633			395			486			251			
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91			
Reduktion Windrichtung		0.65			0.66			0.70			0.69			
Gesamte Reduktion		0.27			0.30			0.26			0.21			
Met.wahrsch.Beschattung		168			117			124			52			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AW - IO49

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar			März			April			Mai			Juni		
1	08:29		07:59			07:02			17:01 (2)	06:48		18:37 (6)	05:40		19:25 (11)	04:51		20:18 (10)
	16:03		16:54			17:48	18		17:19 (2)	19:46	32	19:19 (5)	20:41	23	19:48 (11)	21:30	26	20:44 (10)
2	08:28		07:57			07:00			17:00 (2)	06:46		18:38 (6)	05:38		19:26 (11)	04:50		20:18 (10)
	16:04		16:55			17:50	19		17:19 (2)	19:48	32	19:21 (5)	20:42	21	19:47 (11)	21:31	26	20:44 (10)
3	08:28		07:56			06:58			16:59 (2)	06:43		18:41 (6)	05:36		19:27 (11)	04:49		20:19 (10)
	16:05		16:57			17:52	21		17:20 (2)	19:50	29	19:22 (5)	20:44	18	19:45 (11)	21:32	26	20:45 (10)
4	08:28		07:54			06:55			16:59 (2)	06:41		18:44 (6)	05:34		19:28 (11)	04:48		20:19 (10)
	16:06		16:59			17:54	22		17:21 (2)	19:52	22	19:22 (5)	20:46	16	19:44 (11)	21:33	25	20:44 (10)
5	08:28		07:52			06:53			16:58 (2)	06:38		19:03 (5)	05:32		19:30 (11)	04:48		20:19 (10)
	16:08		17:01			17:56	22		17:20 (2)	19:53	19	19:22 (5)	20:48	13	19:43 (11)	21:34	25	20:44 (10)
6	08:27		07:50			06:51			16:58 (2)	06:36		19:03 (5)	05:30		19:33 (11)	04:47		20:20 (10)
	16:09		17:03			17:58	22		17:20 (2)	19:55	19	19:22 (5)	20:50	7	19:40 (11)	21:35	25	20:45 (10)
7	08:27		07:49			06:48			16:58 (2)	06:34		19:02 (5)	05:28			04:46		20:19 (10)
	16:10		17:05			18:00	21		17:19 (2)	19:57	19	19:21 (5)	20:51			21:36	26	20:45 (10)
8	08:26		07:47			06:46			16:58 (2)	06:31		19:03 (5)	05:26			04:46		20:20 (10)
	16:12		17:07			18:02	21		17:19 (2)	19:59	17	19:20 (5)	20:53			21:37	25	20:45 (10)
9	08:26		07:45			06:44			16:59 (2)	06:29		19:03 (5)	05:24			04:45		20:20 (10)
	16:13		17:09			18:04	19		17:18 (2)	20:01	15	19:18 (5)	20:55			21:38	25	20:45 (10)
10	08:25		07:43			06:41			17:00 (2)	06:27		19:04 (5)	05:22			04:45		20:20 (10)
	16:15		17:11			18:06	16		17:16 (2)	20:03	13	19:17 (5)	20:57			21:39	25	20:45 (10)
11	08:25		07:41			06:39			17:02 (2)	06:24		19:07 (5)	05:20			04:44		20:21 (10)
	16:16		17:13			18:07	13		17:15 (2)	20:04	8	19:15 (5)	20:58			21:40	25	20:46 (10)
12	08:24		07:39			06:37			17:04 (2)	06:22			05:19			04:44		20:21 (10)
	16:18		17:15			18:09	7		17:11 (2)	20:06			21:00			21:41	25	20:46 (10)
13	08:23		07:37			06:34				06:20			05:17			04:43		20:21 (10)
	16:19		17:17			18:11				20:08			21:02			21:41	24	20:45 (10)
14	08:22		07:35			06:32				06:17			05:15			04:43		20:21 (10)
	16:21		17:19			18:13				20:10			21:03			21:42	25	20:46 (10)
15	08:21		07:33			06:29				06:15			05:14			04:43		20:22 (10)
	16:22		17:21			18:15				20:12			21:05			21:43	24	20:46 (10)
16	08:20		07:31			06:27				06:13			05:12			04:43		20:22 (10)
	16:24		17:23			18:17				20:13			21:07			21:43	24	20:46 (10)
17	08:19		07:29			06:24				06:10		19:37 (11)	05:10			04:43		20:22 (10)
	16:26		17:25			18:19				20:15	4	19:41 (11)	21:08			21:44	24	20:46 (10)
18	08:18		07:27			06:22				06:08		19:33 (11)	05:09		20:27 (10)	04:43		20:23 (10)
	16:27		17:27			18:20				20:17	12	19:45 (11)	21:10	7	20:34 (10)	21:44	24	20:47 (10)
19	08:17		07:25			06:20				06:06		19:31 (11)	05:07		20:24 (10)	04:43		20:23 (10)
	16:29		17:29			18:22				20:19	16	19:47 (11)	21:11	12	20:36 (10)	21:44	24	20:47 (10)
20	08:16		07:22			06:17			17:48 (6)	06:03		19:29 (11)	05:06		20:23 (10)	04:43		20:23 (10)
	16:31		17:31			18:24	5		17:53 (6)	20:21	19	19:48 (11)	21:13	15	20:38 (10)	21:45	24	20:47 (10)
21	08:15		07:20			06:15			17:43 (6)	06:01		19:28 (11)	05:04		20:22 (10)	04:43		20:23 (10)
	16:33		17:33			18:26	13		17:56 (6)	20:23	21	19:49 (11)	21:15	17	20:39 (10)	21:45	24	20:47 (10)
22	08:14		07:18			06:12			17:42 (6)	05:59		19:26 (11)	05:03		20:20 (10)	04:43		20:24 (10)
	16:35		17:35			18:28	16		17:58 (6)	20:24	23	19:49 (11)	21:16	19	20:39 (10)	21:45	24	20:48 (10)
23	08:12		07:16			06:10			17:39 (6)	05:57		19:25 (11)	05:01		20:20 (10)	04:43		20:24 (10)
	16:36		17:37			18:30	20		17:59 (6)	20:26	25	19:50 (11)	21:18	20	20:40 (10)	21:45	24	20:48 (10)
24	08:11		07:14			06:08			17:39 (6)	05:55		19:25 (11)	05:00		20:20 (10)	04:44		20:24 (10)
	16:38		17:39			18:32	21		18:00 (6)	20:28	25	19:50 (11)	21:19	21	20:41 (10)	21:45	24	20:48 (10)
25	08:10		07:11			06:05			17:37 (6)	05:52		19:25 (11)	04:59		20:19 (10)	04:44		20:25 (10)
	16:40		17:41			18:33	23		18:00 (6)	20:30	25	19:50 (11)	21:21	23	20:42 (10)	21:46	23	20:48 (10)
26	08:08		07:09			06:03			17:37 (6)	05:50		19:24 (11)	04:58		20:19 (10)	04:44		20:24 (10)
	16:42		17:43			18:35	23		18:00 (6)	20:32	26	19:50 (11)	21:22	23	20:42 (10)	21:45	24	20:48 (10)
27	08:07		07:07		17:04 (2)	06:00			17:37 (6)	05:48		19:24 (11)	04:56		20:19 (10)	04:45		20:24 (10)
	16:44		17:45	11	17:15 (2)	18:37	24		18:01 (6)	20:33	26	19:50 (11)	21:23	24	20:43 (10)	21:45	24	20:48 (10)
28	08:05		07:05		17:03 (2)	05:58			17:36 (6)	05:46		19:24 (11)	04:55		20:19 (10)	04:45		20:25 (10)
	16:46		17:47	15	17:18 (2)	18:39	24		18:00 (6)	20:35	26	19:50 (11)	21:25	24	20:43 (10)	21:45	24	20:49 (10)
29	08:04					06:55			18:36 (6)	05:44		19:25 (11)	04:54		20:19 (10)	04:46		20:25 (10)
	16:48					19:41	24		19:00 (6)	20:37	24	19:49 (11)	21:26	24	20:43 (10)	21:45	25	20:50 (10)
30	08:02					06:53			18:36 (6)	05:42		19:25 (11)	04:53		20:19 (10)	04:47		20:25 (10)
	16:50					19:42	26		19:16 (5)	20:39	23	19:48 (11)	21:27	25	20:44 (10)	21:45	24	20:49 (10)
31	08:01					06:51			18:37 (6)				04:52		20:19 (10)			
	16:52					19:44	31		19:18 (5)				21:29	25	20:44 (10)			
Sonnenscheinstunden	252		274			367				419			492			508		
astr.max.mögl.Beschattung				26			471				520			377			737	
Red.Sonnenscheinwahrsch.				0.24			0.31				0.41			0.51			0.45	
Reduktion Betriebsdauer				0.91			0.91				0.91			0.91			0.91	
Reduktion Windrichtung				0.68			0.69				0.68			0.65			0.65	
Gesamte Reduktion				0.15			0.20				0.25			0.31			0.27	
Met.wahrsch.Beschattung				4			93				132			115			199	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AW - IO49

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1 | 04:47		20:25 (10)	05:26			06:20		19:06 (5)	07:12			07:10	08:04
| 21:45	25	20:50 (10)	21:10			20:04	8	19:14 (5)	18:51			16:42	15:58
2 | 04:48		20:26 (10)	05:28			06:22		19:03 (5)	07:14		17:41 (2)	07:12	08:05
| 21:44	24	20:50 (10)	21:08			20:02	13	19:16 (5)	18:49	10	17:51 (2)	16:40	15:57
3 | 04:49		20:25 (10)	05:30			06:23		19:01 (5)	07:16		17:39 (2)	07:14	08:07
| 21:44	25	20:50 (10)	21:06			20:00	15	19:16 (5)	18:46	14	17:53 (2)	16:38	15:57
4 | 04:49		20:25 (10)	05:31			06:25		19:00 (5)	07:18		17:37 (2)	07:15	08:08
| 21:43	25	20:50 (10)	21:05			19:57	17	19:17 (5)	18:44	18	17:55 (2)	16:36	15:56
5 | 04:50		20:26 (10)	05:33			06:27		18:59 (5)	07:19		17:36 (2)	07:17	08:10
| 21:43	25	20:51 (10)	21:03			19:55	19	19:18 (5)	18:42	20	17:56 (2)	16:34	15:55
6 | 04:51		20:26 (10)	05:35			06:29		18:58 (5)	07:21		17:35 (2)	07:19	08:11
| 21:42	25	20:51 (10)	21:01			19:52	19	19:17 (5)	18:39	21	17:56 (2)	16:32	15:55
7 | 04:52		20:26 (10)	05:36		19:41 (11)	06:30		18:58 (5)	07:23		17:33 (2)	07:21	08:12
| 21:42	26	20:52 (10)	20:59	9	19:50 (11)	19:50	19	19:17 (5)	18:37	22	17:55 (2)	16:30	15:54
8 | 04:53		20:26 (10)	05:38		19:39 (11)	06:32		18:58 (5)	07:25		17:33 (2)	07:23	08:14
| 21:41	26	20:52 (10)	20:57	14	19:53 (11)	19:48	19	19:17 (5)	18:35	22	17:55 (2)	16:28	15:54
9 | 04:54		20:26 (10)	05:40		19:37 (11)	06:34		18:34 (6)	07:27		17:33 (2)	07:25	08:15
| 21:40	26	20:52 (10)	20:55	17	19:54 (11)	19:45	30	19:16 (5)	18:32	22	17:55 (2)	16:27	15:54
10 | 04:55		20:27 (10)	05:42		19:36 (11)	06:35		18:32 (6)	07:28		17:33 (2)	07:27	08:16
| 21:39	25	20:52 (10)	20:53	19	19:55 (11)	19:43	33	19:15 (5)	18:30	22	17:55 (2)	16:25	15:53
11 | 04:56		20:27 (10)	05:43		19:34 (11)	06:37		18:30 (6)	07:30		17:33 (2)	07:29	08:17
| 21:38	25	20:52 (10)	20:51	21	19:55 (11)	19:40	33	19:13 (5)	18:27	21	17:54 (2)	16:23	15:53
12 | 04:58		20:27 (10)	05:45		19:34 (11)	06:39		18:28 (6)	07:32		17:34 (2)	07:31	08:18
| 21:38	25	20:52 (10)	20:49	22	19:56 (11)	19:38	31	19:09 (5)	18:25	19	17:53 (2)	16:22	15:53
13 | 04:59		20:27 (10)	05:47		19:33 (11)	06:41		18:27 (6)	07:34		17:35 (2)	07:33	08:19
| 21:37	25	20:52 (10)	20:47	24	19:57 (11)	19:35	27	19:07 (5)	18:23	17	17:52 (2)	16:20	15:53
14 | 05:00		20:27 (10)	05:48		19:32 (11)	06:42		18:27 (6)	07:36		17:36 (2)	07:34	08:20
| 21:36	25	20:52 (10)	20:45	25	19:57 (11)	19:33	23	18:50 (6)	18:20	14	17:50 (2)	16:18	15:53
15 | 05:01		20:27 (10)	05:50		19:32 (11)	06:44		18:26 (6)	07:38		17:39 (2)	07:36	08:21
| 21:34	25	20:52 (10)	20:43	25	19:57 (11)	19:30	24	18:50 (6)	18:18	8	17:47 (2)	16:17	15:53
16 | 05:02		20:27 (10)	05:52		19:32 (11)	06:46		18:25 (6)	07:39			07:38	08:22
| 21:33	24	20:51 (10)	20:41	25	19:57 (11)	19:28	24	18:49 (6)	18:16			16:15	15:53
17 | 05:04		20:29 (10)	05:54		19:31 (11)	06:48		18:25 (6)	07:41			07:40	08:23
| 21:32	23	20:52 (10)	20:38	26	19:57 (11)	19:26	24	18:49 (6)	18:14			16:14	15:53
18 | 05:05		20:29 (10)	05:55		19:31 (11)	06:49		18:25 (6)	07:43			07:42	08:24
| 21:31	22	20:51 (10)	20:36	26	19:57 (11)	19:23	23	18:48 (6)	18:11			16:12	15:53
19 | 05:07		20:29 (10)	05:57		19:31 (11)	06:51		18:25 (6)	07:45			07:44	08:25
| 21:30	22	20:51 (10)	20:34	24	19:55 (11)	19:21	22	18:47 (6)	18:09			16:11	15:54
20 | 05:08		20:29 (10)	05:59		19:31 (11)	06:53		18:26 (6)	07:47			07:45	08:25
| 21:28	21	20:50 (10)	20:32	24	19:55 (11)	19:18	20	18:46 (6)	18:07			16:10	15:54
21 | 05:09		20:31 (10)	06:01		19:32 (11)	06:55		18:27 (6)	07:49			07:47	08:26
| 21:27	19	20:50 (10)	20:30	23	19:55 (11)	19:16	17	18:44 (6)	18:05			16:08	15:54
22 | 05:11		20:31 (10)	06:02		19:32 (11)	06:56		18:28 (6)	07:51			07:49	08:26
| 21:26	18	20:49 (10)	20:27	21	19:53 (11)	19:13	15	18:43 (6)	18:02			16:07	15:55
23 | 05:12		20:32 (10)	06:04		19:33 (11)	06:58		18:30 (6)	07:53			07:51	08:27
| 21:24	16	20:48 (10)	20:25	19	19:52 (11)	19:11	9	18:39 (6)	18:00			16:06	15:55
24 | 05:14		20:34 (10)	06:06		19:35 (11)	07:00			07:54			07:53	08:27
| 21:23	13	20:47 (10)	20:23	16	19:51 (11)	19:08			17:58			16:05	15:56
25 | 05:15		20:35 (10)	06:08		19:36 (11)	07:02			06:56			07:54	08:28
| 21:21	10	20:45 (10)	20:21	11	19:47 (11)	19:06			16:56			16:04	15:56
26 | 05:17		20:39 (10)	06:09			07:03			06:58			07:56	08:28
| 21:20	4	20:43 (10)	20:18			19:03			16:54			16:03	15:57
27 | 05:18			06:11			07:05			07:00			07:58	08:28
| 21:18			20:16			19:01			16:52			16:02	15:58
28 | 05:20			06:13			07:07			07:02			07:59	08:28
| 21:17			20:14			18:59			16:50			16:01	15:59
29 | 05:22			06:15			07:09			07:04			08:01	08:29
| 21:15			20:11			18:56			16:48			16:00	16:00
30 | 05:23			06:16			07:11			07:06			08:02	08:29
| 21:13			20:09			18:54			16:46			15:59	16:01
31 | 05:25			06:18						07:08				08:29
| 21:12			20:07						16:44				16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung		569		391			484			250			
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91		0.91			0.91			0.91			
Reduktion Windrichtung		0.65		0.66			0.69			0.68			
Gesamte Reduktion		0.26		0.30			0.26			0.21			
Met.wahrsch.Beschattung		150		116			124			51			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AX - IO50

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:29 - 16:03	07:59 - 16:54	07:02 - 17:48 (14)	17:06 (2) - 17:20 (2)	06:48 - 19:46 (31)	18:38 (6) - 19:19 (5)	05:40 - 20:41 (24)	19:27 (11) - 19:51 (11)	04:51 - 21:30 (25)	20:21 (10) - 20:46 (10)
2	08:28 - 16:04	07:57 - 16:55	07:00 - 17:50 (18)	17:03 (2) - 17:21 (2)	06:46 - 19:48 (33)	18:39 (6) - 19:21 (5)	05:38 - 20:42 (22)	19:28 (11) - 19:50 (11)	04:50 - 21:31 (25)	20:21 (10) - 20:46 (10)
3	08:28 - 16:05	07:56 - 16:57	06:58 - 17:52 (19)	17:03 (2) - 17:22 (2)	06:43 - 19:50 (33)	18:41 (6) - 19:23 (5)	05:36 - 20:44 (21)	19:28 (11) - 19:49 (11)	04:49 - 21:32 (25)	20:22 (10) - 20:47 (10)
4	08:28 - 16:06	07:54 - 16:59	06:55 - 17:54 (21)	17:02 (2) - 17:23 (2)	06:41 - 19:52 (32)	18:42 (6) - 19:24 (5)	05:34 - 20:46 (19)	19:29 (11) - 19:48 (11)	04:48 - 21:33 (26)	20:21 (10) - 20:47 (10)
5	08:28 - 16:08	07:52 - 17:01	06:53 - 17:56 (22)	17:01 (2) - 17:23 (2)	06:38 - 19:53 (26)	18:45 (6) - 19:24 (5)	05:32 - 20:48 (17)	19:31 (11) - 19:48 (11)	04:48 - 21:34 (25)	20:21 (10) - 20:46 (10)
6	08:27 - 16:09	07:50 - 17:03	06:51 - 17:58 (22)	17:01 (2) - 17:23 (2)	06:36 - 19:55 (19)	19:05 (5) - 19:24 (5)	05:30 - 20:50 (14)	19:32 (11) - 19:46 (11)	04:47 - 21:35 (25)	20:22 (10) - 20:47 (10)
7	08:27 - 16:10	07:49 - 17:05	06:48 - 18:00 (22)	17:00 (2) - 17:22 (2)	06:34 - 19:57 (19)	19:04 (5) - 19:23 (5)	05:28 - 20:51 (9)	19:34 (11) - 19:43 (11)	04:46 - 21:36 (25)	20:22 (10) - 20:47 (10)
8	08:26 - 16:12	07:47 - 17:07	06:46 - 18:02 (21)	17:01 (2) - 17:22 (2)	06:31 - 19:59 (18)	19:05 (5) - 19:23 (5)	05:26 - 20:53		04:46 - 21:37 (25)	20:22 (10) - 20:47 (10)
9	08:26 - 16:13	07:45 - 17:09	06:44 - 18:04 (21)	17:01 (2) - 17:22 (2)	06.29 - 20:01 (17)	19:04 (5) - 19:21 (5)	05:24 - 20:55		04:45 - 21:38 (25)	20:22 (10) - 20:47 (10)
10	08:25 - 16:15	07:43 - 17:11	06:41 - 18:06 (19)	17:01 (2) - 17:20 (2)	06:27 - 20:03 (16)	19:05 (5) - 19:21 (5)	05:22 - 20:57		04:45 - 21:39 (26)	20:22 (10) - 20:48 (10)
11	08:25 - 16:16	07:41 - 17:13	06:39 - 18:07 (17)	17:02 (2) - 17:19 (2)	06:24 - 20:04 (12)	19:07 (5) - 19:19 (5)	05:20 - 20:58		04:44 - 21:40 (25)	20:23 (10) - 20:48 (10)
12	08:24 - 16:18	07:39 - 17:15	06:37 - 18:09 (14)	17:03 (2) - 17:17 (2)	06:22 - 20:06 (8)	19:09 (5) - 19:17 (5)	05:19 - 21:00		04:44 - 21:41 (24)	20:24 (10) - 20:48 (10)
13	08:23 - 16:19	07:37 - 17:17	06:34 - 18:11 (8)	17:06 (2) - 17:14 (2)	06:20 - 20:08		05:17 - 21:02		04:43 - 21:41 (25)	20:23 (10) - 20:48 (10)
14	08:22 - 16:21	07:35 - 17:19	06:32 - 18:13		06:17 - 20:10		05:15 - 21:03		04:43 - 21:42 (25)	20:23 (10) - 20:48 (10)
15	08:21 - 16:22	07:33 - 17:21	06:29 - 18:15		06:15 - 20:12		05:14 - 21:05		04:43 - 21:43 (24)	20:24 (10) - 20:48 (10)
16	08:20 - 16:24	07:31 - 17:23	06:27 - 18:17		06:13 - 20:13		05:12 - 21:07		04:43 - 21:43 (25)	20:24 (10) - 20:49 (10)
17	08:19 - 16:26	07:29 - 17:25	06:24 - 18:19		06:10 - 20:15		05:10 - 21:08		04:43 - 21:44 (25)	20:24 (10) - 20:49 (10)
18	08:18 - 16:27	07:27 - 17:27	06:22 - 18:20		06:08 - 20:17		05:09 - 21:10		04:43 - 21:44 (24)	20:25 (10) - 20:49 (10)
19	08:17 - 16:29	07:25 - 17:29	06:20 - 18:22		06:06 - 20:19 (11)	19:36 (11) - 19:47 (11)	05:07 - 21:11 (4)	20:30 (10) - 20:34 (10)	04:43 - 21:44 (24)	20:25 (10) - 20:49 (10)
20	08:16 - 16:31	07:22 - 17:31	06:17 - 18:24		06:03 - 20:21 (15)	19:34 (11) - 19:49 (11)	05:06 - 21:13 (10)	20:27 (10) - 20:37 (10)	04:43 - 21:45 (24)	20:25 (10) - 20:49 (10)
21	08:15 - 16:33	07:20 - 17:33	06:15 - 18:26		06:01 - 20:23 (19)	19:32 (11) - 19:51 (11)	05:04 - 21:15 (13)	20:26 (10) - 20:39 (10)	04:43 - 21:45 (24)	20:25 (10) - 20:49 (10)
22	08:14 - 16:35	07:18 - 17:35	06:12 - 18:28 (12)	17:47 (6) - 17:59 (6)	05:59 - 20:24 (21)	19:30 (11) - 19:51 (11)	05:03 - 21:16 (16)	20:24 (10) - 20:40 (10)	04:43 - 21:45 (24)	20:26 (10) - 20:50 (10)
23	08:12 - 16:36	07:16 - 17:37	06:10 - 18:30 (16)	17:44 (6) - 18:00 (6)	05:57 - 20:26 (22)	19:29 (11) - 19:51 (11)	05:01 - 21:18 (18)	20:23 (10) - 20:41 (10)	04:43 - 21:45 (24)	20:26 (10) - 20:50 (10)
24	08:11 - 16:38	07:14 - 17:39	06:08 - 18:32 (18)	17:43 (6) - 18:01 (6)	05:55 - 20:28 (24)	19:28 (11) - 19:52 (11)	05:00 - 21:19 (19)	20:23 (10) - 20:42 (10)	04:44 - 21:45 (24)	20:26 (10) - 20:50 (10)
25	08:10 - 16:40	07:11 - 17:41	06:05 - 18:33 (21)	17:41 (6) - 18:02 (6)	05:52 - 20:30 (24)	19:28 (11) - 19:52 (11)	04:59 - 21:21 (20)	20:23 (10) - 20:43 (10)	04:44 - 21:46 (24)	20:27 (10) - 20:51 (10)
26	08:08 - 16:42	07:09 - 17:43	06:03 - 18:35 (22)	17:40 (6) - 18:02 (6)	05:50 - 20:32 (25)	19:27 (11) - 19:52 (11)	04:58 - 21:22 (22)	20:22 (10) - 20:44 (10)	04:44 - 21:45 (25)	20:26 (10) - 20:51 (10)
27	08:07 - 16:44	07:07 - 17:45	06:00 - 18:37 (23)	17:40 (6) - 18:03 (6)	05:48 - 20:33 (25)	19:27 (11) - 19:52 (11)	04:56 - 21:23 (22)	20:22 (10) - 20:44 (10)	04:45 - 21:45 (25)	20:27 (10) - 20:52 (10)
28	08:05 - 16:46	07:05 - 17:47 (10) 17:08 (2) - 17:18 (2)	05:58 - 18:39 (23)	17:39 (6) - 18:02 (6)	05:46 - 20:35 (25)	19:27 (11) - 19:52 (11)	04:55 - 21:25 (23)	20:22 (10) - 20:45 (10)	04:45 - 21:45 (24)	20:27 (10) - 20:51 (10)
29	08:04 - 16:48		06:55 - 19:41 (24)	18:39 (6) - 19:03 (6)	05:44 - 20:37 (25)	19:27 (11) - 19:52 (11)	04:54 - 21:26 (24)	20:21 (10) - 20:45 (10)	04:46 - 21:45 (25)	20:27 (10) - 20:52 (10)
30	08:02 - 16:50		06:53 - 19:42 (23)	18:38 (6) - 19:01 (6)	05:42 - 20:39 (25)	19:27 (11) - 19:52 (11)	04:53 - 21:27 (24)	20:21 (10) - 20:45 (10)	04:47 - 21:45 (25)	20:27 (10) - 20:52 (10)
31	08:01 - 16:52		06:51 - 19:44 (26)	18:39 (6) - 19:18 (5)			04:52 - 21:29 (25)	20:21 (10) - 20:46 (10)		
Sonnenscheinstunden	252	274	367	419	492	508
astr.max.mögl.Beschattung		10	446	525	366	741
Red.Sonnenscheinwahrsch.		0.24	0.31	0.41	0.51	0.45
Reduktion Betriebsdauer		0.91	0.91	0.91	0.91	0.91
Reduktion Windrichtung		0.68	0.69	0.68	0.65	0.65
Gesamte Reduktion		0.15	0.20	0.26	0.31	0.27
Met.wahrsch.Beschattung		1	88	134	112	199

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AX - IO50

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November	Dezember
1	04:47	20:27 (10)	05:26		06:20	19:06 (5)	07:12	17:43 (2)	07:10	08:04
	21:45	25 20:52 (10)	21:10		20:04	12 19:18 (5)	18:51	12 17:55 (2)	16:42	15:58
2	04:48	20:28 (10)	05:28		06:22	19:04 (5)	07:14	17:41 (2)	07:12	08:05
	21:44	25 20:53 (10)	21:08		20:02	16 19:20 (5)	18:49	16 17:57 (2)	16:40	15:57
3	04:49	20:27 (10)	05:30		06:23	19:02 (5)	07:16	17:40 (2)	07:14	08:07
	21:44	25 20:52 (10)	21:06		20:00	17 19:19 (5)	18:46	18 17:58 (2)	16:38	15:57
4	04:49	20:27 (10)	05:31		06:25	19:02 (5)	07:18	17:38 (2)	07:15	08:08
	21:43	26 20:53 (10)	21:05		19:57	18 19:20 (5)	18:44	20 17:58 (2)	16:36	15:56
5	04:50	20:28 (10)	05:33	19:47 (11)	06:27	19:01 (5)	07:19	17:38 (2)	07:17	08:10
	21:43	25 20:53 (10)	21:03	4 19:51 (11)	19:55	19 19:20 (5)	18:42	21 17:59 (2)	16:34	15:55
6	04:51	20:28 (10)	05:35	19:42 (11)	06:29	19:00 (5)	07:21	17:37 (2)	07:19	08:11
	21:42	25 20:53 (10)	21:01	12 19:54 (11)	19:52	19 19:19 (5)	18:39	22 17:59 (2)	16:32	15:55
7	04:52	20:28 (10)	05:36	19:41 (11)	06:30	18:41 (6)	07:23	17:36 (2)	07:21	08:12
	21:42	26 20:54 (10)	20:59	15 19:56 (11)	19:50	24 19:19 (5)	18:37	22 17:58 (2)	16:30	15:54
8	04:53	20:29 (10)	05:38	19:40 (11)	06:32	18:37 (6)	07:25	17:36 (2)	07:23	08:14
	21:41	25 20:54 (10)	20:57	18 19:58 (11)	19:48	31 19:19 (5)	18:35	22 17:58 (2)	16:28	15:54
9	04:54	20:29 (10)	05:40	19:38 (11)	06:34	18:34 (6)	07:27	17:36 (2)	07:25	08:15
	21:40	25 20:54 (10)	20:55	20 19:58 (11)	19:45	34 19:17 (5)	18:32	21 17:57 (2)	16:27	15:54
10	04:55	20:29 (10)	05:42	19:37 (11)	06:35	18:33 (6)	07:28	17:36 (2)	07:27	08:16
	21:39	25 20:54 (10)	20:53	22 19:59 (11)	19:43	33 19:15 (5)	18:30	21 17:57 (2)	16:25	15:53
11	04:56	20:29 (10)	05:43	19:36 (11)	06:37	18:32 (6)	07:30	17:37 (2)	07:29	08:17
	21:38	25 20:54 (10)	20:51	23 19:59 (11)	19:40	31 19:13 (5)	18:27	19 17:56 (2)	16:23	15:53
12	04:58	20:29 (10)	05:45	19:36 (11)	06:39	18:30 (6)	07:32	17:38 (2)	07:31	08:18
	21:38	25 20:54 (10)	20:49	24 20:00 (11)	19:38	26 19:09 (5)	18:25	16 17:54 (2)	16:22	15:53
13	04:59	20:30 (10)	05:47	19:35 (11)	06:41	18:29 (6)	07:34	17:40 (2)	07:33	08:19
	21:37	24 20:54 (10)	20:47	25 20:00 (11)	19:35	24 18:53 (6)	18:23	12 17:52 (2)	16:20	15:53
14	05:00	20:30 (10)	05:48	19:34 (11)	06:42	18:29 (6)	07:36	17:43 (2)	07:34	08:20
	21:36	24 20:54 (10)	20:45	26 20:00 (11)	19:33	24 18:53 (6)	18:20	6 17:49 (2)	16:18	15:53
15	05:01	20:30 (10)	05:50	19:34 (11)	06:44	18:29 (6)	07:38		07:36	08:21
	21:34	23 20:53 (10)	20:43	26 20:00 (11)	19:30	24 18:53 (6)	18:18		16:17	15:53
16	05:02	20:30 (10)	05:52	19:35 (11)	06:46	18:28 (6)	07:39		07:38	08:22
	21:33	23 20:53 (10)	20:41	25 20:00 (11)	19:28	24 18:52 (6)	18:16		16:15	15:53
17	05:04	20:32 (10)	05:54	19:34 (11)	06:48	18:28 (6)	07:41		07:40	08:23
	21:32	21 20:53 (10)	20:38	25 19:59 (11)	19:26	23 18:51 (6)	18:14		16:14	15:53
18	05:05	20:32 (10)	05:55	19:34 (11)	06:49	18:29 (6)	07:43		07:42	08:24
	21:31	21 20:53 (10)	20:36	25 19:59 (11)	19:23	21 18:50 (6)	18:11		16:12	15:53
19	05:07	20:32 (10)	05:57	19:34 (11)	06:51	18:29 (6)	07:45		07:44	08:25
	21:30	20 20:52 (10)	20:34	23 19:57 (11)	19:21	19 18:48 (6)	18:09		16:11	15:54
20	05:08	20:33 (10)	05:59	19:35 (11)	06:53	18:30 (6)	07:47		07:45	08:25
	21:28	18 20:51 (10)	20:32	22 19:57 (11)	19:18	17 18:47 (6)	18:07		16:10	15:54
21	05:09	20:34 (10)	06:01	19:36 (11)	06:55	18:32 (6)	07:49		07:47	08:26
	21:27	17 20:51 (10)	20:30	20 19:56 (11)	19:16	13 18:45 (6)	18:05		16:08	15:54
22	05:11	20:35 (10)	06:02	19:36 (11)	06:56	18:35 (6)	07:51		07:49	08:26
	21:26	15 20:50 (10)	20:27	18 19:54 (11)	19:13	6 18:41 (6)	18:02		16:07	15:55
23	05:12	20:36 (10)	06:04	19:38 (11)	06:58		07:53		07:51	08:27
	21:24	12 20:48 (10)	20:25	15 19:53 (11)	19:11		18:00		16:06	15:55
24	05:14	20:39 (10)	06:06	19:40 (11)	07:00		07:54		07:53	08:27
	21:23	8 20:47 (10)	20:23	10 19:50 (11)	19:08		17:58		16:05	15:56
25	05:15		06:08		07:02		06:56		07:54	08:28
	21:21		20:21		19:06		16:56		16:04	15:56
26	05:17		06:09		07:03		06:58		07:56	08:28
	21:20		20:18		19:03		16:54		16:03	15:57
27	05:18		06:11		07:05		07:00		07:58	08:28
	21:18		20:16		19:01		16:52		16:02	15:58
28	05:20		06:13		07:07		07:02		07:59	08:28
	21:17		20:14		18:59		16:50		16:01	15:59
29	05:22		06:15		07:09		07:04		08:01	08:29
	21:15		20:11		18:56		16:48		16:00	16:00
30	05:23		06:16		07:11	17:49 (2)	07:06		08:02	08:29
	21:13		20:09		18:54	3 17:52 (2)	16:46		15:59	16:01
31	05:25		06:18	19:08 (5)			07:08			08:29
	21:12		20:07	8 19:16 (5)			16:44			16:02
Sonnenscheinstunden	510		459		382		329		260	235
astr.max.mögl.Beschattung		528		406		478		248		
Red.Sonnenscheinwahrsch.		0.45		0.49		0.40		0.33		
Reduktion Betriebsdauer		0.91		0.91		0.91		0.91		
Reduktion Windrichtung		0.65		0.66		0.69		0.68		
Gesamte Reduktion		0.26		0.30		0.26		0.20		
Met.wahrsch.Beschattung		139		120		122		51		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AY - IO51

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar	Februar	März	April	Mai	Juni
1 | 08:29	| 07:59	| 07:02	| 16:50 (2) | 06:48	| 05:40	| 04:51
| 16:03	| 16:54	| 17:48 19	| 17:09 (2) | 19:46	| 20:41	| 21:30
2 | 08:28	| 07:57	| 07:00	| 16:49 (2) | 06:46	| 05:38	| 04:50
| 16:04	| 16:55	| 17:50 19	| 17:08 (2) | 19:48	| 20:42	| 21:31
3 | 08:28	| 07:56	| 06:58	| 16:51 (2) | 06:43	| 05:36	| 04:49
| 16:05	| 16:57	| 17:52 16	| 17:07 (2) | 19:50	| 20:44	| 21:32
4 | 08:28	| 07:54	| 06:55	| 16:52 (2) | 06:41	| 05:34 | 20:04 (10)	| 04:48
| 16:06	| 16:59	| 17:54 14	| 17:06 (2) | 19:52	| 20:46 8	20:12 (10) | 21:33
5 | 08:28	| 07:52	| 06:53	| 16:54 (2) | 06:38	| 05:32	| 20:02 (10) | 04:48
| 16:08	| 17:01	| 17:56 8	| 17:02 (2) | 19:53	| 20:48 14	20:16 (10) | 21:34
6 | 08:27	| 07:50	| 06:51	| 06:36	| 05:30	| 20:00 (10) | 04:47
| 16:09	| 17:03	| 17:58	| 19:55	| 20:50 17	20:17 (10) | 21:35
7 | 08:27	| 07:49	| 06:48	| 06:34 | 19:18 (11)	| 05:28	| 19:59 (10) | 04:46
| 16:10	| 17:05	| 18:00	| 19:57 8 | 19:26 (11)	| 20:51 19	20:18 (10) | 21:36
8 | 08:26	| 07:47	| 06:46	| 06:31 | 19:15 (11)	| 05:26	| 19:58 (10) | 04:46
| 16:12	| 17:07	| 18:02	| 19:59 14 | 19:29 (11)	| 20:53 20	20:18 (10) | 21:37
9 | 08:26	| 07:45	| 06:44	| 06:29 | 19:13 (11)	| 05:24	| 19:58 (10) | 04:45
| 16:13	| 17:09	| 18:04	| 20:01 17 | 19:30 (11)	| 20:55 22	20:20 (10) | 21:38
10 | 08:25	| 07:43	| 06:41	| 06:27 | 19:11 (11)	| 05:22	| 19:57 (10) | 04:45
| 16:15	| 17:11	| 18:06	| 20:03 20 | 19:31 (11)	| 20:57 23	20:20 (10) | 21:39
11 | 08:25	| 07:41	| 06:39	| 06:24 | 19:11 (11)	| 05:20	| 19:56 (10) | 04:44
| 16:16	| 17:13	| 18:07	| 20:04 21 | 19:32 (11)	| 20:58 24	20:20 (10) | 21:40
12 | 08:24	| 07:39	| 06:37	| 17:36 (6) | 06:22 | 19:10 (11)	| 05:19	| 19:56 (10) | 04:44
| 16:18	| 17:15	| 18:09 3	| 17:39 (6) | 20:06 23 | 19:33 (11)	| 21:00 25	20:21 (10) | 21:41
13 | 08:23	| 07:37	| 06:34	| 17:32 (6) | 06:20 | 19:09 (11)	| 05:17	| 19:56 (10) | 04:43
| 16:19	| 17:17	| 18:11 12	| 17:44 (6) | 20:08 23 | 19:32 (11)	| 21:02 24	20:20 (10) | 21:41
14 | 08:22	| 07:35	| 06:32	| 17:29 (6) | 06:17 | 19:08 (11)	| 05:15	| 19:55 (10) | 04:43
| 16:21	| 17:19	| 18:13 16	| 17:45 (6) | 20:10 25 | 19:33 (11)	| 21:03 25	20:20 (10) | 21:42
15 | 08:21	| 07:33	| 06:29	| 17:28 (6) | 06:15 | 19:08 (11)	| 05:14	| 19:56 (10) | 04:43
| 16:22	| 17:21	| 18:15 18	| 17:46 (6) | 20:12 25 | 19:33 (11)	| 21:05 24	20:20 (10) | 21:43
16 | 08:20	| 07:31	| 06:27	| 17:26 (6) | 06:13 | 19:07 (11)	| 05:12	| 19:55 (10) | 04:43
| 16:24	| 17:23	| 18:17 20	| 17:46 (6) | 20:13 24 | 19:31 (11)	| 21:07 25	20:20 (10) | 21:43
17 | 08:19	| 07:29	| 06:24	| 17:26 (6) | 06:10 | 19:08 (11)	| 05:10	| 19:56 (10) | 04:43
| 16:26	| 17:25	| 18:19 21	| 17:47 (6) | 20:15 23 | 19:31 (11)	| 21:08 24	20:20 (10) | 21:44
18 | 08:18	| 07:27	| 06:22	| 17:25 (6) | 06:08 | 19:08 (11)	| 05:09	| 19:57 (10) | 04:43
| 16:27	| 17:27	| 18:20 23	| 17:48 (6) | 20:17 23 | 19:31 (11)	| 21:10 23	20:20 (10) | 21:44
19 | 08:17	| 07:25	| 06:20	| 17:24 (6) | 06:06 | 19:09 (11)	| 05:07	| 19:56 (10) | 04:43
| 16:29	| 17:29	| 18:22 23	| 17:47 (6) | 20:19 21 | 19:30 (11)	| 21:11 24	20:20 (10) | 21:44
20 | 08:16	| 07:22 | 16:58 (2)	| 06:17	| 17:25 (6) | 06:03 | 19:10 (11)	| 05:06	| 19:57 (10) | 04:43
| 16:31	| 17:31 3 | 17:01 (2)	| 18:24 22	| 17:47 (6) | 20:21 19 | 19:29 (11)	| 21:13 23	20:20 (10) | 21:45
21 | 08:15	| 07:20 | 16:54 (2)	| 06:15	| 17:24 (6) | 06:01 | 19:11 (11)	| 05:04	| 19:58 (10) | 04:43
| 16:33	| 17:33 11 | 17:05 (2)	| 18:26 22	| 17:46 (6) | 20:23 16 | 19:27 (11)	| 21:15 21	20:19 (10) | 21:45
22 | 08:14	| 07:18 | 16:53 (2)	| 06:12	| 17:25 (6) | 05:59 | 19:12 (11)	| 05:03	| 19:58 (10) | 04:43
| 16:35	| 17:35 14 | 17:07 (2)	| 18:28 20	| 17:45 (6) | 20:24 13 | 19:25 (11)	| 21:16 20	20:18 (10) | 21:45
23 | 08:12	| 07:16 | 16:52 (2)	| 06:10	| 17:25 (6) | 05:57 | 19:15 (11)	| 05:01	| 19:59 (10) | 04:43
| 16:36	| 17:37 17 | 17:09 (2)	| 18:30 18	| 17:43 (6) | 20:26 6 | 19:21 (11)	| 21:18 19	20:18 (10) | 21:45
24 | 08:11	| 07:14 | 16:50 (2)	| 06:07	| 17:27 (6) | 05:55	| 05:00	| 20:00 (10) | 04:44
| 16:38	| 17:39 19 | 17:09 (2)	| 18:32 15	| 17:42 (6) | 20:28	| 21:19 17	20:17 (10) | 21:45
25 | 08:10	| 07:11 | 16:50 (2)	| 06:05	| 17:28 (6) | 05:52	| 04:59	| 20:01 (10) | 04:44
| 16:40	| 17:41 19 | 17:09 (2)	| 18:33 11	| 17:39 (6) | 20:30	| 21:21 16	20:17 (10) | 21:46
26 | 08:08	| 07:09 | 16:49 (2)	| 06:03	| 17:32 (6) | 05:50	| 04:58	| 20:02 (10) | 04:44
| 16:42	| 17:43 21 | 17:10 (2)	| 18:35 3	| 17:35 (6) | 20:32	| 21:22 14	20:16 (10) | 21:46
27 | 08:07	| 07:07 | 16:49 (2)	| 06:00	| 05:48	| 04:56	| 20:03 (10) | 04:45
| 16:44	| 17:45 20 | 17:09 (2)	| 18:37	| 20:33	| 21:23 12	20:15 (10) | 21:45
28 | 08:05	| 07:05 | 16:49 (2)	| 05:58	| 05:46	| 04:55	| 20:05 (10) | 04:45
| 16:46	| 17:47 20 | 17:09 (2)	| 18:39	| 20:35	| 21:25 8	20:13 (10) | 21:45
29 | 08:04	|	| 06:55	| 05:44	| 04:54	| 20:08 (10) | 04:46
| 16:48	|	| 19:41	| 20:37	| 21:26 3	20:11 (10) | 21:45
30 | 08:02	|	| 06:53	| 05:42	| 04:53	| 04:47
| 16:50	|	| 19:42	| 20:39	| 21:27	| 21:45
31 | 08:01	|	| 06:51	|	| 04:52	|
| 16:52	|	| 19:44	|	| 21:29	|
Sonnenscheinstunden | 252	| 274	| 367	| 419	| 492	| 508
astr.max.mögl.Beschattung	| 144	| 323	| 321	| 494	|
Red.Sonnenscheinwahrsch.	| 0.24	| 0.31	| 0.41	| 0.51	|
Reduktion Betriebsdauer	| 0.91	| 0.91	| 0.91	| 0.91	|
Reduktion Windrichtung	| 0.69	| 0.69	| 0.68	| 0.66	|
Gesamte Reduktion	| 0.15	| 0.20	| 0.26	| 0.31	|
Met.wahrsch.Beschattung	| 22	| 64	| 82	| 153	|

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AY - IO51

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		05:26		20:07 (10)	06:20		19:10 (11)	07:12		18:12 (6)	07:10	08:04
	21:45		21:10	24	20:31 (10)	20:04	21	19:31 (11)	18:51	8	18:20 (6)	16:42	15:58
2	04:48		05:28		20:07 (10)	06:22		19:10 (11)	07:14			07:12	08:05
	21:44		21:08	23	20:30 (10)	20:02	20	19:30 (11)	18:49			16:40	15:57
3	04:49		05:30		20:07 (10)	06:23		19:11 (11)	07:16			07:14	08:07
	21:44		21:06	23	20:30 (10)	20:00	17	19:28 (11)	18:46			16:38	15:57
4	04:49		05:31		20:07 (10)	06:25		19:12 (11)	07:18			07:15	08:08
	21:43		21:05	22	20:29 (10)	19:57	14	19:26 (11)	18:44			16:36	15:56
5	04:50		05:33		20:08 (10)	06:27		19:15 (11)	07:19			07:17	08:10
	21:43		21:03	20	20:28 (10)	19:55	9	19:24 (11)	18:42			16:34	15:55
6	04:51		05:35		20:09 (10)	06:29			07:21			07:19	08:11
	21:42		21:01	18	20:27 (10)	19:52			18:39			16:32	15:55
7	04:52		05:36		20:10 (10)	06:30			07:23			07:21	08:12
	21:42		20:59	16	20:26 (10)	19:50			18:37			16:30	15:54
8	04:53		05:38		20:12 (10)	06:32			07:25		17:32 (2)	07:23	08:14
	21:41		20:57	12	20:24 (10)	19:47			18:35	2	17:34 (2)	16:28	15:54
9	04:54		05:40		20:15 (10)	06:34			07:27		17:28 (2)	07:25	08:15
	21:40		20:55	5	20:20 (10)	19:45			18:32	11	17:39 (2)	16:27	15:54
10	04:55		05:42			06:35			07:28		17:26 (2)	07:27	08:16
	21:39		20:53			19:43			18:30	14	17:40 (2)	16:25	15:53
11	04:56		05:43			06:37			07:30		17:24 (2)	07:29	08:17
	21:38		20:51			19:40			18:27	17	17:41 (2)	16:23	15:53
12	04:58		05:45			06:39			07:32		17:23 (2)	07:31	08:18
	21:38		20:49			19:38			18:25	19	17:42 (2)	16:22	15:53
13	04:59		05:47			06:41			07:34		17:22 (2)	07:33	08:19
	21:37		20:47			19:35			18:23	20	17:42 (2)	16:20	15:53
14	05:00		05:48			06:42			07:36		17:22 (2)	07:34	08:20
	21:36		20:45			19:33			18:20	20	17:42 (2)	16:18	15:53
15	05:01		05:50			06:44			07:38		17:22 (2)	07:36	08:21
	21:34	6	20:43			19:30			18:18	20	17:42 (2)	16:17	15:53
16	05:02		05:52			06:46			07:39		17:22 (2)	07:38	08:22
	21:33	10	20:41			19:28			18:16	20	17:42 (2)	16:15	15:53
17	05:04		05:54			06:48			07:41		17:21 (2)	07:40	08:23
	21:32	13	20:38			19:26			18:14	19	17:40 (2)	16:14	15:53
18	05:05		05:55			06:49		18:17 (6)	07:43		17:21 (2)	07:42	08:24
	21:31	15	20:36			19:23	10	18:27 (6)	18:11	19	17:40 (2)	16:12	15:53
19	05:06		05:57			06:51		18:13 (6)	07:45		17:22 (2)	07:44	08:25
	21:30	17	20:34			19:21	15	18:28 (6)	18:09	17	17:39 (2)	16:11	15:54
20	05:08		05:59		19:20 (11)	06:53		18:12 (6)	07:47		17:23 (2)	07:45	08:25
	21:28	18	20:32	8	19:28 (11)	19:18	18	18:30 (6)	18:07	14	17:37 (2)	16:10	15:54
21	05:09		06:01		19:17 (11)	06:55		18:11 (6)	07:49		17:25 (2)	07:47	08:26
	21:27	20	20:30	14	19:31 (11)	19:16	20	18:31 (6)	18:05	9	17:34 (2)	16:08	15:54
22	05:11		06:02		19:15 (11)	06:56		18:10 (6)	07:51			07:49	08:26
	21:26	21	20:27	16	19:31 (11)	19:13	21	18:31 (6)	18:02			16:07	15:55
23	05:12		06:04		19:14 (11)	06:58		18:08 (6)	07:53			07:51	08:27
	21:24	22	20:25	19	19:33 (11)	19:11	22	18:30 (6)	18:00			16:06	15:55
24	05:14		06:06		19:13 (11)	07:00		18:08 (6)	07:54			07:53	08:27
	21:23	23	20:23	21	19:34 (11)	19:08	22	18:30 (6)	17:58			16:05	15:56
25	05:15		06:08		19:11 (11)	07:02		18:08 (6)	06:56			07:54	08:28
	21:21	23	20:21	22	19:33 (11)	19:06	22	18:30 (6)	16:56			16:04	15:56
26	05:17		06:09		19:11 (11)	07:03		18:08 (6)	06:58			07:56	08:28
	21:20	24	20:18	23	19:34 (11)	19:03	22	18:30 (6)	16:54			16:03	15:57
27	05:18		06:11		19:10 (11)	07:05		18:08 (6)	07:00			07:58	08:28
	21:18	25	20:16	24	19:34 (11)	19:01	20	18:28 (6)	16:52			16:02	15:58
28	05:20		06:13		19:09 (11)	07:07		18:08 (6)	07:02			07:59	08:28
	21:17	24	20:14	24	19:33 (11)	18:59	19	18:27 (6)	16:50			16:01	15:59
29	05:22		06:15		19:09 (11)	07:09		18:09 (6)	07:04			08:01	08:29
	21:15	25	20:11	24	19:33 (11)	18:56	17	18:26 (6)	16:48			16:00	16:00
30	05:23		06:16		19:09 (11)	07:11		18:11 (6)	07:06			08:02	08:29
	21:13	24	20:09	24	19:33 (11)	18:54	13	18:24 (6)	16:46			15:59	16:01
31	05:25		06:18		19:09 (11)				07:08				08:29
	21:12	25	20:07	23	19:32 (11)				16:44				16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung		335		405			322			229			
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91		0.91			0.91			0.91			
Reduktion Windrichtung		0.66		0.67			0.69			0.69			
Gesamte Reduktion		0.27		0.30			0.25			0.21			
Met.wahrsch.Beschattung		90		121			82			47			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AZ - IO52

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar			März			April			Mai			Juni		
1	08:29	07:59			07:02		16:51 (2)	06:48			05:40			04:51		20:09 (10)
	16:03	16:54			17:48	21	17:12 (2)	19:46			20:41			21:30	8	20:17 (10)
2	08:28	07:57			07:00		16:51 (2)	06:46			05:38			04:50		20:11 (10)
	16:04	16:55			17:50	20	17:11 (2)	19:48			20:42			21:31	4	20:15 (10)
3	08:28	07:56			06:58		16:51 (2)	06:43			05:36			04:49		
	16:05	16:57			17:52	19	17:10 (2)	19:50			20:44			21:32		
4	08:28	07:54			06:55		16:53 (2)	06:41			05:34			04:48		
	16:06	16:59			17:54	16	17:09 (2)	19:52			20:46			21:33		
5	08:28	07:52			06:53		16:53 (2)	06:38			05:32			04:48		
	16:08	17:01			17:56	14	17:07 (2)	19:53			20:48			21:34		
6	08:27	07:50			06:51		16:56 (2)	06:36			05:30		20:08 (10)	04:47		
	16:09	17:03			17:58	9	17:05 (2)	19:55			20:50	8	20:16 (10)	21:35		
7	08:27	07:49			06:48			06:34			05:28		20:05 (10)	04:46		
	16:10	17:05			18:00			19:57			20:51	13	20:18 (10)	21:36		
8	08:26	07:47			06:46			06:31			05:26		20:04 (10)	04:46		
	16:12	17:07			18:02			19:59			20:53	16	20:20 (10)	21:37		
9	08:26	07:45			06:44			06:29		19:19 (11)	05:24		20:03 (10)	04:45		
	16:13	17:09			18:04			20:01	11	19:30 (11)	20:55	18	20:21 (10)	21:38		
10	08:25	07:43			06:41			06:27		19:17 (11)	05:22		20:02 (10)	04:45		
	16:15	17:11			18:06			20:03	15	19:32 (11)	20:57	20	20:22 (10)	21:39		
11	08:25	07:41			06:39			06:24		19:15 (11)	05:20		20:01 (10)	04:44		
	16:16	17:13			18:07			20:04	19	19:34 (11)	20:58	21	20:22 (10)	21:40		
12	08:24	07:39			06:37			06:22		19:14 (11)	05:19		20:01 (10)	04:44		
	16:18	17:15			18:09			20:06	21	19:35 (11)	21:00	22	20:23 (10)	21:41		
13	08:23	07:37			06:34			06:20		19:13 (11)	05:17		20:00 (10)	04:43		
	16:19	17:17			18:11			20:08	22	19:35 (11)	21:02	23	20:23 (10)	21:41		
14	08:22	07:35			06:32		17:34 (6)	06:17		19:12 (11)	05:15		19:59 (10)	04:43		
	16:21	17:19			18:13	10	17:44 (6)	20:10	23	19:35 (11)	21:03	24	20:23 (10)	21:42		
15	08:21	07:33			06:29		17:32 (6)	06:15		19:12 (11)	05:14		19:59 (10)	04:43		
	16:22	17:21			18:15	15	17:47 (6)	20:12	24	19:36 (11)	21:05	25	20:24 (10)	21:43		
16	08:20	07:31			06:27		17:30 (6)	06:13		19:11 (11)	05:12		19:59 (10)	04:43		
	16:24	17:23			18:17	18	17:48 (6)	20:13	24	19:35 (11)	21:07	24	20:23 (10)	21:43		
17	08:19	07:29			06:24		17:29 (6)	06:10		19:10 (11)	05:10		19:59 (10)	04:43		
	16:26	17:25			18:19	20	17:49 (6)	20:15	25	19:35 (11)	21:08	25	20:24 (10)	21:44		
18	08:18	07:27			06:22		17:28 (6)	06:08		19:11 (11)	05:09		20:00 (10)	04:43		
	16:27	17:27			18:20	22	17:50 (6)	20:17	24	19:35 (11)	21:10	24	20:24 (10)	21:44		
19	08:17	07:25			06:20		17:27 (6)	06:06		19:11 (11)	05:07		19:59 (10)	04:43		
	16:29	17:29			18:22	22	17:49 (6)	20:19	23	19:34 (11)	21:11	25	20:24 (10)	21:44		
20	08:16	07:22			06:17		17:27 (6)	06:03		19:11 (11)	05:06		20:00 (10)	04:43		
	16:31	17:31			18:24	23	17:50 (6)	20:21	23	19:34 (11)	21:13	24	20:24 (10)	21:45		
21	08:15	07:20			06:15		17:26 (6)	06:01		19:12 (11)	05:04		20:00 (10)	04:43		
	16:33	17:33			18:26	23	17:49 (6)	20:23	21	19:33 (11)	21:15	24	20:24 (10)	21:45		
22	08:14	07:18		16:57 (2)	06:12		17:27 (6)	05:59		19:12 (11)	05:03		20:00 (10)	04:43		
	16:35	17:35	10	17:07 (2)	18:28	22	17:49 (6)	20:24	19	19:31 (11)	21:16	23	20:23 (10)	21:45		
23	08:12	07:16		16:55 (2)	06:10		17:26 (6)	05:57		19:13 (11)	05:01		20:01 (10)	04:43		
	16:36	17:37	14	17:09 (2)	18:30	21	17:47 (6)	20:26	16	19:29 (11)	21:18	22	20:23 (10)	21:45		
24	08:11	07:14		16:53 (2)	06:08		17:27 (6)	05:55		19:15 (11)	05:00		20:01 (10)	04:44		
	16:38	17:39	17	17:10 (2)	18:32	20	17:47 (6)	20:28	12	19:27 (11)	21:19	22	20:23 (10)	21:45		
25	08:10	07:11		16:52 (2)	06:05		17:28 (6)	05:52		19:18 (11)	04:59		20:02 (10)	04:44		
	16:40	17:41	19	17:11 (2)	18:33	17	17:45 (6)	20:30	6	19:24 (11)	21:21	21	20:23 (10)	21:46		
26	08:08	07:09		16:52 (2)	06:03		17:29 (6)	05:50			04:58		20:03 (10)	04:44		
	16:42	17:43	20	17:12 (2)	18:35	14	17:43 (6)	20:32			21:22	19	20:22 (10)	21:46		
27	08:07	07:07		16:51 (2)	06:00		17:32 (6)	05:48			04:56		20:04 (10)	04:45		
	16:44	17:45	20	17:11 (2)	18:37	9	17:41 (6)	20:33			21:23	18	20:22 (10)	21:45		
28	08:05	07:05		16:51 (2)	05:58			05:46			04:55		20:04 (10)	04:45		
	16:46	17:47	21	17:12 (2)	18:39			20:35			21:25	17	20:21 (10)	21:45		
29	08:04				06:55			05:44			04:54		20:05 (10)	04:46		
	16:48				19:41			20:37			21:26	15	20:20 (10)	21:45		
30	08:02				06:53			05:42			04:53		20:06 (10)	04:47		
	16:50				19:42			20:39			21:27	14	20:20 (10)	21:45		
31	08:01				06:51						04:52		20:07 (10)			
	16:52				19:44						21:29	11	20:18 (10)			
Sonnenscheinstunden	252	274			367			419			492			508		
astr.max.mögl.Beschattung			121			355			328			518			12	
Red.Sonnenscheinwahrsch.			0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer			0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung			0.69			0.69			0.68			0.66			0.66	
Gesamte Reduktion			0.15			0.20			0.25			0.31			0.27	
Met.wahrsch.Beschattung			18			71			84			160			3	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)	
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)	

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** AZ - IO52

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1 | 04:47			| 05:26		20:11 (10)	| 06:20		19:14 (11)	| 07:12			| 07:10	| 08:04
| 21:45			| 21:10	23	20:34 (10)	| 20:04	19	19:33 (11)	| 18:51			| 16:42	| 15:58
2 | 04:48			| 05:28		20:11 (10)	| 06:22		19:16 (11)	| 07:14			| 07:12	| 08:05
| 21:44			| 21:08	21	20:32 (10)	| 20:02	15	19:31 (11)	| 18:49			| 16:40	| 15:57
3 | 04:49			| 05:30		20:12 (10)	| 06:23		19:17 (11)	| 07:16			| 07:14	| 08:07
| 21:44			| 21:06	20	20:32 (10)	| 20:00	11	19:28 (11)	| 18:46			| 16:38	| 15:57
4 | 04:49			| 05:31		20:13 (10)	| 06:25			| 07:18			| 07:15	| 08:08
| 21:43			| 21:05	17	20:30 (10)	| 19:57			| 18:44			| 16:36	| 15:56
5 | 04:50			| 05:33		20:14 (10)	| 06:27			| 07:19			| 07:17	| 08:10
| 21:43			| 21:03	15	20:29 (10)	| 19:55			| 18:42			| 16:34	| 15:55
6 | 04:51			| 05:35		20:16 (10)	| 06:29			| 07:21			| 07:19	| 08:11
| 21:42			| 21:01	11	20:27 (10)	| 19:52			| 18:39			| 16:32	| 15:55
7 | 04:52			| 05:36		20:19 (10)	| 06:30			| 07:23		17:33 (2)	| 07:21	| 08:12
| 21:42			| 20:59	5	20:24 (10)	| 19:50			| 18:37	5	17:38 (2)	| 16:30	| 15:54
8 | 04:53			| 05:38			| 06:32			| 07:25		17:29 (2)	| 07:23	| 08:14
| 21:41			| 20:57			| 19:47			| 18:35	12	17:41 (2)	| 16:28	| 15:54
9 | 04:54			| 05:40			| 06:34			| 07:27		17:27 (2)	| 07:25	| 08:15
| 21:40			| 20:55			| 19:45			| 18:32	16	17:43 (2)	| 16:27	| 15:54
10 | 04:55			| 05:42			| 06:35			| 07:28		17:26 (2)	| 07:27	| 08:16
| 21:39			| 20:53			| 19:43			| 18:30	18	17:44 (2)	| 16:25	| 15:53
11 | 04:56		20:18 (10)	| 05:43			| 06:37			| 07:30		17:25 (2)	| 07:29	| 08:17
| 21:38	7	20:25 (10)	| 20:51			| 19:40			| 18:27	19	17:44 (2)	| 16:23	| 15:53
12 | 04:58		20:16 (10)	| 05:45			| 06:39			| 07:32		17:24 (2)	| 07:31	| 08:18
| 21:38	10	20:26 (10)	| 20:49			| 19:38			| 18:25	21	17:45 (2)	| 16:22	| 15:53
13 | 04:59		20:15 (10)	| 05:47			| 06:41			| 07:34		17:24 (2)	| 07:33	| 08:19
| 21:37	13	20:28 (10)	| 20:47			| 19:35			| 18:23	21	17:45 (2)	| 16:20	| 15:53
14 | 05:00		20:14 (10)	| 05:48			| 06:42			| 07:36		17:24 (2)	| 07:34	| 08:20
| 21:36	15	20:29 (10)	| 20:45			| 19:33			| 18:20	21	17:45 (2)	| 16:18	| 15:53
15 | 05:01		20:13 (10)	| 05:50			| 06:44			| 07:38		17:24 (2)	| 07:36	| 08:21
| 21:34	16	20:29 (10)	| 20:43			| 19:30			| 18:18	20	17:44 (2)	| 16:17	| 15:53
16 | 05:02		20:12 (10)	| 05:52			| 06:46		18:21 (6)	| 07:39		17:24 (2)	| 07:38	| 08:22
| 21:33	18	20:30 (10)	| 20:41			| 19:28	7	18:28 (6)	| 18:16	20	17:44 (2)	| 16:15	| 15:53
17 | 05:04		20:13 (10)	| 05:54			| 06:48		18:18 (6)	| 07:41		17:24 (2)	| 07:40	| 08:23
| 21:32	18	20:31 (10)	| 20:38			| 19:26	13	18:31 (6)	| 18:14	18	17:42 (2)	| 16:14	| 15:53
18 | 05:05		20:12 (10)	| 05:55		19:24 (11)	| 06:49		18:16 (6)	| 07:43		17:25 (2)	| 07:42	| 08:24
| 21:31	20	20:32 (10)	| 20:36	8	19:32 (11)	| 19:23	17	18:33 (6)	| 18:11	16	17:41 (2)	| 16:12	| 15:53
19 | 05:06		20:11 (10)	| 05:57		19:20 (11)	| 06:51		18:14 (6)	| 07:45		17:26 (2)	| 07:44	| 08:25
| 21:30	21	20:32 (10)	| 20:34	14	19:34 (11)	| 19:21	19	18:33 (6)	| 18:09	13	17:39 (2)	| 16:11	| 15:54
20 | 05:08		20:11 (10)	| 05:59		19:19 (11)	| 06:53		18:13 (6)	| 07:47		17:28 (2)	| 07:45	| 08:25
| 21:28	21	20:32 (10)	| 20:32	16	19:35 (11)	| 19:18	21	18:34 (6)	| 18:07	9	17:37 (2)	| 16:10	| 15:54
21 | 05:09		20:11 (10)	| 06:01		19:18 (11)	| 06:55		18:12 (6)	| 07:49			| 07:47	| 08:26
| 21:27	23	20:34 (10)	| 20:30	19	19:37 (11)	| 19:16	22	18:34 (6)	| 18:05			| 16:08	| 15:54
22 | 05:11		20:10 (10)	| 06:02		19:16 (11)	| 06:56		18:12 (6)	| 07:51			| 07:49	| 08:26
| 21:26	24	20:34 (10)	| 20:27	21	19:37 (11)	| 19:13	22	18:34 (6)	| 18:02			| 16:07	| 15:55
23 | 05:12		20:10 (10)	| 06:04		19:15 (11)	| 06:58		18:11 (6)	| 07:53			| 07:51	| 08:27
| 21:24	24	20:34 (10)	| 20:25	23	19:38 (11)	| 19:11	22	18:33 (6)	| 18:00			| 16:06	| 15:55
24 | 05:14		20:10 (10)	| 06:06		19:15 (11)	| 07:00		18:11 (6)	| 07:54			| 07:53	| 08:27
| 21:23	24	20:34 (10)	| 20:23	23	19:38 (11)	| 19:08	22	18:33 (6)	| 17:58			| 16:05	| 15:56
25 | 05:15		20:10 (10)	| 06:08		19:13 (11)	| 07:02		18:11 (6)	| 06:56			| 07:54	| 08:28
| 21:21	24	20:34 (10)	| 20:21	24	19:37 (11)	| 19:06	22	18:33 (6)	| 16:56			| 16:04	| 15:56
26 | 05:17		20:10 (10)	| 06:09		19:13 (11)	| 07:03		18:11 (6)	| 06:58			| 07:56	| 08:28
| 21:20	25	20:35 (10)	| 20:18	25	19:38 (11)	| 19:03	21	18:32 (6)	| 16:54			| 16:03	| 15:57
27 | 05:18		20:10 (10)	| 06:11		19:13 (11)	| 07:05		18:11 (6)	| 07:00			| 07:58	| 08:28
| 21:18	24	20:34 (10)	| 20:16	25	19:38 (11)	| 19:01	19	18:30 (6)	| 16:52			| 16:02	| 15:58
28 | 05:20		20:10 (10)	| 06:13		19:13 (11)	| 07:07		18:12 (6)	| 07:02			| 07:59	| 08:28
| 21:17	25	20:35 (10)	| 20:14	24	19:37 (11)	| 18:59	16	18:28 (6)	| 16:50			| 16:01	| 15:59
29 | 05:22		20:10 (10)	| 06:15		19:13 (11)	| 07:09		18:14 (6)	| 07:04			| 08:01	| 08:29
| 21:15	24	20:34 (10)	| 20:11	23	19:36 (11)	| 18:56	12	18:26 (6)	| 16:48			| 16:00	| 16:00
30 | 05:23		20:11 (10)	| 06:16		19:14 (11)	| 07:11		18:18 (6)	| 07:06			| 08:02	| 08:29
| 21:13	23	20:34 (10)	| 20:09	22	19:36 (11)	| 18:54	4	18:22 (6)	| 16:46			| 15:59	| 16:01
31 | 05:25		20:10 (10)	| 06:18		19:13 (11)	|			| 07:08			|	| 08:29
| 21:12	24	20:34 (10)	| 20:07	21	19:34 (11)	|			| 16:44			|	| 16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung	423		400			304			229				
Red.Sonnenscheinwahrsch.	0.45		0.49			0.40			0.33				
Reduktion Betriebsdauer	0.91		0.91			0.91			0.91				
Reduktion Windrichtung	0.66		0.67			0.69			0.69				
Gesamte Reduktion	0.27		0.30			0.26			0.21				
Met.wahrsch.Beschattung	114		120			78			47				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BA - IO53

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar			März			April			Mai			Juni		
1	08:29	07:59			07:02		16:52 (2)	06:48			05:40			04:51		20:08 (10)
	16:03	16:54			17:48	21	17:13 (2)	19:46			20:41			21:30	15	20:23 (10)
2	08:28	07:57			07:00		16:52 (2)	06:46			05:38			04:50		20:09 (10)
	16:04	16:55			17:50	20	17:12 (2)	19:48			20:42			21:31	13	20:22 (10)
3	08:28	07:56			06:58		16:52 (2)	06:43			05:36			04:49		20:10 (10)
	16:05	16:57			17:52	20	17:12 (2)	19:50			20:44			21:32	12	20:22 (10)
4	08:28	07:54			06:55		16:53 (2)	06:41			05:34			04:48		20:11 (10)
	16:06	16:59			17:54	19	17:12 (2)	19:52			20:46			21:33	10	20:21 (10)
5	08:28	07:52			06:53		16:53 (2)	06:38			05:32			04:48		20:13 (10)
	16:08	17:01			17:56	17	17:10 (2)	19:53			20:48			21:34	6	20:19 (10)
6	08:27	07:50			06:51		16:55 (2)	06:36			05:30			04:47		
	16:09	17:03			17:58	13	17:08 (2)	19:55			20:50			21:35		
7	08:27	07:49			06:48		16:57 (2)	06:34			05:28			04:46		
	16:10	17:05			18:00	8	17:05 (2)	19:57			20:51			21:36		
8	08:26	07:47			06:46			06:31			05:26		20:09 (10)	04:46		
	16:12	17:07			18:02			19:59			20:53	10	20:19 (10)	21:37		
9	08:26	07:45			06:44			06:29			05:24		20:08 (10)	04:45		
	16:13	17:09			18:04			20:01			20:55	14	20:22 (10)	21:38		
10	08:25	07:43			06:41			06:27		19:22 (11)	05:22		20:06 (10)	04:45		
	16:15	17:11			18:06			20:03	10	19:32 (11)	20:57	17	20:23 (10)	21:39		
11	08:25	07:41			06:39			06:24		19:20 (11)	05:20		20:04 (10)	04:44		
	16:16	17:13			18:07			20:04	14	19:34 (11)	20:58	20	20:24 (10)	21:40		
12	08:24	07:39			06:37			06:22		19:18 (11)	05:19		20:04 (10)	04:44		
	16:18	17:15			18:09			20:06	18	19:36 (11)	21:00	21	20:25 (10)	21:41		
13	08:23	07:37			06:34			06:20		19:16 (11)	05:17		20:03 (10)	04:43		
	16:19	17:17			18:11			20:08	20	19:36 (11)	21:02	22	20:25 (10)	21:41		
14	08:22	07:35			06:32			06:17		19:15 (11)	05:15		20:02 (10)	04:43		
	16:21	17:19			18:13			20:10	22	19:37 (11)	21:03	23	20:25 (10)	21:42		
15	08:21	07:33			06:29		17:36 (6)	06:15		19:14 (11)	05:14		20:02 (10)	04:43		
	16:22	17:21			18:15	11	17:47 (6)	20:12	24	19:38 (11)	21:05	24	20:26 (10)	21:43		
16	08:20	07:31			06:27		17:33 (6)	06:13		19:13 (11)	05:12		20:02 (10)	04:43		
	16:24	17:23			18:17	15	17:48 (6)	20:13	24	19:37 (11)	21:07	24	20:26 (10)	21:43		
17	08:19	07:29			06:24		17:32 (6)	06:10		19:13 (11)	05:10		20:02 (10)	04:43		
	16:26	17:25			18:19	18	17:50 (6)	20:15	24	19:37 (11)	21:08	24	20:26 (10)	21:44		
18	08:18	07:27			06:22		17:31 (6)	06:08		19:13 (11)	05:09		20:02 (10)	04:43		
	16:27	17:27			18:20	20	17:51 (6)	20:17	24	19:37 (11)	21:10	25	20:27 (10)	21:44		
19	08:17	07:25			06:20		17:29 (6)	06:06		19:13 (11)	05:07		20:02 (10)	04:43		
	16:29	17:29			18:22	22	17:51 (6)	20:19	24	19:37 (11)	21:11	24	20:26 (10)	21:44		
20	08:16	07:22			06:17		17:29 (6)	06:03		19:13 (11)	05:06		20:02 (10)	04:43		
	16:31	17:31			18:24	22	17:51 (6)	20:21	24	19:37 (11)	21:13	25	20:27 (10)	21:45		
21	08:15	07:20			06:15		17:28 (6)	06:01		19:13 (11)	05:04		20:02 (10)	04:43		
	16:33	17:33			18:26	23	17:51 (6)	20:23	23	19:36 (11)	21:15	25	20:27 (10)	21:45		
22	08:14	07:18		17:01 (2)	06:12		17:28 (6)	05:59		19:13 (11)	05:03		20:02 (10)	04:43		
	16:35	17:35	5	17:06 (2)	18:28	23	17:51 (6)	20:24	22	19:35 (11)	21:16	24	20:26 (10)	21:45		
23	08:12	07:16		16:58 (2)	06:10		17:28 (6)	05:57		19:14 (11)	05:01		20:02 (10)	04:43		
	16:36	17:37	11	17:09 (2)	18:30	22	17:50 (6)	20:26	20	19:34 (11)	21:18	24	20:26 (10)	21:45		
24	08:11	07:14		16:55 (2)	06:08		17:28 (6)	05:55		19:15 (11)	05:00		20:03 (10)	04:44		
	16:38	17:39	15	17:10 (2)	18:32	21	17:49 (6)	20:28	17	19:32 (11)	21:19	23	20:26 (10)	21:45		
25	08:10	07:11		16:54 (2)	06:05		17:28 (6)	05:52		19:16 (11)	04:59		20:04 (10)	04:44		
	16:40	17:41	18	17:12 (2)	18:33	20	17:46 (6)	20:30	15	19:31 (11)	21:21	22	20:26 (10)	21:46		
26	08:08	07:09		16:54 (2)	06:03		17:29 (6)	05:50		19:19 (11)	04:58		20:04 (10)	04:44		
	16:42	17:43	19	17:13 (2)	18:35	18	17:47 (6)	20:32	9	19:28 (11)	21:22	22	20:26 (10)	21:46		
27	08:07	07:07		16:52 (2)	06:00		17:31 (6)	05:48			04:56		20:05 (10)	04:45		
	16:44	17:45	21	17:13 (2)	18:37	14	17:45 (6)	20:33			21:23	21	20:26 (10)	21:45		
28	08:05	07:05		16:52 (2)	05:58		17:33 (6)	05:46			04:55		20:05 (10)	04:45		
	16:46	17:47	21	17:13 (2)	18:39	9	17:42 (6)	20:35			21:25	20	20:25 (10)	21:45		
29	08:04				06:55			05:44			04:54		20:06 (10)	04:46		
	16:48				19:41			20:37			21:26	19	20:25 (10)	21:45		
30	08:02				06:53			05:42			04:53		20:07 (10)	04:47		
	16:50				19:42			20:39			21:27	17	20:24 (10)	21:45		
31	08:01				06:51						04:52		20:07 (10)			
	16:52				19:44						21:29	17	20:24 (10)			
Sonnenscheinstunden	252	274			367			419			492			508		
astr.max.mögl.Beschattung			110			376			334			507			56	
Red.Sonnenscheinwahrsch.			0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer			0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung			0.69			0.69			0.67			0.66			0.66	
Gesamte Reduktion			0.15			0.20			0.25			0.31			0.27	
Met.wahrsch.Beschattung			16			75			85			156			15	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BA - IO53

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47			05:26		20:15 (10)	06:20		19:19 (11)	07:12			07:10	08:04
	21:45			21:10	20	20:35 (10)	20:04	14	19:33 (11)	18:51			16:42	15:58
2	04:48			05:28		20:15 (10)	06:22		19:21 (11)	07:14			07:12	08:05
	21:44			21:08	19	20:34 (10)	20:02	10	19:31 (11)	18:49			16:40	15:57
3	04:49			05:30		20:17 (10)	06:23			07:16			07:14	08:07
	21:44			21:06	16	20:33 (10)	20:00			18:46			16:38	15:57
4	04:49			05:31		20:18 (10)	06:25			07:18			07:15	08:08
	21:43			21:05	13	20:31 (10)	19:57			18:44			16:36	15:56
5	04:50			05:33		20:20 (10)	06:27			07:19			07:17	08:10
	21:43			21:03	9	20:29 (10)	19:55			18:42			16:34	15:55
6	04:51			05:35			06:29			07:21		17:37 (2)	07:19	08:11
	21:42			21:01			19:52			18:39	2	17:39 (2)	16:32	15:55
7	04:52		20:21 (10)	05:36			06:30			07:23		17:31 (2)	07:21	08:12
	21:42	4	20:25 (10)	20:59			19:50			18:37	12	17:43 (2)	16:30	15:54
8	04:53		20:19 (10)	05:38			06:32			07:25		17:29 (2)	07:23	08:14
	21:41	8	20:27 (10)	20:57			19:47			18:35	15	17:44 (2)	16:28	15:54
9	04:54		20:18 (10)	05:40			06:34			07:27		17:28 (2)	07:25	08:15
	21:40	11	20:29 (10)	20:55			19:45			18:32	17	17:45 (2)	16:27	15:54
10	04:55		20:17 (10)	05:42			06:35			07:28		17:27 (2)	07:27	08:16
	21:39	13	20:30 (10)	20:53			19:43			18:30	19	17:46 (2)	16:25	15:53
11	04:56		20:17 (10)	05:43			06:37			07:30		17:26 (2)	07:29	08:17
	21:38	14	20:31 (10)	20:51			19:40			18:27	20	17:46 (2)	16:23	15:53
12	04:58		20:16 (10)	05:45			06:39			07:32		17:26 (2)	07:31	08:18
	21:38	16	20:32 (10)	20:49			19:38			18:25	20	17:46 (2)	16:22	15:53
13	04:59		20:15 (10)	05:47			06:41			07:34		17:25 (2)	07:33	08:19
	21:37	18	20:33 (10)	20:47			19:35			18:23	21	17:46 (2)	16:20	15:53
14	05:00		20:15 (10)	05:48			06:42			07:36		17:25 (2)	07:34	08:20
	21:36	18	20:33 (10)	20:45			19:33			18:20	21	17:46 (2)	16:18	15:53
15	05:01		20:14 (10)	05:50			06:44		18:24 (6)	07:38		17:26 (2)	07:36	08:21
	21:34	20	20:34 (10)	20:43			19:30	8	18:32 (6)	18:18	20	17:46 (2)	16:17	15:53
16	05:02		20:13 (10)	05:52			06:46		18:20 (6)	07:39		17:26 (2)	07:38	08:22
	21:33	21	20:34 (10)	20:41			19:28	13	18:33 (6)	18:16	19	17:45 (2)	16:15	15:53
17	05:04		20:14 (10)	05:54		19:25 (11)	06:48		18:18 (6)	07:41		17:26 (2)	07:40	08:23
	21:32	21	20:35 (10)	20:38	10	19:35 (11)	19:26	17	18:35 (6)	18:14	17	17:43 (2)	16:14	15:53
18	05:05		20:13 (10)	05:55		19:23 (11)	06:49		18:17 (6)	07:43		17:27 (2)	07:42	08:24
	21:31	23	20:36 (10)	20:36	15	19:38 (11)	19:23	19	18:36 (6)	18:11	14	17:41 (2)	16:12	15:53
19	05:07		20:13 (10)	05:57		19:20 (11)	06:51		18:15 (6)	07:45		17:29 (2)	07:44	08:25
	21:30	23	20:36 (10)	20:34	18	19:38 (11)	19:21	21	18:36 (6)	18:09	10	17:39 (2)	16:11	15:54
20	05:08		20:12 (10)	05:59		19:19 (11)	06:53		18:14 (6)	07:47			07:45	08:25
	21:28	24	20:36 (10)	20:32	20	19:39 (11)	19:18	22	18:36 (6)	18:07			16:10	15:54
21	05:09		20:13 (10)	06:01		19:19 (11)	06:55		18:14 (6)	07:49			07:47	08:26
	21:27	24	20:37 (10)	20:30	21	19:40 (11)	19:16	22	18:36 (6)	18:05			16:08	15:54
22	05:11		20:12 (10)	06:02		19:17 (11)	06:56		18:14 (6)	07:51			07:49	08:26
	21:26	25	20:37 (10)	20:27	23	19:40 (11)	19:13	22	18:36 (6)	18:02			16:07	15:55
23	05:12		20:12 (10)	06:04		19:17 (11)	06:58		18:13 (6)	07:53			07:51	08:27
	21:24	24	20:36 (10)	20:25	24	19:41 (11)	19:11	22	18:35 (6)	18:00			16:06	15:55
24	05:14		20:12 (10)	06:06		19:17 (11)	07:00		18:13 (6)	07:54			07:53	08:27
	21:23	25	20:37 (10)	20:23	24	19:41 (11)	19:08	22	18:35 (6)	17:58			16:05	15:56
25	05:15		20:12 (10)	06:08		19:15 (11)	07:02		18:13 (6)	06:56			07:54	08:28
	21:21	25	20:37 (10)	20:21	25	19:40 (11)	19:06	21	18:34 (6)	16:56			16:04	15:56
26	05:17		20:13 (10)	06:09		19:16 (11)	07:03		18:14 (6)	06:58			07:56	08:28
	21:20	24	20:37 (10)	20:18	24	19:40 (11)	19:03	19	18:33 (6)	16:54			16:03	15:57
27	05:18		20:12 (10)	06:11		19:16 (11)	07:05		18:14 (6)	07:00			07:58	08:28
	21:18	25	20:37 (10)	20:16	24	19:40 (11)	19:01	17	18:31 (6)	16:52			16:02	15:58
28	05:20		20:13 (10)	06:13		19:15 (11)	07:07		18:16 (6)	07:02			07:59	08:28
	21:17	24	20:37 (10)	20:14	23	19:38 (11)	18:59	12	18:28 (6)	16:50			16:01	15:59
29	05:22		20:13 (10)	06:15		19:16 (11)	07:09		18:20 (6)	07:04			08:01	08:29
	21:15	23	20:36 (10)	20:11	22	19:38 (11)	18:56	5	18:25 (6)	16:48			16:00	16:00
30	05:23		20:14 (10)	06:16		19:17 (11)	07:11			07:06			08:02	08:29
	21:13	22	20:36 (10)	20:09	20	19:37 (11)	18:54			16:46			15:59	16:01
31	05:25		20:14 (10)	06:18		19:17 (11)				07:08				08:29
	21:12	21	20:35 (10)	20:07	18	19:35 (11)				16:44				16:02
Sonnenscheinstunden	510			459			382			329			260	235
astr.max.mögl.Beschattung		496			388			286			227			
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91			
Reduktion Windrichtung		0.66			0.67			0.70			0.69			
Gesamte Reduktion		0.27			0.30			0.26			0.21			
Met.wahrsch.Beschattung		133			116			73			47			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BB - IO54

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar			März			April			Mai			Juni		
1	08:29	07:59			07:02		16:58 (2)	06:48		18:40 (6)	05:40		19:26 (11)	04:51		20:12 (10)
	16:03	16:54			17:48	20	17:18 (2)	19:46	4	18:44 (6)	20:41	8	19:34 (11)	21:30	23	20:35 (10)
2	08:28	07:57			07:00		16:57 (2)	06:46			05:38			04:50		20:12 (10)
	16:04	16:55			17:50	21	17:18 (2)	19:48			20:42			21:31	23	20:35 (10)
3	08:28	07:56			06:58		16:57 (2)	06:43			05:36			04:49		20:13 (10)
	16:05	16:57			17:52	21	17:18 (2)	19:50			20:44			21:32	22	20:35 (10)
4	08:28	07:54			06:55		16:57 (2)	06:41			05:34			04:48		20:13 (10)
	16:06	16:59			17:54	21	17:18 (2)	19:52			20:46			21:33	22	20:35 (10)
5	08:28	07:52			06:53		16:56 (2)	06:38			05:32			04:48		20:13 (10)
	16:08	17:01			17:56	21	17:17 (2)	19:53			20:48			21:34	22	20:35 (10)
6	08:27	07:50			06:51		16:57 (2)	06:36			05:30			04:47		20:14 (10)
	16:09	17:03			17:58	20	17:17 (2)	19:55			20:50			21:35	21	20:35 (10)
7	08:27	07:49			06:48		16:57 (2)	06:34			05:28			04:46		20:14 (10)
	16:10	17:05			18:00	18	17:15 (2)	19:57			20:51			21:36	20	20:34 (10)
8	08:26	07:47			06:46		16:58 (2)	06:31			05:26			04:46		20:15 (10)
	16:12	17:07			18:02	16	17:14 (2)	19:59			20:53			21:37	20	20:35 (10)
9	08:26	07:45			06:44		17:00 (2)	06:29			05:24			04:45		20:15 (10)
	16:13	17:09			18:04	13	17:13 (2)	20:01			20:55			21:38	19	20:34 (10)
10	08:25	07:43			06:41		17:02 (2)	06:27			05:22			04:45		20:16 (10)
	16:15	17:11			18:06	7	17:09 (2)	20:03			20:57			21:39	18	20:34 (10)
11	08:25	07:41			06:39			06:24			05:20			04:44		20:17 (10)
	16:16	17:13			18:07			20:04			20:58			21:40	18	20:35 (10)
12	08:24	07:39			06:37			06:22			05:19		20:22 (10)	04:44		20:18 (10)
	16:18	17:15			18:09			20:06			21:00	1	20:23 (10)	21:41	17	20:35 (10)
13	08:23	07:37			06:34			06:20			05:17		20:17 (10)	04:43		20:17 (10)
	16:19	17:17			18:11			20:08			21:02	10	20:27 (10)	21:41	17	20:34 (10)
14	08:22	07:35			06:32			06:17		19:29 (11)	05:15		20:15 (10)	04:43		20:18 (10)
	16:21	17:19			18:13			20:10	9	19:38 (11)	21:03	14	20:29 (10)	21:42	16	20:34 (10)
15	08:21	07:33			06:29			06:15		19:26 (11)	05:14		20:14 (10)	04:43		20:19 (10)
	16:22	17:21			18:15			20:12	15	19:41 (11)	21:05	17	20:31 (10)	21:43	15	20:34 (10)
16	08:20	07:31			06:27			06:13		19:24 (11)	05:12		20:13 (10)	04:43		20:19 (10)
	16:24	17:23			18:17			20:13	18	19:42 (11)	21:07	18	20:31 (10)	21:43	15	20:34 (10)
17	08:19	07:29			06:24			06:10		19:22 (11)	05:10		20:12 (10)	04:43		20:20 (10)
	16:26	17:25			18:19			20:15	21	19:43 (11)	21:08	20	20:32 (10)	21:44	14	20:34 (10)
18	08:18	07:27			06:22		17:43 (6)	06:08		19:22 (11)	05:09		20:12 (10)	04:43		20:20 (10)
	16:27	17:27			18:20	9	17:52 (6)	20:17	22	19:44 (11)	21:10	21	20:33 (10)	21:44	14	20:34 (10)
19	08:17	07:25			06:20		17:39 (6)	06:06		19:21 (11)	05:07		20:11 (10)	04:43		20:20 (10)
	16:29	17:29			18:22	15	17:54 (6)	20:19	23	19:44 (11)	21:11	22	20:33 (10)	21:44	14	20:34 (10)
20	08:16	07:22			06:17		17:38 (6)	06:03		19:20 (11)	05:06		20:11 (10)	04:43		20:20 (10)
	16:31	17:31			18:24	17	17:55 (6)	20:21	25	19:45 (11)	21:13	23	20:34 (10)	21:45	14	20:34 (10)
21	08:15	07:20			06:15		17:36 (6)	06:01		19:20 (11)	05:04		20:11 (10)	04:43		20:20 (10)
	16:33	17:33			18:26	20	17:56 (6)	20:23	25	19:45 (11)	21:15	24	20:35 (10)	21:45	14	20:34 (10)
22	08:14	07:18			06:12		17:35 (6)	05:59		19:19 (11)	05:03		20:10 (10)	04:43		20:21 (10)
	16:35	17:35			18:28	22	17:57 (6)	20:24	25	19:44 (11)	21:16	24	20:34 (10)	21:45	14	20:35 (10)
23	08:12	07:16			06:10		17:34 (6)	05:57		19:19 (11)	05:01		20:10 (10)	04:43		20:21 (10)
	16:36	17:37			18:30	22	17:56 (6)	20:26	25	19:44 (11)	21:18	25	20:35 (10)	21:45	14	20:35 (10)
24	08:11	07:14			06:08		17:34 (6)	05:55		19:19 (11)	05:00		20:10 (10)	04:44		20:21 (10)
	16:38	17:39			18:32	23	17:57 (6)	20:28	24	19:43 (11)	21:19	25	20:35 (10)	21:45	14	20:35 (10)
25	08:10	07:11		17:04 (2)	06:05		17:33 (6)	05:52		19:19 (11)	04:59		20:10 (10)	04:44		20:22 (10)
	16:40	17:41	8	17:12 (2)	18:33	23	17:56 (6)	20:30	24	19:43 (11)	21:21	25	20:35 (10)	21:46	14	20:36 (10)
26	08:08	07:09		17:02 (2)	06:03		17:33 (6)	05:50		19:20 (11)	04:58		20:11 (10)	04:44		20:21 (10)
	16:42	17:43	13	17:15 (2)	18:35	23	17:56 (6)	20:32	22	19:42 (11)	21:22	25	20:36 (10)	21:45	15	20:36 (10)
27	08:07	07:07		16:59 (2)	06:00		17:34 (6)	05:48		19:20 (11)	04:56		20:11 (10)	04:45		20:21 (10)
	16:44	17:45	17	17:16 (2)	18:37	22	17:56 (6)	20:33	21	19:41 (11)	21:23	25	20:36 (10)	21:45	15	20:36 (10)
28	08:05	07:05		16:58 (2)	05:58		17:33 (6)	05:46		19:21 (11)	04:55		20:11 (10)	04:45		20:21 (10)
	16:46	17:47	19	17:17 (2)	18:39	21	17:54 (6)	20:35	19	19:40 (11)	21:25	25	20:36 (10)	21:45	16	20:37 (10)
29	08:04				06:55		18:34 (6)	05:44		19:22 (11)	04:54		20:11 (10)	04:46		20:22 (10)
	16:48				19:41	19	18:53 (6)	20:37	17	19:39 (11)	21:26	25	20:36 (10)	21:45	16	20:38 (10)
30	08:02				06:53		18:35 (6)	05:42		19:24 (11)	04:53		20:11 (10)	04:47		20:21 (10)
	16:50				19:42	16	18:51 (6)	20:39	13	19:37 (11)	21:27	25	20:36 (10)	21:45	17	20:38 (10)
31	08:01				06:51		18:37 (6)				04:52		20:12 (10)			
	16:52				19:44	12	18:49 (6)				21:29	23	20:35 (10)			
Sonnenscheinstunden	252	274			367			419			492			508		
astr.max.mögl.Beschattung			57			442			352			425			513	
Red.Sonnenscheinwahrsch.			0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer			0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung			0.69			0.69			0.67			0.65			0.65	
Gesamte Reduktion			0.15			0.20			0.25			0.31			0.27	
Met.wahrsch.Beschattung			8			88			88			130			139	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BB - IO54

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August			September			Oktober			November	Dezember
1 | 04:47		20:21 (10) | 05:26			06:20			07:12			07:10	08:04
| 21:45	18	20:39 (10) | 21:10			20:04			18:51			16:42	15:58
2 | 04:48		20:21 (10) | 05:28			06:22			07:14			07:12	08:05
| 21:44	18	20:39 (10) | 21:08			20:02			18:49			16:40	15:57
3 | 04:49		20:21 (10) | 05:30			06:23			07:16			07:14	08:07
| 21:44	18	20:39 (10) | 21:06			20:00			18:46			16:38	15:57
4 | 04:49		20:21 (10) | 05:31			06:25			07:18		17:38 (2)	07:15	08:08
| 21:43	19	20:40 (10) | 21:05			19:57			18:44	11	17:49 (2)	16:36	15:56
5 | 04:50		20:21 (10) | 05:33			06:27			07:19		17:36 (2)	07:17	08:10
| 21:43	20	20:41 (10) | 21:03			19:55			18:42	15	17:51 (2)	16:34	15:55
6 | 04:51		20:21 (10) | 05:35			06:29			07:21		17:34 (2)	07:19	08:11
| 21:42	20	20:41 (10) | 21:01			19:52			18:39	18	17:52 (2)	16:32	15:55
7 | 04:52		20:21 (10) | 05:36			06:30			07:23		17:32 (2)	07:21	08:12
| 21:42	21	20:42 (10) | 20:59			19:50			18:37	20	17:52 (2)	16:30	15:54
8 | 04:53		20:21 (10) | 05:38			06:32			07:25		17:32 (2)	07:23	08:14
| 21:41	21	20:42 (10) | 20:57			19:47			18:35	20	17:52 (2)	16:28	15:54
9 | 04:54		20:21 (10) | 05:40			06:34			07:27		17:31 (2)	07:25	08:15
| 21:40	22	20:43 (10) | 20:55			19:45			18:32	21	17:52 (2)	16:27	15:54
10 | 04:55		20:20 (10) | 05:42			06:35			07:28		17:31 (2)	07:27	08:16
| 21:39	23	20:43 (10) | 20:53			19:43			18:30	21	17:52 (2)	16:25	15:53
11 | 04:56		20:20 (10) | 05:43			06:37			07:30		17:31 (2)	07:29	08:17
| 21:38	23	20:43 (10) | 20:51			19:40			18:27	21	17:52 (2)	16:23	15:53
12 | 04:58		20:20 (10) | 05:45		19:34 (11)	06:39		18:29 (6)	07:32		17:31 (2)	07:31	08:18
| 21:38	24	20:44 (10) | 20:49	10	19:44 (11)	19:38	11	18:40 (6)	18:25	20	17:51 (2)	16:22	15:53
13 | 04:59		20:20 (10) | 05:47		19:32 (11)	06:41		18:26 (6)	07:34		17:31 (2)	07:33	08:19
| 21:37	24	20:44 (10) | 20:47	14	19:46 (11)	19:35	16	18:42 (6)	18:23	20	17:51 (2)	16:20	15:53
14 | 05:00		20:20 (10) | 05:48		19:30 (11)	06:42		18:25 (6)	07:36		17:32 (2)	07:34	08:20
| 21:36	24	20:44 (10) | 20:45	17	19:47 (11)	19:33	18	18:43 (6)	18:20	18	17:50 (2)	16:18	15:53
15 | 05:01		20:20 (10) | 05:50		19:29 (11)	06:44		18:24 (6)	07:38		17:33 (2)	07:36	08:21
| 21:34	24	20:44 (10) | 20:43	19	19:48 (11)	19:30	20	18:44 (6)	18:18	15	17:48 (2)	16:17	15:53
16 | 05:02		20:19 (10) | 05:52		19:28 (11)	06:46		18:22 (6)	07:39		17:35 (2)	07:38	08:22
| 21:33	25	20:44 (10) | 20:41	21	19:49 (11)	19:28	22	18:44 (6)	18:16	11	17:46 (2)	16:15	15:53
17 | 05:04		20:20 (10) | 05:54		19:26 (11)	06:48		18:22 (6)	07:41		17:37 (2)	07:40	08:23
| 21:32	25	20:45 (10) | 20:38	23	19:49 (11)	19:26	22	18:44 (6)	18:14	5	17:42 (2)	16:14	15:53
18 | 05:05		20:20 (10) | 05:55		19:26 (11)	06:49		18:21 (6)	07:43			07:42	08:24
| 21:31	25	20:45 (10) | 20:36	24	19:50 (11)	19:23	23	18:44 (6)	18:11			16:12	15:53
19 | 05:07		20:20 (10) | 05:57		19:25 (11)	06:51		18:20 (6)	07:45			07:44	08:25
| 21:30	25	20:45 (10) | 20:34	24	19:49 (11)	19:21	23	18:43 (6)	18:09			16:11	15:54
20 | 05:08		20:20 (10) | 05:59		19:25 (11)	06:53		18:20 (6)	07:47			07:45	08:25
| 21:28	24	20:44 (10) | 20:32	24	19:49 (11)	19:18	23	18:43 (6)	18:07			16:10	15:54
21 | 05:09		20:21 (10) | 06:01		19:25 (11)	06:55		18:21 (6)	07:49			07:47	08:26
| 21:27	24	20:45 (10) | 20:30	24	19:49 (11)	19:16	21	18:42 (6)	18:05			16:08	15:54
22 | 05:11		20:20 (10) | 06:02		19:24 (11)	06:56		18:21 (6)	07:51			07:49	08:26
| 21:26	25	20:45 (10) | 20:27	24	19:48 (11)	19:13	21	18:42 (6)	18:02			16:07	15:55
23 | 05:12		20:20 (10) | 06:04		19:24 (11)	06:58		18:21 (6)	07:53			07:51	08:27
| 21:24	24	20:44 (10) | 20:25	24	19:48 (11)	19:11	18	18:39 (6)	18:00			16:06	15:55
24 | 05:14		20:21 (10) | 06:06		19:25 (11)	07:00		18:22 (6)	07:54			07:53	08:27
| 21:23	23	20:44 (10) | 20:23	23	19:48 (11)	19:08	16	18:38 (6)	17:58			16:05	15:56
25 | 05:15		20:22 (10) | 06:08		19:24 (11)	07:02		18:24 (6)	06:56			07:54	08:28
| 21:21	21	20:43 (10) | 20:21	22	19:46 (11)	19:06	12	18:36 (6)	16:56			16:04	15:56
26 | 05:17		20:23 (10) | 06:09		19:25 (11)	07:03			06:58			07:56	08:28
| 21:20	20	20:43 (10) | 20:18	20	19:45 (11)	19:03			16:54			16:03	15:57
27 | 05:18		20:23 (10) | 06:11		19:27 (11)	07:05			07:00			07:58	08:28
| 21:18	19	20:42 (10) | 20:16	17	19:44 (11)	19:01			16:52			16:02	15:58
28 | 05:20		20:24 (10) | 06:13		19:27 (11)	07:07			07:02			07:59	08:28
| 21:17	18	20:42 (10) | 20:14	15	19:42 (11)	18:59			16:50			16:01	15:59
29 | 05:22		20:25 (10) | 06:15		19:30 (11)	07:09			07:04			08:01	08:29
| 21:15	15	20:40 (10) | 20:11	9	19:39 (11)	18:56			16:48			16:00	16:00
30 | 05:23		20:27 (10) | 06:16			07:11			07:06			08:02	08:29
| 21:13	12	20:39 (10) | 20:09			18:54			16:46			15:59	16:01
31 | 05:25		20:29 (10) | 06:18						07:08				08:29
| 21:12	8	20:37 (10) | 20:07						16:44				16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung		652			354			266			236		
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33		
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91		
Reduktion Windrichtung		0.65			0.67			0.70			0.69		
Gesamte Reduktion		0.27			0.30			0.26			0.21		
Met.wahrsch.Beschattung		174			105			68			49		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BC - IO55

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar			März			April			Mai			Juni		
1	08:29	07:59			07:02		17:04 (2)	06:48		18:38 (6)	05:40		19:26 (11)	04:51		20:16 (10)
	16:03	16:54			17:48	16	17:20 (2)	19:46	18	18:56 (6)	20:41	18	19:44 (11)	21:30	24	20:40 (10)
2	08:28	07:57			07:00		17:02 (2)	06:46		18:40 (6)	05:38		19:27 (11)	04:50		20:16 (10)
	16:04	16:55			17:50	19	17:21 (2)	19:48	14	18:54 (6)	20:42	16	19:43 (11)	21:31	24	20:40 (10)
3	08:28	07:56			06:58		17:02 (2)	06:43		18:43 (6)	05:36		19:29 (11)	04:49		20:17 (10)
	16:05	16:57			17:52	20	17:22 (2)	19:50	8	18:51 (6)	20:44	12	19:41 (11)	21:32	24	20:41 (10)
4	08:28	07:54			06:55		17:01 (2)	06:41			05:34		19:32 (11)	04:48		20:17 (10)
	16:06	16:59			17:54	21	17:22 (2)	19:52			20:46	5	19:37 (11)	21:33	23	20:40 (10)
5	08:28	07:52			06:53		17:00 (2)	06:38			05:32			04:48		20:17 (10)
	16:08	17:01			17:56	22	17:22 (2)	19:53			20:48			21:34	23	20:40 (10)
6	08:27	07:50			06:51		17:01 (2)	06:36			05:30			04:47		20:18 (10)
	16:09	17:03			17:58	21	17:22 (2)	19:55			20:50			21:35	23	20:41 (10)
7	08:27	07:49			06:48		17:00 (2)	06:34			05:28			04:46		20:17 (10)
	16:10	17:05			18:00	21	17:21 (2)	19:57			20:51			21:36	23	20:40 (10)
8	08:26	07:47			06:46		17:01 (2)	06:31			05:26			04:46		20:18 (10)
	16:12	17:07			18:02	20	17:21 (2)	19:59			20:53			21:37	23	20:41 (10)
9	08:26	07:45			06:44		17:02 (2)	06:29			05:24			04:45		20:18 (10)
	16:13	17:09			18:04	18	17:20 (2)	20:01			20:55			21:38	22	20:40 (10)
10	08:25	07:43			06:41		17:02 (2)	06:27			05:22			04:45		20:19 (10)
	16:15	17:11			18:06	16	17:18 (2)	20:03			20:57			21:39	21	20:40 (10)
11	08:25	07:41			06:39		17:04 (2)	06:24			05:20			04:44		20:19 (10)
	16:16	17:13			18:07	13	17:17 (2)	20:04			20:58			21:40	22	20:41 (10)
12	08:24	07:39			06:37		17:06 (2)	06:22			05:19			04:44		20:20 (10)
	16:18	17:15			18:09	7	17:13 (2)	20:06			21:00			21:41	21	20:41 (10)
13	08:23	07:37			06:34			06:20			05:17			04:43		20:20 (10)
	16:19	17:17			18:11			20:08			21:02			21:41	20	20:40 (10)
14	08:22	07:35			06:32			06:17			05:15			04:43		20:20 (10)
	16:21	17:19			18:13			20:10			21:03			21:42	21	20:41 (10)
15	08:21	07:33			06:29			06:15			05:14		20:24 (10)	04:43		20:21 (10)
	16:22	17:21			18:15			20:12			21:05	6	20:30 (10)	21:43	20	20:41 (10)
16	08:20	07:31			06:27			06:13		19:35 (11)	05:12		20:21 (10)	04:43		20:21 (10)
	16:24	17:23			18:17			20:13	5	19:40 (11)	21:07	11	20:32 (10)	21:43	20	20:41 (10)
17	08:19	07:29			06:24			06:10		19:31 (11)	05:10		20:20 (10)	04:43		20:21 (10)
	16:26	17:25			18:19			20:15	13	19:44 (11)	21:08	14	20:34 (10)	21:44	20	20:41 (10)
18	08:18	07:27			06:22			06:08		19:29 (11)	05:09		20:19 (10)	04:43		20:22 (10)
	16:27	17:27			18:20			20:17	17	19:46 (11)	21:10	16	20:35 (10)	21:44	19	20:41 (10)
19	08:17	07:25			06:20			06:06		19:28 (11)	05:07		20:17 (10)	04:43		20:22 (10)
	16:29	17:29			18:22			20:19	19	19:47 (11)	21:11	19	20:36 (10)	21:44	19	20:41 (10)
20	08:16	07:22			06:17		17:48 (6)	06:03		19:27 (11)	05:06		20:17 (10)	04:43		20:22 (10)
	16:31	17:31			18:24	7	17:55 (6)	20:21	21	19:48 (11)	21:13	20	20:37 (10)	21:45	19	20:41 (10)
21	08:15	07:20			06:15		17:44 (6)	06:01		19:26 (11)	05:04		20:17 (10)	04:43		20:22 (10)
	16:33	17:33			18:26	13	17:57 (6)	20:23	23	19:49 (11)	21:15	21	20:38 (10)	21:45	19	20:41 (10)
22	08:14	07:18			06:12		17:42 (6)	05:59		19:25 (11)	05:03		20:16 (10)	04:43		20:23 (10)
	16:35	17:35			18:28	17	17:59 (6)	20:24	23	19:48 (11)	21:16	22	20:38 (10)	21:45	19	20:42 (10)
23	08:12	07:16			06:10		17:40 (6)	05:57		19:24 (11)	05:01		20:16 (10)	04:43		20:23 (10)
	16:36	17:37			18:30	20	18:00 (6)	20:26	24	19:48 (11)	21:18	22	20:38 (10)	21:45	19	20:42 (10)
24	08:11	07:14			06:08		17:39 (6)	05:55		19:24 (11)	05:00		20:15 (10)	04:44		20:23 (10)
	16:38	17:39			18:32	22	18:01 (6)	20:28	24	19:48 (11)	21:19	24	20:39 (10)	21:45	19	20:42 (10)
25	08:10	07:11			06:05		17:38 (6)	05:52		19:24 (11)	04:59		20:15 (10)	04:44		20:24 (10)
	16:40	17:41			18:33	22	18:00 (6)	20:30	24	19:48 (11)	21:21	24	20:39 (10)	21:46	19	20:43 (10)
26	08:08	07:09			06:03		17:38 (6)	05:50		19:24 (11)	04:58		20:15 (10)	04:44		20:23 (10)
	16:42	17:43			18:35	23	18:01 (6)	20:32	24	19:48 (11)	21:22	25	20:40 (10)	21:45	20	20:43 (10)
27	08:07	07:07		17:09 (2)	06:00		17:38 (6)	05:48		19:24 (11)	04:56		20:15 (10)	04:45		20:23 (10)
	16:44	17:45	6	17:15 (2)	18:37	23	18:01 (6)	20:33	24	19:48 (11)	21:23	25	20:40 (10)	21:45	20	20:43 (10)
28	08:05	07:05		17:06 (2)	05:58		17:37 (6)	05:46		19:24 (11)	04:55		20:16 (10)	04:45		20:23 (10)
	16:46	17:47	13	17:19 (2)	18:39	23	18:00 (6)	20:35	23	19:47 (11)	21:25	24	20:40 (10)	21:45	21	20:44 (10)
29	08:04				06:55		18:38 (6)	05:44		19:25 (11)	04:54		20:16 (10)	04:46		20:24 (10)
	16:48				19:41	22	19:00 (6)	20:37	21	19:46 (11)	21:26	24	20:40 (10)	21:45	20	20:44 (10)
30	08:02				06:53		18:37 (6)	05:42		19:25 (11)	04:53		20:16 (10)	04:47		20:23 (10)
	16:50				19:42	21	18:58 (6)	20:39	20	19:45 (11)	21:27	24	20:40 (10)	21:45	21	20:44 (10)
31	08:01				06:51		18:38 (6)				04:52		20:16 (10)			
	16:52				19:44	20	18:58 (6)				21:29	24	20:40 (10)			
Sonnenscheinstunden	252	274			367			419			492			508		
astr.max.mögl.Beschattung			19			447			345			396			628	
Red.Sonnenscheinwahrsch.			0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer			0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung			0.68			0.69			0.67			0.65			0.65	
Gesamte Reduktion			0.15			0.20			0.25			0.31			0.27	
Met.wahrsch.Beschattung			3			88			87			121			170	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BC - IO55

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober		November	Dezember
1 | 04:47		20:24 (10) | 05:26		06:20		07:12	17:47 (2) | 07:10	08:04
| 21:45	21	20:45 (10) | 21:10		20:04		18:51	2 17:49 (2) | 16:42	15:58
2 | 04:48		20:24 (10) | 05:28		06:22		07:14	17:43 (2) | 07:12	08:05
| 21:44	22	20:46 (10) | 21:08		20:02		18:49	11 17:54 (2) | 16:40	15:57
3 | 04:49		20:23 (10) | 05:30		06:23		07:16	17:40 (2) | 07:14	08:07
| 21:44	22	20:45 (10) | 21:06		20:00		18:46	16 17:56 (2) | 16:38	15:57
4 | 04:49		20:24 (10) | 05:31		06:25		07:18	17:39 (2) | 07:15	08:08
| 21:43	22	20:46 (10) | 21:05		19:57		18:44	18 17:57 (2) | 16:36	15:56
5 | 04:50		20:24 (10) | 05:33		06:27		07:19	17:38 (2) | 07:17	08:10
| 21:43	22	20:46 (10) | 21:03		19:55		18:42	19 17:57 (2) | 16:34	15:55
6 | 04:51		20:24 (10) | 05:35		06:29		07:21	17:37 (2) | 07:19	08:11
| 21:42	23	20:47 (10) | 21:01		19:52		18:39	21 17:58 (2) | 16:32	15:55
7 | 04:52		20:24 (10) | 05:36		06:30		07:23	17:36 (2) | 07:21	08:12
| 21:42	23	20:47 (10) | 20:59		19:50		18:37	21 17:57 (2) | 16:30	15:54
8 | 04:53		20:24 (10) | 05:38		06:32		07:25	17:35 (2) | 07:23	08:14
| 21:41	24	20:48 (10) | 20:57		19:47		18:35	22 17:57 (2) | 16:28	15:54
9 | 04:54		20:24 (10) | 05:40	19:40 (11)	06:34	18:37 (6)	07:27	17:35 (2) | 07:25	08:15
| 21:40	24	20:48 (10) | 20:55	8 19:48 (11)	19:45	7 18:44 (6)	18:32	22 17:57 (2) | 16:27	15:54
10 | 04:55		20:24 (10) | 05:42	19:38 (11)	06:35	18:34 (6)	07:28	17:36 (2) | 07:27	08:16
| 21:39	24	20:48 (10) | 20:53	13 19:51 (11)	19:43	13 18:47 (6)	18:30	20 17:56 (2) | 16:25	15:53
11 | 04:56		20:24 (10) | 05:43	19:35 (11)	06:37	18:32 (6)	07:30	17:36 (2) | 07:29	08:17
| 21:38	24	20:48 (10) | 20:51	17 19:52 (11)	19:40	17 18:49 (6)	18:27	19 17:55 (2) | 16:23	15:53
12 | 04:58		20:24 (10) | 05:45	19:34 (11)	06:39	18:30 (6)	07:32	17:37 (2) | 07:31	08:18
| 21:38	25	20:49 (10) | 20:49	19 19:53 (11)	19:38	19 18:49 (6)	18:25	17 17:54 (2) | 16:22	15:53
13 | 04:59		20:24 (10) | 05:47	19:34 (11)	06:41	18:29 (6)	07:34	17:38 (2) | 07:33	08:19
| 21:37	25	20:49 (10) | 20:47	20 19:54 (11)	19:35	21 18:50 (6)	18:23	15 17:53 (2) | 16:20	15:53
14 | 05:00		20:24 (10) | 05:48	19:32 (11)	06:42	18:28 (6)	07:36	17:40 (2) | 07:34	08:20
| 21:36	25	20:49 (10) | 20:45	22 19:54 (11)	19:33	22 18:50 (6)	18:20	11 17:51 (2) | 16:18	15:53
15 | 05:01		20:24 (10) | 05:50	19:32 (11)	06:44	18:27 (6)	07:38	| 07:36	08:21
| 21:34	25	20:49 (10) | 20:43	23 19:55 (11)	19:30	23 18:50 (6)	18:18	| 16:17	15:53
16 | 05:02		20:24 (10) | 05:52	19:31 (11)	06:46	18:26 (6)	07:39	| 07:38	08:22
| 21:33	25	20:49 (10) | 20:41	24 19:55 (11)	19:28	23 18:49 (6)	18:16	| 16:15	15:53
17 | 05:04		20:25 (10) | 05:54	19:30 (11)	06:48	18:26 (6)	07:41	| 07:40	08:23
| 21:32	24	20:49 (10) | 20:38	25 19:55 (11)	19:26	23 18:49 (6)	18:14	| 16:14	15:53
18 | 05:05		20:25 (10) | 05:55	19:30 (11)	06:49	18:26 (6)	07:43	| 07:42	08:24
| 21:31	24	20:49 (10) | 20:36	25 19:55 (11)	19:23	23 18:49 (6)	18:11	| 16:12	15:53
19 | 05:07		20:25 (10) | 05:57	19:30 (11)	06:51	18:26 (6)	07:45	| 07:44	08:25
| 21:30	24	20:49 (10) | 20:34	24 19:54 (11)	19:21	21 18:47 (6)	18:09	| 16:11	15:54
20 | 05:08		20:25 (10) | 05:59	19:30 (11)	06:53	18:27 (6)	07:47	| 07:45	08:25
| 21:28	23	20:48 (10) | 20:32	24 19:54 (11)	19:18	19 18:46 (6)	18:07	| 16:10	15:54
21 | 05:09		20:26 (10) | 06:01	19:30 (11)	06:55	18:28 (6)	07:49	| 07:47	08:26
| 21:27	22	20:48 (10) | 20:30	24 19:54 (11)	19:16	17 18:45 (6)	18:05	| 16:08	15:54
22 | 05:11		20:26 (10) | 06:02	19:30 (11)	06:56	18:29 (6)	07:51	| 07:49	08:26
| 21:26	22	20:48 (10) | 20:27	22 19:52 (11)	19:13	14 18:43 (6)	18:02	| 16:07	15:55
23 | 05:12		20:26 (10) | 06:04	19:31 (11)	06:58	18:31 (6)	07:53	| 07:51	08:27
| 21:24	21	20:47 (10) | 20:25	21 19:52 (11)	19:11	9 18:40 (6)	18:00	| 16:06	15:55
24 | 05:14		20:28 (10) | 06:06	19:32 (11)	07:00		07:54	| 07:53	08:27
| 21:23	19	20:47 (10) | 20:23	19 19:51 (11)	19:08		17:58	| 16:05	15:56
25 | 05:15		20:28 (10) | 06:08	19:32 (11)	07:02		06:56	| 07:54	08:28
| 21:21	18	20:46 (10) | 20:21	16 19:48 (11)	19:06		16:56	| 16:04	15:56
26 | 05:17		20:30 (10) | 06:09	19:34 (11)	07:03		06:58	| 07:56	08:28
| 21:20	15	20:45 (10) | 20:18	12 19:46 (11)	19:03		16:54	| 16:03	15:57
27 | 05:18		20:31 (10) | 06:11	19:38 (11)	07:05		07:00	| 07:58	08:28
| 21:18	13	20:44 (10) | 20:16	5 19:43 (11)	19:01		16:52	| 16:02	15:58
28 | 05:20		20:33 (10) | 06:13		07:07		07:02	| 07:59	08:28
| 21:17	9	20:42 (10) | 20:14		18:59		16:50	| 16:01	15:59
29 | 05:22		| 06:15		07:09		07:04	| 08:01	08:29
| 21:15		| 20:11		18:56		16:48	| 16:00	16:00
30 | 05:23		| 06:16		07:11		07:06	| 08:02	08:29
| 21:13		| 20:09		18:54		16:46	| 15:59	16:01
31 | 05:25		| 06:18				07:08	|	08:29
| 21:12		| 20:07				16:44	|	16:02
Sonnenscheinstunden | 510		| 459		382		329	| 260	235
astr.max.mögl.Beschattung |	610	|	363		271		234	|	|
Red.Sonnenscheinwahrsch. |	0.45	|	0.49		0.40		0.33	|	|
Reduktion Betriebsdauer |	0.91	|	0.91		0.91		0.91	|	|
Reduktion Windrichtung |	0.65	|	0.66		0.70		0.68	|	|
Gesamte Reduktion |	0.27	|	0.30		0.26		0.21	|	|
Met.wahrsch.Beschattung |	162	|	107		70		48	|	|

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BD - IO56

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März			April			Mai			Juni		
1	08:29	07:59		07:02		17:11 (2)	06:48		18:40 (6)	05:40		19:29 (11)	04:51		20:21 (10)
	16:03	16:54		17:48	9	17:20 (2)	19:46	28	19:19 (5)	20:41	23	19:52 (11)	21:30	25	20:46 (10)
2	08:28	07:57		07:00		17:08 (2)	06:46		18:41 (6)	05:38		19:29 (11)	04:50		20:21 (10)
	16:04	16:55		17:50	14	17:22 (2)	19:48	31	19:21 (5)	20:42	22	19:51 (11)	21:31	25	20:46 (10)
3	08:28	07:56		06:58		17:07 (2)	06:43		18:42 (6)	05:36		19:29 (11)	04:49		20:22 (10)
	16:05	16:57		17:52	17	17:24 (2)	19:50	33	19:23 (5)	20:44	21	19:50 (11)	21:32	24	20:46 (10)
4	08:28	07:54		06:55		17:06 (2)	06:41		18:43 (6)	05:34		19:30 (11)	04:48		20:22 (10)
	16:06	16:59		17:54	19	17:25 (2)	19:52	33	19:25 (5)	20:46	19	19:49 (11)	21:33	24	20:46 (10)
5	08:28	07:52		06:53		17:04 (2)	06:38		18:45 (6)	05:32		19:32 (11)	04:48		20:21 (10)
	16:08	17:01		17:56	21	17:25 (2)	19:53	29	19:25 (5)	20:48	17	19:49 (11)	21:34	25	20:46 (10)
6	08:27	07:50		06:51		17:04 (2)	06:36		19:07 (5)	05:30		19:33 (11)	04:47		20:22 (10)
	16:09	17:03		17:58	21	17:25 (2)	19:55	19	19:26 (5)	20:50	14	19:47 (11)	21:35	25	20:47 (10)
7	08:27	07:49		06:48		17:03 (2)	06:34		19:06 (5)	05:28		19:35 (11)	04:46		20:22 (10)
	16:10	17:05		18:00	22	17:25 (2)	19:57	19	19:25 (5)	20:51	10	19:45 (11)	21:36	25	20:47 (10)
8	08:26	07:47		06:46		17:03 (2)	06:31		19:06 (5)	05:26			04:46		20:23 (10)
	16:12	17:07		18:02	22	17:25 (2)	19:59	18	19:24 (5)	20:53			21:37	24	20:47 (10)
9	08:26	07:45		06:44		17:04 (2)	06:29		19:05 (5)	05:24			04:45		20:22 (10)
	16:13	17:09		18:04	21	17:25 (2)	20:01	18	19:23 (5)	20:55			21:38	25	20:47 (10)
10	08:25	07:43		06:41		17:03 (2)	06:27		19:06 (5)	05:22			04:45		20:23 (10)
	16:15	17:11		18:06	21	17:24 (2)	20:03	16	19:22 (5)	20:57			21:39	24	20:47 (10)
11	08:25	07:41		06:39		17:04 (2)	06:24		19:07 (5)	05:20			04:44		20:23 (10)
	16:16	17:13		18:07	19	17:23 (2)	20:04	14	19:21 (5)	20:58			21:40	25	20:48 (10)
12	08:24	07:39		06:37		17:05 (2)	06:22		19:09 (5)	05:19			04:44		20:24 (10)
	16:18	17:15		18:09	16	17:21 (2)	20:06	10	19:19 (5)	21:00			21:41	24	20:48 (10)
13	08:23	07:37		06:34		17:06 (2)	06:20			05:17			04:43		20:24 (10)
	16:19	17:17		18:11	13	17:19 (2)	20:08			21:02			21:41	24	20:48 (10)
14	08:22	07:35		06:32		17:09 (2)	06:17			05:15			04:43		20:24 (10)
	16:21	17:19		18:13	7	17:16 (2)	20:10			21:03			21:42	24	20:48 (10)
15	08:21	07:33		06:29			06:15			05:14			04:43		20:24 (10)
	16:22	17:21		18:15			20:12			21:05			21:43	24	20:48 (10)
16	08:20	07:31		06:27			06:13			05:12			04:43		20:25 (10)
	16:24	17:23		18:17			20:13			21:07			21:43	23	20:48 (10)
17	08:19	07:29		06:24			06:10			05:10			04:43		20:25 (10)
	16:26	17:25		18:19			20:15			21:08			21:44	24	20:49 (10)
18	08:18	07:27		06:22			06:08			05:09			04:43		20:25 (10)
	16:27	17:27		18:20			20:17			21:10			21:44	24	20:49 (10)
19	08:17	07:25		06:20			06:06		19:39 (11)	05:07		20:29 (10)	04:43		20:25 (10)
	16:29	17:29		18:22			20:19	8	19:47 (11)	21:11	6	20:35 (10)	21:44	24	20:49 (10)
20	08:16	07:22		06:17			06:03		19:36 (11)	05:06		20:27 (10)	04:43		20:25 (10)
	16:31	17:31		18:24			20:21	13	19:49 (11)	21:13	11	20:38 (10)	21:45	24	20:49 (10)
21	08:15	07:20		06:15			06:01		19:34 (11)	05:04		20:26 (10)	04:43		20:25 (10)
	16:33	17:33		18:26			20:23	17	19:51 (11)	21:15	14	20:40 (10)	21:45	24	20:49 (10)
22	08:14	07:18		06:12		17:53 (6)	05:59		19:32 (11)	05:03		20:24 (10)	04:43		20:26 (10)
	16:35	17:35		18:28	4	17:57 (6)	20:24	19	19:51 (11)	21:16	16	20:40 (10)	21:45	24	20:50 (10)
23	08:12	07:16		06:10		17:48 (6)	05:57		19:31 (11)	05:01		20:23 (10)	04:43		20:26 (10)
	16:36	17:37		18:30	12	18:00 (6)	20:26	21	19:52 (11)	21:18	18	20:41 (10)	21:45	24	20:50 (10)
24	08:11	07:14		06:08		17:46 (6)	05:55		19:30 (11)	05:00		20:23 (10)	04:44		20:26 (10)
	16:38	17:39		18:32	16	18:02 (6)	20:28	23	19:53 (11)	21:19	19	20:42 (10)	21:45	24	20:50 (10)
25	08:10	07:11		06:05		17:44 (6)	05:52		19:29 (11)	04:59		20:23 (10)	04:44		20:27 (10)
	16:40	17:41		18:33	19	18:03 (6)	20:30	24	19:53 (11)	21:21	20	20:43 (10)	21:46	24	20:51 (10)
26	08:08	07:09		06:03		17:43 (6)	05:50		19:29 (11)	04:58		20:22 (10)	04:44		20:27 (10)
	16:42	17:43		18:35	21	18:04 (6)	20:32	24	19:53 (11)	21:22	22	20:44 (10)	21:45	23	20:50 (10)
27	08:07	07:07		06:00		17:43 (6)	05:48		19:29 (11)	04:56		20:22 (10)	04:45		20:26 (10)
	16:44	17:45		18:37	22	18:05 (6)	20:33	24	19:53 (11)	21:23	22	20:44 (10)	21:45	24	20:50 (10)
28	08:05	07:05		05:58		17:41 (6)	05:46		19:28 (11)	04:55		20:22 (10)	04:45		20:27 (10)
	16:46	17:47		18:39	23	18:04 (6)	20:35	25	19:53 (11)	21:25	23	20:45 (10)	21:45	24	20:51 (10)
29	08:04			06:55		18:41 (6)	05:44		19:28 (11)	04:54		20:22 (10)	04:46		20:28 (10)
	16:48			19:41	24	19:05 (6)	20:37	25	19:53 (11)	21:26	23	20:45 (10)	21:45	24	20:52 (10)
30	08:02			06:53		18:40 (6)	05:42		19:28 (11)	04:53		20:22 (10)	04:47		20:27 (10)
	16:50			19:42	24	19:04 (6)	20:39	25	19:53 (11)	21:27	23	20:45 (10)	21:45	24	20:51 (10)
31	08:01			06:51		18:41 (6)				04:52		20:21 (10)			
	16:52			19:44	22	19:03 (6)				21:29	24	20:45 (10)			
Sonnenscheinstunden		252	274	367			419			492			508		
astr.max.mögl.Beschattung					429			516			367			725	
Red.Sonnenscheinwahrsch.					0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer					0.91			0.91			0.91			0.91	
Reduktion Windrichtung					0.69			0.68			0.65			0.65	
Gesamte Reduktion					0.20			0.26			0.31			0.27	
Met.wahrsch.Beschattung					85			132			112			195	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BD - IO56

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1 | 04:47		20:28 (10)	05:26			06:20		19:06 (5)	07:12		17:44 (2)	07:10	08:04
| 21:45	24	20:52 (10)	21:10			20:04	14	19:20 (5)	18:51	15	17:59 (2)	16:42	15:58
2 | 04:48		20:28 (10)	05:28			06:22		19:05 (5)	07:14		17:43 (2)	07:12	08:05
| 21:44	24	20:52 (10)	21:08			20:02	16	19:21 (5)	18:49	17	18:00 (2)	16:40	15:57
3 | 04:49		20:28 (10)	05:30			06:23		19:03 (5)	07:16		17:42 (2)	07:14	08:07
| 21:44	24	20:52 (10)	21:06			20:00	18	19:21 (5)	18:46	19	18:01 (2)	16:38	15:57
4 | 04:49		20:28 (10)	05:31			06:25		19:03 (5)	07:18		17:41 (2)	07:15	08:08
| 21:43	24	20:52 (10)	21:05			19:57	18	19:21 (5)	18:44	21	18:02 (2)	16:36	15:56
5 | 04:50		20:28 (10)	05:33		19:48 (11)	06:27		19:03 (5)	07:19		17:40 (2)	07:17	08:10
| 21:43	25	20:53 (10)	21:03	4	19:52 (11)	19:55	19	19:22 (5)	18:42	22	18:02 (2)	16:34	15:55
6 | 04:51		20:29 (10)	05:35		19:44 (11)	06:29		19:02 (5)	07:21		17:40 (2)	07:19	08:11
| 21:42	24	20:53 (10)	21:01	11	19:55 (11)	19:52	19	19:21 (5)	18:39	22	18:02 (2)	16:32	15:55
7 | 04:52		20:29 (10)	05:36		19:42 (11)	06:30		18:40 (6)	07:23		17:39 (2)	07:21	08:12
| 21:42	24	20:53 (10)	20:59	15	19:57 (11)	19:50	29	19:20 (5)	18:37	22	18:01 (2)	16:30	15:54
8 | 04:53		20:29 (10)	05:38		19:41 (11)	06:32		18:38 (6)	07:25		17:39 (2)	07:23	08:14
| 21:41	25	20:54 (10)	20:57	18	19:59 (11)	19:47	33	19:20 (5)	18:35	21	18:00 (2)	16:28	15:54
9 | 04:54		20:29 (10)	05:40		19:39 (11)	06:34		18:36 (6)	07:27		17:39 (2)	07:25	08:15
| 21:40	25	20:54 (10)	20:55	20	19:59 (11)	19:45	33	19:17 (5)	18:32	20	17:59 (2)	16:27	15:54
10 | 04:55		20:29 (10)	05:42		19:39 (11)	06:35		18:34 (6)	07:28		17:40 (2)	07:27	08:16
| 21:39	25	20:54 (10)	20:53	21	20:00 (11)	19:43	33	19:15 (5)	18:30	18	17:58 (2)	16:25	15:53
11 | 04:56		20:30 (10)	05:43		19:37 (11)	06:37		18:34 (6)	07:30		17:41 (2)	07:29	08:17
| 21:38	24	20:54 (10)	20:51	23	20:00 (11)	19:40	28	19:13 (5)	18:27	16	17:57 (2)	16:23	15:53
12 | 04:58		20:30 (10)	05:45		19:37 (11)	06:39		18:32 (6)	07:32		17:43 (2)	07:31	08:18
| 21:38	24	20:54 (10)	20:49	24	20:01 (11)	19:38	23	18:55 (6)	18:25	12	17:55 (2)	16:22	15:53
13 | 04:59		20:30 (10)	05:47		19:37 (11)	06:41		18:32 (6)	07:34		17:46 (2)	07:33	08:19
| 21:37	24	20:54 (10)	20:47	24	20:01 (11)	19:35	23	18:55 (6)	18:23	5	17:51 (2)	16:20	15:53
14 | 05:00		20:30 (10)	05:48		19:36 (11)	06:42		18:32 (6)	07:36			07:34	08:20
| 21:36	24	20:54 (10)	20:45	25	20:01 (11)	19:33	23	18:55 (6)	18:20			16:18	15:53
15 | 05:01		20:30 (10)	05:50		19:36 (11)	06:44		18:32 (6)	07:38			07:36	08:21
| 21:34	23	20:53 (10)	20:43	25	20:01 (11)	19:30	23	18:55 (6)	18:18			16:17	15:53
16 | 05:02		20:30 (10)	05:52		19:36 (11)	06:46		18:31 (6)	07:39			07:38	08:22
| 21:33	23	20:53 (10)	20:41	25	20:01 (11)	19:28	22	18:53 (6)	18:16			16:15	15:53
17 | 05:04		20:32 (10)	05:54		19:36 (11)	06:48		18:31 (6)	07:41			07:40	08:23
| 21:32	22	20:54 (10)	20:38	24	20:00 (11)	19:26	22	18:53 (6)	18:14			16:14	15:53
18 | 05:05		20:32 (10)	05:55		19:36 (11)	06:49		18:32 (6)	07:43			07:42	08:24
| 21:31	21	20:53 (10)	20:36	24	20:00 (11)	19:23	20	18:52 (6)	18:11			16:12	15:53
19 | 05:07		20:32 (10)	05:57		19:36 (11)	06:51		18:32 (6)	07:45			07:44	08:25
| 21:30	20	20:52 (10)	20:34	22	19:58 (11)	19:21	17	18:49 (6)	18:09			16:11	15:54
20 | 05:08		20:33 (10)	05:59		19:36 (11)	06:53		18:34 (6)	07:47			07:45	08:25
| 21:28	18	20:51 (10)	20:32	22	19:58 (11)	19:18	13	18:47 (6)	18:07			16:10	15:54
21 | 05:09		20:34 (10)	06:01		19:38 (11)	06:55		18:37 (6)	07:49			07:47	08:26
| 21:27	17	20:51 (10)	20:30	19	19:57 (11)	19:16	7	18:44 (6)	18:05			16:08	15:54
22 | 05:11		20:35 (10)	06:02		19:38 (11)	06:56			07:51			07:49	08:26
| 21:26	15	20:50 (10)	20:27	17	19:55 (11)	19:13			18:02			16:07	15:55
23 | 05:12		20:36 (10)	06:04		19:40 (11)	06:58			07:53			07:51	08:27
| 21:24	13	20:49 (10)	20:25	13	19:53 (11)	19:11			18:00			16:06	15:55
24 | 05:14		20:38 (10)	06:06		19:43 (11)	07:00			07:54			07:53	08:27
| 21:23	10	20:48 (10)	20:23	7	19:50 (11)	19:08			17:58			16:05	15:56
25 | 05:15		20:42 (10)	06:08			07:02			06:56			07:54	08:28
| 21:21	1	20:43 (10)	20:21			19:06			16:56			16:04	15:56
26 | 05:17			06:09			07:03			06:58			07:56	08:28
| 21:20			20:18			19:03			16:54			16:03	15:57
27 | 05:18			06:11			07:05			07:00			07:58	08:28
| 21:18			20:16			19:01			16:52			16:02	15:58
28 | 05:20			06:13			07:07			07:02			07:59	08:28
| 21:17			20:14			18:59			16:50			16:01	15:59
29 | 05:22			06:15			07:09			07:04			08:01	08:29
| 21:15			20:11			18:56			16:48			16:00	16:00
30 | 05:23			06:16			07:11		17:47 (2)	07:06			08:02	08:29
| 21:13			20:09			18:54	11	17:58 (2)	16:46			15:59	16:01
31 | 05:25			06:18		19:08 (5)				07:08				08:29
| 21:12			20:07	10	19:18 (5)				16:44				16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung		523		393			464			230			
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91		0.91			0.91			0.91			
Reduktion Windrichtung		0.65		0.67			0.69			0.68			
Gesamte Reduktion		0.26		0.30			0.25			0.21			
Met.wahrsch.Beschattung		138		116			118			47			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BE - IO57

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März			April			Mai			Juni		
1	08:29	07:59		07:02			06:48			18:43 (6)	05:40		19:32 (11)	04:51		20:26 (10)
	16:03	16:54		17:48			19:46	24		19:07 (6)	20:41	25	19:57 (11)	21:30	23	20:49 (10)
2	08:28	07:57		07:00			06:46			18:44 (6)	05:38		19:32 (11)	04:50		20:25 (10)
	16:04	16:55		17:50			19:48	24		19:21 (5)	20:42	24	19:56 (11)	21:31	24	20:49 (10)
3	08:28	07:56		06:58		17:13 (2)	06:43			18:44 (6)	05:36		19:32 (11)	04:49		20:26 (10)
	16:05	16:57		17:52	11	17:24 (2)	19:50	30		19:23 (5)	20:44	24	19:56 (11)	21:32	24	20:50 (10)
4	08:28	07:54		06:55		17:11 (2)	06:41			18:44 (6)	05:34		19:32 (11)	04:48		20:26 (10)
	16:06	16:59		17:54	15	17:26 (2)	19:52	33		19:25 (5)	20:46	23	19:55 (11)	21:33	24	20:50 (10)
5	08:28	07:52		06:53		17:09 (2)	06:38			18:45 (6)	05:32		19:34 (11)	04:48		20:26 (10)
	16:08	17:01		17:56	18	17:27 (2)	19:53	34		19:27 (5)	20:48	21	19:55 (11)	21:34	24	20:50 (10)
6	08:27	07:50		06:51		17:08 (2)	06:36			18:47 (6)	05:30		19:34 (11)	04:47		20:26 (10)
	16:09	17:03		17:58	20	17:28 (2)	19:55	33		19:28 (5)	20:50	20	19:54 (11)	21:35	25	20:51 (10)
7	08:27	07:49		06:48		17:07 (2)	06:34			18:48 (6)	05:28		19:35 (11)	04:46		20:26 (10)
	16:10	17:05		18:00	21	17:28 (2)	19:57	29		19:27 (5)	20:51	18	19:53 (11)	21:36	24	20:50 (10)
8	08:26	07:47		06:46		17:06 (2)	06:31			19:09 (5)	05:26		19:36 (11)	04:46		20:26 (10)
	16:12	17:07		18:02	22	17:28 (2)	19:59	19		19:28 (5)	20:53	15	19:51 (11)	21:37	25	20:51 (10)
9	08:26	07:45		06:44		17:06 (2)	06:29			19:08 (5)	05:24		19:38 (11)	04:45		20:26 (10)
	16:13	17:09		18:04	22	17:28 (2)	20:01	19		19:27 (5)	20:55	12	19:50 (11)	21:38	25	20:51 (10)
10	08:25	07:43		06:41		17:06 (2)	06:27			19:08 (5)	05:22		19:40 (11)	04:45		20:27 (10)
	16:15	17:11		18:06	21	17:27 (2)	20:03	18		19:26 (5)	20:57	7	19:47 (11)	21:39	24	20:51 (10)
11	08:25	07:41		06:39		17:06 (2)	06:24			19:09 (5)	05:20			04:44		20:27 (10)
	16:16	17:13		18:07	21	17:27 (2)	20:04	17		19:26 (5)	20:58			21:40	25	20:52 (10)
12	08:24	07:39		06:37		17:06 (2)	06:22			19:10 (5)	05:19			04:44		20:28 (10)
	16:18	17:15		18:09	20	17:26 (2)	20:06	15		19:25 (5)	21:00			21:41	24	20:52 (10)
13	08:23	07:37		06:34		17:07 (2)	06:20			19:10 (5)	05:17			04:43		20:27 (10)
	16:19	17:17		18:11	18	17:25 (2)	20:08	13		19:23 (5)	21:02			21:41	25	20:52 (10)
14	08:22	07:35		06:32		17:08 (2)	06:17			19:12 (5)	05:15			04:43		20:27 (10)
	16:21	17:19		18:13	15	17:23 (2)	20:10	8		19:20 (5)	21:03			21:42	25	20:52 (10)
15	08:21	07:33		06:29		17:10 (2)	06:15				05:14			04:43		20:28 (10)
	16:22	17:21		18:15	11	17:21 (2)	20:12				21:05			21:43	24	20:52 (10)
16	08:20	07:31		06:27		17:13 (2)	06:13				05:12			04:43		20:28 (10)
	16:24	17:23		18:17	3	17:16 (2)	20:13				21:07			21:43	25	20:53 (10)
17	08:19	07:29		06:24			06:10				05:10			04:43		20:28 (10)
	16:26	17:25		18:19			20:15				21:08			21:44	25	20:53 (10)
18	08:18	07:27		06:22			06:08				05:09			04:43		20:28 (10)
	16:27	17:27		18:20			20:17				21:10			21:44	25	20:53 (10)
19	08:17	07:25		06:20			06:06				05:07			04:43		20:29 (10)
	16:29	17:29		18:22			20:19				21:11			21:44	24	20:53 (10)
20	08:16	07:22		06:17			06:03				05:06			04:43		20:29 (10)
	16:31	17:31		18:24			20:21				21:13			21:45	24	20:53 (10)
21	08:15	07:20		06:15			06:01			19:43 (11)	05:04			04:43		20:29 (10)
	16:33	17:33		18:26			20:23	7		19:50 (11)	21:15			21:45	24	20:53 (10)
22	08:14	07:18		06:12			05:59			19:39 (11)	05:03		20:32 (10)	04:43		20:30 (10)
	16:35	17:35		18:28			20:24	13		19:52 (11)	21:16	8	20:40 (10)	21:45	24	20:54 (10)
23	08:12	07:16		06:10			05:57			19:37 (11)	05:01		20:31 (10)	04:43		20:30 (10)
	16:36	17:37		18:30			20:26	17		19:54 (11)	21:18	11	20:42 (10)	21:45	24	20:54 (10)
24	08:11	07:14		06:08		17:55 (6)	05:55			19:36 (11)	05:00		20:29 (10)	04:44		20:30 (10)
	16:38	17:39		18:32	6	18:01 (6)	20:28	19		19:55 (11)	21:19	15	20:44 (10)	21:45	24	20:54 (10)
25	08:10	07:11		06:05		17:51 (6)	05:52			19:35 (11)	04:59		20:29 (10)	04:44		20:30 (10)
	16:40	17:41		18:33	13	18:04 (6)	20:30	21		19:56 (11)	21:21	16	20:45 (10)	21:46	25	20:55 (10)
26	08:08	07:09		06:03		17:49 (6)	05:50			19:34 (11)	04:58		20:28 (10)	04:44		20:30 (10)
	16:42	17:43		18:35	17	18:06 (6)	20:32	22		19:56 (11)	21:22	18	20:46 (10)	21:45	25	20:55 (10)
27	08:07	07:07		06:00		17:48 (6)	05:48			19:33 (11)	04:56		20:28 (10)	04:45		20:31 (10)
	16:44	17:45		18:37	19	18:07 (6)	20:33	24		19:57 (11)	21:23	19	20:47 (10)	21:45	24	20:55 (10)
28	08:05	07:05		05:58		17:46 (6)	05:46			19:33 (11)	04:55		20:27 (10)	04:45		20:31 (10)
	16:46	17:47		18:39	21	18:07 (6)	20:35	24		19:57 (11)	21:25	20	20:47 (10)	21:45	24	20:55 (10)
29	08:04			06:55		18:45 (6)	05:44			19:32 (11)	04:54		20:27 (10)	04:46		20:31 (10)
	16:48			19:41	23	19:08 (6)	20:37	25		19:57 (11)	21:26	21	20:48 (10)	21:45	25	20:56 (10)
30	08:02			06:53		18:44 (6)	05:42			19:32 (11)	04:53		20:26 (10)	04:47		20:31 (10)
	16:50			19:42	23	19:07 (6)	20:39	25		19:57 (11)	21:27	22	20:48 (10)	21:45	24	20:55 (10)
31	08:01			06:51		18:44 (6)					04:52		20:26 (10)			
	16:52			19:44	23	19:07 (6)					21:29	22	20:48 (10)			
Sonnenscheinstunden		252	274	367			419				492			508		
astr.max.mögl.Beschattung					383			513				361			731	
Red.Sonnenscheinwahrsch.					0.31			0.41				0.51			0.45	
Reduktion Betriebsdauer					0.91			0.91				0.91			0.91	
Reduktion Windrichtung					0.69			0.68				0.65			0.64	
Gesamte Reduktion					0.20			0.26				0.31			0.27	
Met.wahrsch.Beschattung					76			131				111			196	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BE - IO57

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		20:31 (10)	05:26			06:20		19:08 (5)	07:12		17:45 (2)	07:10	08:04
	21:45	25	20:56 (10)	21:10			20:04	17	19:25 (5)	18:51	20	18:05 (2)	16:42	15:58
2	04:48		20:32 (10)	05:28			06:22		19:07 (5)	07:14		17:44 (2)	07:12	08:05
	21:44	24	20:56 (10)	21:08			20:02	18	19:25 (5)	18:49	21	18:05 (2)	16:40	15:57
3	04:49		20:31 (10)	05:30		19:49 (11)	06:23		19:06 (5)	07:16		17:44 (2)	07:14	08:07
	21:44	25	20:56 (10)	21:06	10	19:59 (11)	20:00	19	19:25 (5)	18:46	21	18:05 (2)	16:38	15:57
4	04:49		20:32 (10)	05:31		19:47 (11)	06:25		19:06 (5)	07:18		17:43 (2)	07:15	08:08
	21:43	24	20:56 (10)	21:05	13	20:00 (11)	19:57	19	19:25 (5)	18:44	22	18:05 (2)	16:36	15:56
5	04:50		20:32 (10)	05:33		19:46 (11)	06:27		18:45 (6)	07:19		17:43 (2)	07:17	08:10
	21:43	25	20:57 (10)	21:03	16	20:02 (11)	19:55	30	19:25 (5)	18:42	22	18:05 (2)	16:34	15:55
6	04:51		20:32 (10)	05:35		19:44 (11)	06:29		18:42 (6)	07:21		17:43 (2)	07:19	08:11
	21:42	25	20:57 (10)	21:01	19	20:03 (11)	19:52	33	19:23 (5)	18:39	22	18:05 (2)	16:32	15:55
7	04:52		20:33 (10)	05:36		19:43 (11)	06:30		18:40 (6)	07:23		17:43 (2)	07:21	08:12
	21:42	24	20:57 (10)	20:59	21	20:04 (11)	19:50	34	19:22 (5)	18:37	20	18:03 (2)	16:30	15:54
8	04:53		20:33 (10)	05:38		19:43 (11)	06:32		18:39 (6)	07:25		17:43 (2)	07:23	08:14
	21:41	24	20:57 (10)	20:57	22	20:05 (11)	19:47	33	19:20 (5)	18:35	19	18:02 (2)	16:28	15:54
9	04:54		20:33 (10)	05:40		19:42 (11)	06:34		18:37 (6)	07:27		17:44 (2)	07:25	08:15
	21:40	24	20:57 (10)	20:55	23	20:05 (11)	19:45	31	19:17 (5)	18:32	17	18:01 (2)	16:27	15:54
10	04:55		20:34 (10)	05:42		19:41 (11)	06:35		18:37 (6)	07:28		17:46 (2)	07:27	08:16
	21:39	23	20:57 (10)	20:53	24	20:05 (11)	19:43	27	19:15 (5)	18:30	13	17:59 (2)	16:25	15:53
11	04:56		20:34 (10)	05:43		19:40 (11)	06:37		18:36 (6)	07:30		17:48 (2)	07:29	08:17
	21:38	23	20:57 (10)	20:51	25	20:05 (11)	19:40	24	19:00 (6)	18:27	8	17:56 (2)	16:23	15:53
12	04:58		20:34 (10)	05:45		19:40 (11)	06:39		18:35 (6)	07:32			07:31	08:18
	21:38	23	20:57 (10)	20:49	25	20:05 (11)	19:38	24	18:59 (6)	18:25			16:22	15:53
13	04:59		20:35 (10)	05:47		19:41 (11)	06:41		18:35 (6)	07:34			07:33	08:19
	21:37	22	20:57 (10)	20:47	24	20:05 (11)	19:35	24	18:59 (6)	18:23			16:20	15:53
14	05:00		20:35 (10)	05:48		19:40 (11)	06:42		18:36 (6)	07:36			07:34	08:20
	21:36	21	20:56 (10)	20:45	25	20:05 (11)	19:33	22	18:58 (6)	18:20			16:18	15:53
15	05:01		20:35 (10)	05:50		19:40 (11)	06:44		18:36 (6)	07:38			07:36	08:21
	21:34	21	20:56 (10)	20:43	24	20:04 (11)	19:30	21	18:57 (6)	18:18			16:17	15:53
16	05:02		20:36 (10)	05:52		19:41 (11)	06:46		18:36 (6)	07:39			07:38	08:22
	21:33	19	20:55 (10)	20:41	23	20:04 (11)	19:28	20	18:56 (6)	18:16			16:15	15:53
17	05:04		20:37 (10)	05:54		19:41 (11)	06:48		18:37 (6)	07:41			07:40	08:23
	21:32	19	20:56 (10)	20:38	22	20:03 (11)	19:26	17	18:54 (6)	18:14			16:14	15:53
18	05:05		20:38 (10)	05:55		19:41 (11)	06:49		18:39 (6)	07:43			07:42	08:24
	21:31	17	20:55 (10)	20:36	21	20:02 (11)	19:23	13	18:52 (6)	18:11			16:12	15:53
19	05:07		20:39 (10)	05:57		19:42 (11)	06:51		18:40 (6)	07:45			07:44	08:25
	21:30	15	20:54 (10)	20:34	18	20:00 (11)	19:21	9	18:49 (6)	18:09			16:11	15:54
20	05:08		20:39 (10)	05:59		19:43 (11)	06:53			07:47			07:45	08:25
	21:28	13	20:52 (10)	20:32	16	19:59 (11)	19:18			18:07			16:10	15:54
21	05:09		20:42 (10)	06:01		19:45 (11)	06:55			07:49			07:47	08:26
	21:27	10	20:52 (10)	20:30	12	19:57 (11)	19:16			18:05			16:08	15:54
22	05:11		20:44 (10)	06:02		19:48 (11)	06:56			07:51			07:49	08:26
	21:26	4	20:48 (10)	20:27	5	19:53 (11)	19:13			18:02			16:07	15:55
23	05:12			06:04			06:58			07:53			07:51	08:27
	21:24			20:25			19:11			18:00			16:06	15:55
24	05:14			06:06			07:00			07:54			07:53	08:27
	21:23			20:23			19:08			17:58			16:05	15:56
25	05:15			06:08			07:02			06:56			07:54	08:28
	21:21			20:21			19:06			16:56			16:04	15:56
26	05:17			06:09			07:03			06:58			07:56	08:28
	21:20			20:18			19:03			16:54			16:03	15:57
27	05:18			06:11			07:05			07:00			07:58	08:28
	21:18			20:16			19:01			16:52			16:02	15:58
28	05:20			06:13			07:07		17:52 (2)	07:02			07:59	08:28
	21:17			20:14			18:59	9	18:01 (2)	16:50			16:01	15:59
29	05:22			06:15		19:13 (5)	07:09		17:49 (2)	07:04			08:01	08:29
	21:15			20:11	8	19:21 (5)	18:56	14	18:03 (2)	16:48			16:00	16:00
30	05:23			06:16		19:11 (5)	07:11		17:47 (2)	07:06			08:02	08:29
	21:13			20:09	13	19:24 (5)	18:54	18	18:05 (2)	16:46			15:59	16:01
31	05:25			06:18		19:09 (5)				07:08				08:29
	21:12			20:07	15	19:24 (5)				16:44				16:02
Sonnenscheinstunden	510			459			382			329			260	235
astr.max.mögl.Beschattung		450			424			476			205			
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91			
Reduktion Windrichtung		0.64			0.67			0.69			0.69			
Gesamte Reduktion		0.26			0.30			0.25			0.21			
Met.wahrsch.Beschattung		118			126			121			42			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BF - IO58

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März			April			Mai			Juni		
1	08:29	07:59		07:02			06:48		18:53 (6)	05:40		19:42 (11)	04:51		20:39 (10)
	16:03	16:54		17:48			19:46	21	19:14 (6)	20:41	23	20:05 (11)	21:30	14	20:53 (10)
2	08:28	07:57		07:00			06:46		18:52 (6)	05:38		19:41 (11)	04:50		20:38 (10)
	16:04	16:55		17:50			19:48	22	19:14 (6)	20:42	24	20:05 (11)	21:31	16	20:54 (10)
3	08:28	07:56		06:58			06:43		18:52 (6)	05:36		19:41 (11)	04:49		20:39 (10)
	16:05	16:57		17:52			19:50	23	19:15 (6)	20:44	24	20:05 (11)	21:32	16	20:55 (10)
4	08:28	07:54		06:55			06:41		18:51 (6)	05:34		19:40 (11)	04:48		20:38 (10)
	16:06	16:59		17:54			19:52	23	19:14 (6)	20:46	25	20:05 (11)	21:33	17	20:55 (10)
5	08:28	07:52		06:53			06:38		18:51 (6)	05:32		19:41 (11)	04:48		20:37 (10)
	16:08	17:01		17:56			19:53	23	19:14 (6)	20:48	25	20:06 (11)	21:34	19	20:56 (10)
6	08:27	07:50		06:51		17:22 (2)	06:36		18:51 (6)	05:30		19:41 (11)	04:47		20:38 (10)
	16:09	17:03		17:58	6	17:28 (2)	19:55	30	19:29 (5)	20:50	25	20:06 (11)	21:35	19	20:57 (10)
7	08:27	07:49		06:48		17:18 (2)	06:34		18:50 (6)	05:28		19:41 (11)	04:46		20:37 (10)
	16:10	17:05		18:00	13	17:31 (2)	19:57	34	19:30 (5)	20:51	24	20:05 (11)	21:36	20	20:57 (10)
8	08:26	07:47		06:46		17:16 (2)	06:31		18:51 (6)	05:26		19:40 (11)	04:46		20:37 (10)
	16:12	17:07		18:02	17	17:33 (2)	19:59	36	19:32 (5)	20:53	25	20:05 (11)	21:37	21	20:58 (10)
9	08:26	07:45		06:44		17:15 (2)	06:29		18:51 (6)	05:24		19:41 (11)	04:45		20:37 (10)
	16:13	17:09		18:04	19	17:34 (2)	20:01	37	19:33 (5)	20:55	24	20:05 (11)	21:38	21	20:58 (10)
10	08:25	07:43		06:41		17:14 (2)	06:27		18:52 (6)	05:22		19:42 (11)	04:45		20:37 (10)
	16:15	17:11		18:06	20	17:34 (2)	20:03	35	19:33 (5)	20:57	22	20:04 (11)	21:39	21	20:58 (10)
11	08:25	07:41		06:39		17:13 (2)	06:24		18:54 (6)	05:20		19:42 (11)	04:44		20:37 (10)
	16:16	17:13		18:07	22	17:35 (2)	20:04	33	19:34 (5)	20:58	21	20:03 (11)	21:40	22	20:59 (10)
12	08:24	07:39		06:37		17:12 (2)	06:22		18:57 (6)	05:19		19:43 (11)	04:44		20:38 (10)
	16:18	17:15		18:09	22	17:34 (2)	20:06	27	19:34 (5)	21:00	20	20:03 (11)	21:41	22	21:00 (10)
13	08:23	07:37		06:34		17:12 (2)	06:20		19:14 (5)	05:17		19:43 (11)	04:43		20:37 (10)
	16:19	17:17		18:11	22	17:34 (2)	20:08	19	19:33 (5)	21:02	19	20:02 (11)	21:41	22	20:59 (10)
14	08:22	07:35		06:32		17:11 (2)	06:17		19:14 (5)	05:15		19:44 (11)	04:43		20:37 (10)
	16:21	17:19		18:13	22	17:33 (2)	20:10	18	19:32 (5)	21:03	16	20:00 (11)	21:42	23	21:00 (10)
15	08:21	07:33		06:29		17:12 (2)	06:15		19:15 (5)	05:14		19:46 (11)	04:43		20:38 (10)
	16:22	17:21		18:15	21	17:33 (2)	20:12	17	19:32 (5)	21:05	14	20:00 (11)	21:43	22	21:00 (10)
16	08:20	07:31		06:27		17:12 (2)	06:13		19:15 (5)	05:12		19:47 (11)	04:43		20:38 (10)
	16:24	17:23		18:17	20	17:32 (2)	20:13	15	19:30 (5)	21:07	10	19:57 (11)	21:43	23	21:01 (10)
17	08:19	07:29		06:24		17:13 (2)	06:10		19:16 (5)	05:10		19:51 (11)	04:43		20:38 (10)
	16:26	17:25		18:19	18	17:31 (2)	20:15	12	19:28 (5)	21:08	4	19:55 (11)	21:44	23	21:01 (10)
18	08:18	07:27		06:22		17:15 (2)	06:08		19:19 (5)	05:09			04:43		20:38 (10)
	16:27	17:27		18:20	15	17:30 (2)	20:17	7	19:26 (5)	21:10			21:44	23	21:01 (10)
19	08:17	07:25		06:20		17:16 (2)	06:06			05:07			04:43		20:38 (10)
	16:29	17:29		18:22	11	17:27 (2)	20:19			21:11			21:44	23	21:01 (10)
20	08:16	07:22		06:17			06:03			05:06			04:43		20:38 (10)
	16:31	17:31		18:24			20:21			21:13			21:45	23	21:01 (10)
21	08:15	07:20		06:15			06:01			05:04			04:43		20:38 (10)
	16:33	17:33		18:26			20:23			21:15			21:45	23	21:01 (10)
22	08:14	07:18		06:12			05:59			05:03			04:43		20:39 (10)
	16:35	17:35		18:28			20:24			21:16			21:45	23	21:02 (10)
23	08:12	07:16		06:10			05:57			05:01			04:43		20:39 (10)
	16:36	17:37		18:30			20:26			21:18			21:45	23	21:02 (10)
24	08:11	07:14		06:08			05:55			05:00			04:44		20:39 (10)
	16:38	17:39		18:32			20:28			21:19			21:45	23	21:02 (10)
25	08:10	07:11		06:05			05:52			04:59			04:44		20:40 (10)
	16:40	17:41		18:33			20:30			21:21			21:46	23	21:03 (10)
26	08:08	07:09		06:03			05:50		19:51 (11)	04:58			04:44		20:40 (10)
	16:42	17:43		18:35			20:32	7	19:58 (11)	21:22			21:45	23	21:03 (10)
27	08:07	07:07		06:00			05:48		19:48 (11)	04:56			04:45		20:41 (10)
	16:44	17:45		18:37			20:33	12	20:00 (11)	21:23			21:45	22	21:03 (10)
28	08:05	07:05		05:58			05:46		19:46 (11)	04:55			04:45		20:40 (10)
	16:46	17:47		18:39			20:35	16	20:02 (11)	21:25			21:45	23	21:03 (10)
29	08:04			06:55		18:59 (6)	05:44		19:44 (11)	04:54		20:44 (10)	04:46		20:41 (10)
	16:48			19:41	12	19:11 (6)	20:37	19	20:03 (11)	21:26	4	20:48 (10)	21:45	23	21:04 (10)
30	08:02			06:53		18:56 (6)	05:42		19:43 (11)	04:53		20:42 (10)	04:47		20:41 (10)
	16:50			19:42	16	19:12 (6)	20:39	21	20:04 (11)	21:27	9	20:51 (10)	21:45	22	21:03 (10)
31	08:01			06:51		18:55 (6)				04:52		20:40 (10)			
	16:52			19:44	18	19:13 (6)				21:29	12	20:52 (10)			
Sonnenscheinstunden		252	274	367			419			492			508		
astr.max.mögl.Beschattung					294			507			370			638	
Red.Sonnenscheinwahrsch.					0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer					0.91			0.91			0.91			0.91	
Reduktion Windrichtung					0.69			0.68			0.66			0.64	
Gesamte Reduktion					0.20			0.26			0.31			0.26	
Met.wahrsch.Beschattung					58			130			115			169	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BF - IO58

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1 | 04:47		20:42 (10)	05:26		19:53 (11)	06:20		18:53 (6)	07:12		17:51 (2)	07:10	08:04
| 21:45	21	21:03 (10)	21:10	21	20:14 (11)	20:04	33	19:33 (5)	18:51	22	18:13 (2)	16:42	15:58
2 | 04:48		20:42 (10)	05:28		19:52 (11)	06:22		18:51 (6)	07:14		17:51 (2)	07:12	08:05
| 21:44	22	21:04 (10)	21:08	22	20:14 (11)	20:02	35	19:32 (5)	18:49	22	18:13 (2)	16:40	15:57
3 | 04:49		20:42 (10)	05:30		19:52 (11)	06:23		18:49 (6)	07:16		17:51 (2)	07:14	08:07
| 21:44	21	21:03 (10)	21:06	23	20:15 (11)	20:00	37	19:31 (5)	18:46	21	18:12 (2)	16:38	15:57
4 | 04:49		20:43 (10)	05:31		19:51 (11)	06:25		18:48 (6)	07:18		17:52 (2)	07:15	08:08
| 21:43	20	21:03 (10)	21:05	24	20:15 (11)	19:57	36	19:29 (5)	18:44	19	18:11 (2)	16:36	15:56
5 | 04:50		20:43 (10)	05:33		19:51 (11)	06:27		18:47 (6)	07:19		17:53 (2)	07:17	08:10
| 21:43	20	21:03 (10)	21:03	24	20:15 (11)	19:55	34	19:27 (5)	18:42	17	18:10 (2)	16:34	15:55
6 | 04:51		20:44 (10)	05:35		19:50 (11)	06:29		18:46 (6)	07:21		17:54 (2)	07:19	08:11
| 21:42	19	21:03 (10)	21:01	25	20:15 (11)	19:52	30	19:24 (5)	18:39	15	18:09 (2)	16:32	15:55
7 | 04:52		20:44 (10)	05:36		19:50 (11)	06:30		18:46 (6)	07:23		17:55 (2)	07:21	08:12
| 21:42	19	21:03 (10)	20:59	25	20:15 (11)	19:50	23	19:09 (6)	18:37	10	18:05 (2)	16:30	15:54
8 | 04:53		20:45 (10)	05:38		19:50 (11)	06:32		18:46 (6)	07:25			07:23	08:14
| 21:41	18	21:03 (10)	20:57	25	20:15 (11)	19:47	23	19:09 (6)	18:35			16:28	15:54
9 | 04:54		20:46 (10)	05:40		19:50 (11)	06:34		18:45 (6)	07:27			07:25	08:15
| 21:40	17	21:03 (10)	20:55	24	20:14 (11)	19:45	23	19:08 (6)	18:32			16:27	15:54
10 | 04:55		20:46 (10)	05:42		19:50 (11)	06:35		18:45 (6)	07:28			07:27	08:16
| 21:39	16	21:02 (10)	20:53	24	20:14 (11)	19:43	23	19:08 (6)	18:30			16:25	15:53
11 | 04:56		20:47 (10)	05:43		19:50 (11)	06:37		18:46 (6)	07:30			07:29	08:17
| 21:38	15	21:02 (10)	20:51	23	20:13 (11)	19:40	21	19:07 (6)	18:27			16:23	15:53
12 | 04:58		20:48 (10)	05:45		19:51 (11)	06:39		18:46 (6)	07:32			07:31	08:18
| 21:38	13	21:01 (10)	20:49	22	20:13 (11)	19:38	19	19:05 (6)	18:25			16:22	15:53
13 | 04:59		20:49 (10)	05:47		19:52 (11)	06:41		18:47 (6)	07:34			07:33	08:19
| 21:37	11	21:00 (10)	20:47	20	20:12 (11)	19:35	17	19:04 (6)	18:23			16:20	15:53
14 | 05:00		20:51 (10)	05:48		19:52 (11)	06:42		18:49 (6)	07:36			07:34	08:20
| 21:36	7	20:58 (10)	20:45	19	20:11 (11)	19:33	12	19:01 (6)	18:20			16:18	15:53
15 | 05:01			05:50		19:54 (11)	06:44		18:53 (6)	07:38			07:36	08:21
| 21:34			20:43	15	20:09 (11)	19:30	5	18:58 (6)	18:18			16:17	15:53
16 | 05:02			05:52		19:56 (11)	06:46			07:39			07:38	08:22
| 21:33			20:41	12	20:08 (11)	19:28			18:16			16:15	15:53
17 | 05:04			05:54		19:59 (11)	06:48			07:41			07:40	08:23
| 21:32			20:38	4	20:03 (11)	19:26			18:14			16:14	15:53
18 | 05:05			05:55			06:49			07:43			07:42	08:24
| 21:31			20:36			19:23			18:11			16:12	15:53
19 | 05:07			05:57			06:51			07:45			07:44	08:25
| 21:30			20:34			19:21			18:09			16:11	15:54
20 | 05:08			05:59			06:53			07:47			07:45	08:25
| 21:28			20:32			19:18			18:07			16:10	15:54
21 | 05:09			06:01			06:55			07:49			07:47	08:26
| 21:27			20:30			19:16			18:05			16:08	15:54
22 | 05:11			06:02			06:56			07:51			07:49	08:26
| 21:26			20:27			19:13			18:02			16:07	15:55
23 | 05:12			06:04			06:58			07:53			07:51	08:27
| 21:24			20:25			19:11			18:00			16:06	15:55
24 | 05:14			06:06			07:00		18:01 (2)	07:54			07:53	08:27
| 21:23			20:23			19:08	8	18:09 (2)	17:58			16:05	15:56
25 | 05:15			06:08		19:21 (5)	07:02		17:58 (2)	06:56			07:54	08:28
| 21:21			20:21	8	19:29 (5)	19:06	14	18:12 (2)	16:56			16:04	15:56
26 | 05:17			06:09		19:19 (5)	07:03		17:56 (2)	06:58			07:56	08:28
| 21:20			20:18	12	19:31 (5)	19:03	17	18:13 (2)	16:54			16:03	15:57
27 | 05:18		19:59 (11)	06:11		19:18 (5)	07:05		17:54 (2)	07:00			07:58	08:28
| 21:18	8	20:07 (11)	20:16	15	19:33 (5)	19:01	19	18:13 (2)	16:52			16:02	15:58
28 | 05:20		19:58 (11)	06:13		19:16 (5)	07:07		17:53 (2)	07:02			07:59	08:28
| 21:17	12	20:10 (11)	20:14	16	19:32 (5)	18:59	21	18:14 (2)	16:50			16:01	15:59
29 | 05:22		19:56 (11)	06:15		19:15 (5)	07:09		17:52 (2)	07:04			08:01	08:29
| 21:15	15	20:11 (11)	20:11	18	19:33 (5)	18:56	22	18:14 (2)	16:48			16:00	16:00
30 | 05:23		19:55 (11)	06:16		19:15 (5)	07:11		17:52 (2)	07:06			08:02	08:29
| 21:13	17	20:12 (11)	20:09	19	19:34 (5)	18:54	22	18:14 (2)	16:46			15:59	16:01
31 | 05:25		19:53 (11)	06:18		18:55 (6)				07:08				08:29
| 21:12	20	20:13 (11)	20:07	28	19:33 (5)				16:44				16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung		311		468			494			126			
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91		0.91			0.91			0.91			
Reduktion Windrichtung		0.64		0.67			0.69			0.69			
Gesamte Reduktion		0.26		0.30			0.25			0.21			
Met.wahrsch.Beschattung		81		139			125			26			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)			Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten		Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BG - IO59

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar			März			April			Mai			Juni		
1	08:29	07:59			07:02		17:02 (2)	06:48			05:40			04:51		20:12 (10)
	16:03	16:54			17:48	18	17:20 (2)	19:46			20:41			21:30	12	20:24 (10)
2	08:28	07:57			07:00		17:01 (2)	06:46			05:38			04:50		20:13 (10)
	16:04	16:55			17:50	19	17:20 (2)	19:48			20:42			21:31	9	20:22 (10)
3	08:28	07:56			06:58		17:01 (2)	06:43			05:36			04:49		20:15 (10)
	16:05	16:57			17:52	20	17:21 (2)	19:50			20:44			21:32	7	20:22 (10)
4	08:28	07:54			06:55		17:01 (2)	06:41			05:34			04:48		
	16:06	16:59			17:54	20	17:21 (2)	19:52			20:46			21:33		
5	08:28	07:52			06:53		17:00 (2)	06:38			05:32			04:48		
	16:08	17:01			17:56	20	17:20 (2)	19:53			20:48			21:34		
6	08:27	07:50			06:51		17:01 (2)	06:36			05:30			04:47		
	16:09	17:03			17:58	19	17:20 (2)	19:55			20:50			21:35		
7	08:27	07:49			06:48		17:01 (2)	06:34			05:28			04:46		
	16:10	17:05			18:00	17	17:18 (2)	19:57			20:51			21:36		
8	08:26	07:47			06:46		17:02 (2)	06:31			05:26		20:13 (10)	04:46		
	16:12	17:07			18:02	16	17:18 (2)	19:59			20:53	7	20:20 (10)	21:37		
9	08:26	07:45			06:44		17:03 (2)	06:29			05:24		20:11 (10)	04:45		
	16:13	17:09			18:04	12	17:15 (2)	20:01			20:55	12	20:23 (10)	21:38		
10	08:25	07:43			06:41		17:05 (2)	06:27			05:22		20:09 (10)	04:45		
	16:15	17:11			18:06	8	17:13 (2)	20:03			20:57	15	20:24 (10)	21:39		
11	08:25	07:41			06:39			06:24			05:20		20:08 (10)	04:44		
	16:16	17:13			18:07			20:04			20:58	17	20:25 (10)	21:40		
12	08:24	07:39			06:37			06:22		19:27 (11)	05:19		20:07 (10)	04:44		
	16:18	17:15			18:09			20:06	10	19:37 (11)	21:00	20	20:27 (10)	21:41		
13	08:23	07:37			06:34			06:20		19:24 (11)	05:17		20:06 (10)	04:43		
	16:19	17:17			18:11			20:08	15	19:39 (11)	21:02	21	20:27 (10)	21:41		
14	08:22	07:35			06:32			06:17		19:22 (11)	05:15		20:05 (10)	04:43		
	16:21	17:19			18:13			20:10	18	19:40 (11)	21:03	22	20:27 (10)	21:42		
15	08:21	07:33			06:29			06:15		19:21 (11)	05:14		20:05 (10)	04:43		
	16:22	17:21			18:15			20:12	20	19:41 (11)	21:05	23	20:28 (10)	21:43		
16	08:20	07:31			06:27			06:13		19:20 (11)	05:12		20:05 (10)	04:43		
	16:24	17:23			18:17			20:13	21	19:41 (11)	21:07	23	20:28 (10)	21:43		
17	08:19	07:29			06:24			06:10		19:19 (11)	05:10		20:05 (10)	04:43		
	16:26	17:25			18:19			20:15	22	19:41 (11)	21:08	23	20:28 (10)	21:44		
18	08:18	07:27			06:22		17:43 (6)	06:08		19:19 (11)	05:09		20:05 (10)	04:43		
	16:27	17:27			18:20	11	17:54 (6)	20:17	23	19:42 (11)	21:10	24	20:29 (10)	21:44		
19	08:17	07:25			06:20		17:40 (6)	06:06		19:19 (11)	05:07		20:05 (10)	04:43		
	16:29	17:29			18:22	15	17:55 (6)	20:19	23	19:42 (11)	21:11	23	20:28 (10)	21:44		
20	08:16	07:22			06:17		17:39 (6)	06:03		19:19 (11)	05:06		20:05 (10)	04:43		
	16:31	17:31			18:24	18	17:57 (6)	20:21	23	19:42 (11)	21:13	23	20:28 (10)	21:45		
21	08:15	07:20			06:15		17:37 (6)	06:01		19:19 (11)	05:04		20:06 (10)	04:43		
	16:33	17:33			18:26	20	17:57 (6)	20:23	22	19:41 (11)	21:15	23	20:29 (10)	21:45		
22	08:14	07:18			06:12		17:37 (6)	05:59		19:18 (11)	05:03		20:05 (10)	04:43		
	16:35	17:35			18:28	20	17:57 (6)	20:24	22	19:40 (11)	21:16	23	20:28 (10)	21:45		
23	08:12	07:16			06:10		17:35 (6)	05:57		19:19 (11)	05:01		20:06 (10)	04:43		
	16:36	17:37			18:30	22	17:57 (6)	20:26	20	19:39 (11)	21:18	22	20:28 (10)	21:45		
24	08:11	07:14			06:07		17:35 (6)	05:55		19:19 (11)	05:00		20:06 (10)	04:44		
	16:38	17:39			18:31	22	17:57 (6)	20:28	19	19:38 (11)	21:19	22	20:28 (10)	21:45		
25	08:10	07:11			06:05		17:35 (6)	05:52		19:20 (11)	04:59		20:07 (10)	04:44		
	16:40	17:41			18:33	21	17:56 (6)	20:30	17	19:37 (11)	21:21	21	20:28 (10)	21:46		
26	08:08	07:09		17:07 (2)	06:03		17:35 (6)	05:50		19:22 (11)	04:58		20:07 (10)	04:44		
	16:42	17:43	9	17:16 (2)	18:35	21	17:56 (6)	20:32	14	19:36 (11)	21:22	20	20:27 (10)	21:45		
27	08:07	07:07		17:04 (2)	06:00		17:36 (6)	05:48		19:24 (11)	04:56		20:08 (10)	04:45		
	16:44	17:45	13	17:17 (2)	18:37	19	17:55 (6)	20:33	9	19:33 (11)	21:23	19	20:27 (10)	21:45		
28	08:05	07:05		17:03 (2)	05:58		17:36 (6)	05:46			04:55		20:09 (10)	04:45		
	16:46	17:47	16	17:19 (2)	18:39	18	17:54 (6)	20:35			21:25	18	20:27 (10)	21:45		
29	08:04				06:55		18:37 (6)	05:44			04:54		20:09 (10)	04:46		
	16:48				19:41	15	18:52 (6)	20:37			21:26	17	20:26 (10)	21:45		
30	08:02				06:53		18:39 (6)	05:42			04:53		20:10 (10)	04:47		
	16:50				19:42	10	18:49 (6)	20:39			21:27	15	20:25 (10)	21:45		
31	08:01				06:51						04:52		20:11 (10)			
	16:52				19:44						21:29	14	20:25 (10)			
Sonnenscheinstunden	252	274			367			419			492			508		
astr.max.mögl.Beschattung			38			401			298			467			28	
Red.Sonnenscheinwahrsch.			0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer			0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung			0.68			0.69			0.67			0.66			0.66	
Gesamte Reduktion			0.15			0.20			0.25			0.31			0.27	
Met.wahrsch.Beschattung			6			79			75			144			8	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BG - IO59

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli			August			September			Oktober			November	Dezember
1	04:47			05:26		20:18 (10)	06:20			07:12			07:10	08:04
	21:45			21:10	19	20:37 (10)	20:04			18:51			16:42	15:58
2	04:48			05:28		20:18 (10)	06:22			07:14			07:12	08:05
	21:44			21:08	17	20:35 (10)	20:02			18:49			16:40	15:57
3	04:49			05:30		20:20 (10)	06:23			07:16			07:14	08:07
	21:44			21:06	14	20:34 (10)	20:00			18:46			16:38	15:57
4	04:49			05:31		20:21 (10)	06:25			07:18		17:42 (2)	07:15	08:08
	21:43			21:05	11	20:32 (10)	19:57			18:44	10	17:52 (2)	16:36	15:56
5	04:50			05:33		20:24 (10)	06:27			07:19		17:39 (2)	07:17	08:10
	21:43			21:03	5	20:29 (10)	19:55			18:42	15	17:54 (2)	16:34	15:55
6	04:51			05:35			06:29			07:21		17:38 (2)	07:19	08:11
	21:42			21:01			19:52			18:39	17	17:55 (2)	16:32	15:55
7	04:52			05:36			06:30			07:23		17:36 (2)	07:21	08:12
	21:42			20:59			19:50			18:37	19	17:55 (2)	16:30	15:54
8	04:53			05:38			06:32			07:25		17:35 (2)	07:23	08:14
	21:41			20:57			19:47			18:35	20	17:55 (2)	16:28	15:54
9	04:54		20:24 (10)	05:40			06:34			07:27		17:35 (2)	07:25	08:15
	21:40	4	20:28 (10)	20:55			19:45			18:32	20	17:55 (2)	16:27	15:54
10	04:55		20:22 (10)	05:42			06:35			07:28		17:35 (2)	07:27	08:16
	21:39	8	20:30 (10)	20:53			19:43			18:30	20	17:55 (2)	16:25	15:53
11	04:56		20:21 (10)	05:43			06:37			07:30		17:35 (2)	07:29	08:17
	21:38	11	20:32 (10)	20:51			19:40			18:27	20	17:55 (2)	16:23	15:53
12	04:58		20:20 (10)	05:45			06:39			07:32		17:35 (2)	07:31	08:18
	21:38	13	20:33 (10)	20:49			19:38			18:25	19	17:54 (2)	16:22	15:53
13	04:59		20:19 (10)	05:47			06:41		18:30 (6)	07:34		17:36 (2)	07:33	08:19
	21:37	15	20:34 (10)	20:47			19:35	10	18:40 (6)	18:23	17	17:53 (2)	16:20	15:53
14	05:00		20:18 (10)	05:48			06:42		18:28 (6)	07:36		17:37 (2)	07:34	08:20
	21:36	16	20:34 (10)	20:45			19:33	14	18:42 (6)	18:20	15	17:52 (2)	16:18	15:53
15	05:01		20:18 (10)	05:50		19:35 (11)	06:44		18:26 (6)	07:38		17:38 (2)	07:36	08:21
	21:34	17	20:35 (10)	20:43	2	19:37 (11)	19:30	17	18:43 (6)	18:18	11	17:49 (2)	16:17	15:53
16	05:02		20:17 (10)	05:52		19:31 (11)	06:46		18:24 (6)	07:39		17:41 (2)	07:38	08:22
	21:33	18	20:35 (10)	20:41	11	19:42 (11)	19:28	20	18:44 (6)	18:16	6	17:47 (2)	16:15	15:53
17	05:04		20:17 (10)	05:54		19:28 (11)	06:48		18:24 (6)	07:41			07:40	08:23
	21:32	20	20:37 (10)	20:38	15	19:43 (11)	19:26	20	18:44 (6)	18:14			16:14	15:53
18	05:05		20:17 (10)	05:55		19:27 (11)	06:49		18:23 (6)	07:43			07:42	08:24
	21:31	20	20:37 (10)	20:36	17	19:44 (11)	19:23	22	18:45 (6)	18:11			16:12	15:53
19	05:06		20:16 (10)	05:57		19:25 (11)	06:51		18:22 (6)	07:45			07:44	08:25
	21:30	21	20:37 (10)	20:34	19	19:44 (11)	19:21	22	18:44 (6)	18:09			16:11	15:54
20	05:08		20:15 (10)	05:59		19:24 (11)	06:53		18:22 (6)	07:47			07:45	08:25
	21:28	22	20:37 (10)	20:32	21	19:45 (11)	19:18	21	18:43 (6)	18:07			16:10	15:54
21	05:09		20:16 (10)	06:01		19:24 (11)	06:55		18:22 (6)	07:49			07:47	08:26
	21:27	22	20:38 (10)	20:30	22	19:46 (11)	19:16	21	18:43 (6)	18:05			16:08	15:54
22	05:11		20:15 (10)	06:02		19:22 (11)	06:56		18:22 (6)	07:51			07:49	08:26
	21:26	23	20:38 (10)	20:27	23	19:45 (11)	19:13	20	18:42 (6)	18:02			16:07	15:55
23	05:12		20:15 (10)	06:04		19:22 (11)	06:58		18:22 (6)	07:53			07:51	08:27
	21:24	23	20:38 (10)	20:25	23	19:45 (11)	19:11	19	18:41 (6)	18:00			16:06	15:55
24	05:14		20:15 (10)	06:06		19:22 (11)	07:00		18:23 (6)	07:54			07:53	08:27
	21:23	24	20:39 (10)	20:23	24	19:46 (11)	19:08	16	18:39 (6)	17:58			16:05	15:56
25	05:15		20:15 (10)	06:08		19:22 (11)	07:02		18:25 (6)	06:56			07:54	08:28
	21:21	23	20:38 (10)	20:21	22	19:44 (11)	19:06	12	18:37 (6)	16:56			16:04	15:56
26	05:17		20:16 (10)	06:09		19:22 (11)	07:03		18:28 (6)	06:58			07:56	08:28
	21:20	23	20:39 (10)	20:18	22	19:44 (11)	19:03	6	18:34 (6)	16:54			16:03	15:57
27	05:18		20:15 (10)	06:11		19:23 (11)	07:05			07:00			07:58	08:28
	21:18	23	20:38 (10)	20:16	21	19:44 (11)	19:01			16:52			16:02	15:58
28	05:20		20:16 (10)	06:13		19:22 (11)	07:07			07:02			07:59	08:28
	21:17	23	20:39 (10)	20:14	20	19:42 (11)	18:59			16:50			16:01	15:59
29	05:22		20:16 (10)	06:15		19:23 (11)	07:09			07:04			08:01	08:29
	21:15	22	20:38 (10)	20:11	18	19:41 (11)	18:56			16:48			16:00	16:00
30	05:23		20:17 (10)	06:16		19:25 (11)	07:10			07:06			08:02	08:29
	21:13	21	20:38 (10)	20:09	14	19:39 (11)	18:54			16:46			15:59	16:01
31	05:25		20:17 (10)	06:18		19:26 (11)				07:08				08:29
	21:12	20	20:37 (10)	20:07	10	19:36 (11)				16:44				16:02
Sonnenscheinstunden	510			459			382			329			260	235
astr.max.mögl.Beschattung		432			370			240			209			
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91			
Reduktion Windrichtung		0.66			0.67			0.70			0.68			
Gesamte Reduktion		0.27			0.30			0.26			0.21			
Met.wahrsch.Beschattung		116			110			62			43			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BH - IO60

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April		Mai		Juni	
1	08:29		07:59		07:02		17:03 (2)		06:48		05:40		04:51		20:13 (10)
	16:03		16:54		17:48	18	17:21 (2)		19:46		20:41		21:30	7	20:20 (10)
2	08:28		07:57		07:00		17:01 (2)		06:46		05:38		04:50		20:16 (10)
	16:04		16:55		17:50	19	17:20 (2)		19:48		20:42		21:31	1	20:17 (10)
3	08:28		07:56		06:58		17:01 (2)		06:43		05:36		04:49		
	16:05		16:57		17:52	20	17:21 (2)		19:50		20:44		21:32		
4	08:28		07:54		06:55		17:01 (2)		06:41		05:34		04:48		
	16:06		16:59		17:54	20	17:21 (2)		19:52		20:46		21:33		
5	08:28		07:52		06:53		17:01 (2)		06:38		05:32		04:48		
	16:08		17:01		17:56	19	17:20 (2)		19:53		20:48		21:34		
6	08:27		07:50		06:51		17:01 (2)		06:36		05:30		04:47		
	16:09		17:03		17:58	19	17:20 (2)		19:55		20:50		21:35		
7	08:27		07:49		06:48		17:01 (2)		06:34		05:28	20:13 (10)	04:46		
	16:10		17:05		18:00	18	17:19 (2)		19:57		20:51	6 20:19 (10)	21:36		
8	08:26		07:47		06:46		17:02 (2)		06:31		05:26	20:10 (10)	04:46		
	16:12		17:07		18:02	16	17:18 (2)		19:59		20:53	11 20:21 (10)	21:37		
9	08:26		07:45		06:44		17:03 (2)		06:29		05:24	20:09 (10)	04:45		
	16:13		17:09		18:04	12	17:15 (2)		20:01		20:55	14 20:23 (10)	21:38		
10	08:25		07:43		06:41		17:06 (2)		06:27		05:22	20:07 (10)	04:45		
	16:15		17:11		18:06	7	17:13 (2)		20:03		20:57	17 20:24 (10)	21:39		
11	08:25		07:41		06:39				06:24	19:30 (11)	05:20	20:06 (10)	04:44		
	16:16		17:13		18:07				20:04	4 19:34 (11)	20:58	19 20:25 (10)	21:40		
12	08:24		07:39		06:37				06:22	19:26 (11)	05:19	20:06 (10)	04:44		
	16:18		17:15		18:09				20:06	12 19:38 (11)	21:00	20 20:26 (10)	21:41		
13	08:23		07:37		06:34				06:20	19:23 (11)	05:17	20:05 (10)	04:43		
	16:19		17:17		18:11				20:08	16 19:39 (11)	21:02	21 20:26 (10)	21:41		
14	08:22		07:35		06:32				06:17	19:22 (11)	05:15	20:04 (10)	04:43		
	16:21		17:19		18:13				20:10	18 19:40 (11)	21:03	22 20:26 (10)	21:42		
15	08:21		07:33		06:29				06:15	19:21 (11)	05:14	20:04 (10)	04:43		
	16:22		17:21		18:15				20:12	20 19:41 (11)	21:05	23 20:27 (10)	21:43		
16	08:20		07:31		06:27				06:13	19:19 (11)	05:12	20:04 (10)	04:43		
	16:24		17:23		18:17				20:13	22 19:41 (11)	21:07	23 20:27 (10)	21:43		
17	08:19		07:29		06:24				06:10	19:19 (11)	05:10	20:04 (10)	04:43		
	16:26		17:25		18:19				20:15	22 19:41 (11)	21:08	23 20:27 (10)	21:44		
18	08:18		07:27		06:22		17:43 (6)		06:08	19:18 (11)	05:09	20:04 (10)	04:43		
	16:27		17:27		18:20	11	17:54 (6)		20:17	23 19:41 (11)	21:10	24 20:28 (10)	21:44		
19	08:17		07:25		06:20		17:40 (6)		06:06	19:18 (11)	05:07	20:04 (10)	04:43		
	16:29		17:29		18:22	15	17:55 (6)		20:19	23 19:41 (11)	21:11	23 20:27 (10)	21:44		
20	08:16		07:22		06:17		17:39 (6)		06:03	19:18 (11)	05:06	20:04 (10)	04:43		
	16:31		17:31		18:24	18	17:57 (6)		20:21	23 19:41 (11)	21:13	23 20:27 (10)	21:45		
21	08:15		07:20		06:15		17:37 (6)		06:01	19:19 (11)	05:04	20:05 (10)	04:43		
	16:33		17:33		18:26	20	17:57 (6)		20:23	22 19:41 (11)	21:15	22 20:27 (10)	21:45		
22	08:14		07:18		06:12		17:37 (6)		05:59	19:18 (11)	05:03	20:05 (10)	04:43		
	16:35		17:35		18:28	20	17:57 (6)		20:24	21 19:39 (11)	21:16	21 20:26 (10)	21:45		
23	08:12		07:16		06:10		17:35 (6)		05:57	19:19 (11)	05:01	20:05 (10)	04:43		
	16:36		17:37		18:30	22	17:57 (6)		20:26	19 19:38 (11)	21:18	21 20:26 (10)	21:45		
24	08:11		07:14		06:07		17:36 (6)		05:55	19:19 (11)	05:00	20:06 (10)	04:44		
	16:38		17:39		18:31	21	17:57 (6)		20:28	18 19:37 (11)	21:19	20 20:26 (10)	21:45		
25	08:10		07:11		06:05		17:35 (6)		05:52	19:21 (11)	04:59	20:06 (10)	04:44		
	16:40		17:41		18:33	21	17:56 (6)		20:30	15 19:36 (11)	21:21	20 20:26 (10)	21:46		
26	08:08		07:09	17:08 (2)	06:03		17:35 (6)		05:50	19:22 (11)	04:58	20:07 (10)	04:44		
	16:42		17:43	8 17:16 (2)	18:35	21	17:56 (6)		20:32	12 19:34 (11)	21:22	19 20:26 (10)	21:45		
27	08:07		07:07	17:05 (2)	06:00		17:36 (6)		05:48	19:26 (11)	04:56	20:08 (10)	04:45		
	16:44		17:45	12 17:17 (2)	18:37	19	17:55 (6)		20:33	5 19:31 (11)	21:23	17 20:25 (10)	21:45		
28	08:05		07:05	17:04 (2)	05:58		17:36 (6)		05:46		04:55	20:09 (10)	04:45		
	16:46		17:47	15 17:19 (2)	18:39	17	17:53 (6)		20:35		21:25	16 20:25 (10)	21:45		
29	08:04				06:55		18:38 (6)		05:44		04:54	20:10 (10)	04:46		
	16:48				19:41	14	18:52 (6)		20:37		21:26	14 20:24 (10)	21:45		
30	08:02				06:53		18:39 (6)		05:42		04:53	20:11 (10)	04:47		
	16:50				19:42	10	18:49 (6)		20:39		21:27	12 20:23 (10)	21:45		
31	08:01				06:51						04:52	20:12 (10)			
	16:52				19:44						21:29	10 20:22 (10)			
Sonnenscheinstunden	252		274		367				419		492		508		
astr.max.mögl.Beschattung				35		397				295		461			8
Red.Sonnenscheinwahrsch.				0.24		0.31				0.41		0.51			0.45
Reduktion Betriebsdauer				0.91		0.91				0.91		0.91			0.91
Reduktion Windrichtung				0.68		0.69				0.67		0.66			0.66
Gesamte Reduktion				0.15		0.20				0.25		0.31			0.27
Met.wahrsch.Beschattung				5		79				75		142			2

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BH - IO60

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1 | 04:47			| 05:26		20:17 (10)	| 06:20		19:29 (11)	| 07:12			| 07:10	| 08:04
| 21:45			| 21:10	19	20:36 (10)	| 20:04	4	19:33 (11)	| 18:51			| 16:42	| 15:58
2 | 04:48			| 05:28		20:17 (10)	| 06:22			| 07:14			| 07:12	| 08:05
| 21:44			| 21:08	18	20:35 (10)	| 20:02			| 18:49			| 16:40	| 15:57
3 | 04:49			| 05:30		20:18 (10)	| 06:23			| 07:16			| 07:14	| 08:07
| 21:44			| 21:06	16	20:34 (10)	| 20:00			| 18:46			| 16:38	| 15:57
4 | 04:49			| 05:31		20:19 (10)	| 06:25			| 07:18		17:42 (2)	| 07:15	| 08:08
| 21:43			| 21:05	13	20:32 (10)	| 19:57			| 18:44	10	17:52 (2)	| 16:36	| 15:56
5 | 04:50			| 05:33		20:21 (10)	| 06:27			| 07:19		17:40 (2)	| 07:17	| 08:10
| 21:43			| 21:03	10	20:31 (10)	| 19:55			| 18:42	14	17:54 (2)	| 16:34	| 15:55
6 | 04:51			| 05:35			| 06:29			| 07:21		17:38 (2)	| 07:19	| 08:11
| 21:42			| 21:01			| 19:52			| 18:39	17	17:55 (2)	| 16:32	| 15:55
7 | 04:52			| 05:36			| 06:30			| 07:23		17:36 (2)	| 07:21	| 08:12
| 21:42			| 20:59			| 19:50			| 18:37	19	17:55 (2)	| 16:30	| 15:54
8 | 04:53			| 05:38			| 06:32			| 07:25		17:36 (2)	| 07:23	| 08:14
| 21:41			| 20:57			| 19:47			| 18:35	19	17:55 (2)	| 16:28	| 15:54
9 | 04:54			| 05:40			| 06:34			| 07:27		17:35 (2)	| 07:25	| 08:15
| 21:40			| 20:55			| 19:45			| 18:32	20	17:55 (2)	| 16:27	| 15:54
10 | 04:55			| 05:42			| 06:35			| 07:28		17:35 (2)	| 07:27	| 08:16
| 21:39			| 20:53			| 19:43			| 18:30	20	17:55 (2)	| 16:25	| 15:53
11 | 04:56		20:23 (10)	| 05:43			| 06:37			| 07:30		17:35 (2)	| 07:29	| 08:17
| 21:38	5	20:28 (10)	| 20:51			| 19:40			| 18:27	20	17:55 (2)	| 16:23	| 15:53
12 | 04:58		20:21 (10)	| 05:45			| 06:39			| 07:32		17:36 (2)	| 07:31	| 08:18
| 21:38	9	20:30 (10)	| 20:49			| 19:38			| 18:25	18	17:54 (2)	| 16:22	| 15:53
13 | 04:59		20:20 (10)	| 05:47			| 06:41		18:31 (6)	| 07:34		17:36 (2)	| 07:33	| 08:19
| 21:37	11	20:31 (10)	| 20:47			| 19:35	8	18:39 (6)	| 18:23	17	17:53 (2)	| 16:20	| 15:53
14 | 05:00		20:19 (10)	| 05:48			| 06:42		18:29 (6)	| 07:36		17:37 (2)	| 07:34	| 08:20
| 21:36	13	20:32 (10)	| 20:45			| 19:33	13	18:42 (6)	| 18:20	15	17:52 (2)	| 16:18	| 15:53
15 | 05:01		20:18 (10)	| 05:50			| 06:44		18:26 (6)	| 07:38		17:39 (2)	| 07:36	| 08:21
| 21:34	15	20:33 (10)	| 20:43			| 19:30	16	18:42 (6)	| 18:18	10	17:49 (2)	| 16:17	| 15:53
16 | 05:02		20:17 (10)	| 05:52		19:32 (11)	| 06:46		18:25 (6)	| 07:39		17:42 (2)	| 07:38	| 08:22
| 21:33	16	20:33 (10)	| 20:41	7	19:39 (11)	| 19:28	18	18:43 (6)	| 18:16	5	17:47 (2)	| 16:15	| 15:53
17 | 05:04		20:17 (10)	| 05:54		19:28 (11)	| 06:48		18:24 (6)	| 07:41			| 07:40	| 08:23
| 21:32	18	20:35 (10)	| 20:38	13	19:41 (11)	| 19:26	20	18:44 (6)	| 18:14			| 16:14	| 15:53
18 | 05:05		20:16 (10)	| 05:55		19:27 (11)	| 06:49		18:23 (6)	| 07:43			| 07:42	| 08:24
| 21:31	19	20:35 (10)	| 20:36	16	19:43 (11)	| 19:23	21	18:44 (6)	| 18:11			| 16:12	| 15:53
19 | 05:06		20:16 (10)	| 05:57		19:25 (11)	| 06:51		18:22 (6)	| 07:45			| 07:44	| 08:25
| 21:30	20	20:36 (10)	| 20:34	18	19:43 (11)	| 19:21	22	18:44 (6)	| 18:09			| 16:11	| 15:54
20 | 05:08		20:15 (10)	| 05:59		19:24 (11)	| 06:53		18:22 (6)	| 07:47			| 07:45	| 08:25
| 21:28	21	20:36 (10)	| 20:32	20	19:44 (11)	| 19:18	21	18:43 (6)	| 18:07			| 16:10	| 15:54
21 | 05:09		20:15 (10)	| 06:01		19:24 (11)	| 06:55		18:22 (6)	| 07:49			| 07:47	| 08:26
| 21:27	22	20:37 (10)	| 20:30	21	19:45 (11)	| 19:16	21	18:43 (6)	| 18:05			| 16:08	| 15:54
22 | 05:11		20:15 (10)	| 06:02		19:22 (11)	| 06:56		18:22 (6)	| 07:51			| 07:49	| 08:26
| 21:26	22	20:37 (10)	| 20:27	22	19:44 (11)	| 19:13	20	18:42 (6)	| 18:02			| 16:07	| 15:55
23 | 05:12		20:14 (10)	| 06:04		19:22 (11)	| 06:58		18:22 (6)	| 07:53			| 07:51	| 08:27
| 21:24	23	20:37 (10)	| 20:25	23	19:45 (11)	| 19:11	19	18:41 (6)	| 18:00			| 16:06	| 15:55
24 | 05:14		20:15 (10)	| 06:06		19:22 (11)	| 07:00		18:23 (6)	| 07:54			| 07:53	| 08:27
| 21:23	23	20:38 (10)	| 20:23	23	19:45 (11)	| 19:08	16	18:39 (6)	| 17:58			| 16:05	| 15:56
25 | 05:15		20:14 (10)	| 06:08		19:21 (11)	| 07:02		18:25 (6)	| 06:56			| 07:54	| 08:28
| 21:21	23	20:37 (10)	| 20:21	23	19:44 (11)	| 19:06	12	18:37 (6)	| 16:56			| 16:04	| 15:56
26 | 05:17		20:15 (10)	| 06:09		19:21 (11)	| 07:03		18:28 (6)	| 06:58			| 07:56	| 08:28
| 21:20	23	20:38 (10)	| 20:18	23	19:44 (11)	| 19:03	6	18:34 (6)	| 16:54			| 16:03	| 15:57
27 | 05:18		20:14 (10)	| 06:11		19:22 (11)	| 07:05			| 07:00			| 07:58	| 08:28
| 21:18	24	20:38 (10)	| 20:16	21	19:43 (11)	| 19:01			| 16:52			| 16:02	| 15:58
28 | 05:20		20:15 (10)	| 06:13		19:22 (11)	| 07:07			| 07:02			| 07:59	| 08:28
| 21:17	23	20:38 (10)	| 20:14	20	19:42 (11)	| 18:59			| 16:50			| 16:01	| 15:59
29 | 05:22		20:15 (10)	| 06:15		19:23 (11)	| 07:09			| 07:04			| 08:01	| 08:29
| 21:15	22	20:37 (10)	| 20:11	18	19:41 (11)	| 18:56			| 16:48			| 16:00	| 16:00
30 | 05:23		20:16 (10)	| 06:16		19:24 (11)	| 07:10			| 07:06			| 08:02	| 08:29
| 21:13	21	20:37 (10)	| 20:09	16	19:40 (11)	| 18:54			| 16:46			| 15:59	| 16:01
31 | 05:25		20:16 (10)	| 06:18		19:25 (11)				| 07:08				| 08:29
| 21:12	20	20:36 (10)	| 20:07	12	19:37 (11)				| 16:44				| 16:02
Sonnenscheinstunden	510		| 459			| 382			| 329			| 260	| 235
astr.max.mögl.Beschattung		393			372			237			204				
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33				
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91				
Reduktion Windrichtung		0.66			0.67			0.70			0.68				
Gesamte Reduktion		0.27			0.30			0.26			0.21				
Met.wahrsch.Beschattung		105			111			61			42				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BI - IO61

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April		Mai		Juni	
1	08:29		07:59		07:02		17:03 (2)	06:48	18:40 (6)	05:40	19:28 (11)	04:51	20:13 (10)
	16:03		16:54		17:48	17	17:20 (2)	19:46	18:51 (6)	20:41	19:36 (11)	21:30	20:35 (10)
2	08:28		07:57		07:00		17:01 (2)	06:46		05:38		04:50	20:13 (10)
	16:04		16:55		17:50	20	17:21 (2)	19:48		20:42		21:31	20:34 (10)
3	08:28		07:56		06:58		17:01 (2)	06:43		05:36		04:49	20:14 (10)
	16:05		16:57		17:52	20	17:21 (2)	19:50		20:44		21:32	20:35 (10)
4	08:28		07:54		06:55		17:01 (2)	06:41		05:34		04:48	20:14 (10)
	16:06		16:59		17:54	21	17:22 (2)	19:52		20:46		21:33	20:34 (10)
5	08:28		07:52		06:53		17:00 (2)	06:38		05:32		04:48	20:15 (10)
	16:08		17:01		17:56	21	17:21 (2)	19:53		20:48		21:34	20:34 (10)
6	08:27		07:50		06:51		17:00 (2)	06:36		05:30		04:47	20:16 (10)
	16:09		17:03		17:58	21	17:21 (2)	19:55		20:50		21:35	20:34 (10)
7	08:27		07:49		06:48		17:00 (2)	06:34		05:28		04:46	20:16 (10)
	16:10		17:05		18:00	20	17:20 (2)	19:57		20:51		21:36	20:34 (10)
8	08:26		07:47		06:46		17:01 (2)	06:31		05:26		04:46	20:17 (10)
	16:12		17:07		18:02	18	17:19 (2)	19:59		20:53		21:37	20:34 (10)
9	08:26		07:45		06:44		17:02 (2)	06:29		05:24		04:45	20:17 (10)
	16:13		17:09		18:04	17	17:19 (2)	20:01		20:55		21:38	20:33 (10)
10	08:25		07:43		06:41		17:03 (2)	06:27		05:22		04:45	20:18 (10)
	16:15		17:11		18:06	13	17:16 (2)	20:03		20:57		21:39	20:33 (10)
11	08:25		07:41		06:39		17:06 (2)	06:24		05:20		04:44	20:19 (10)
	16:16		17:13		18:07	8	17:14 (2)	20:04		20:58		21:40	20:33 (10)
12	08:24		07:39		06:37			06:22		05:19	20:20 (10)	04:44	20:20 (10)
	16:18		17:15		18:09			20:06		21:00	6 20:26 (10)	21:41	20:33 (10)
13	08:23		07:37		06:34			06:20		05:17	20:17 (10)	04:43	20:19 (10)
	16:19		17:17		18:11			20:08		21:02	11 20:28 (10)	21:41	20:32 (10)
14	08:22		07:35		06:32			06:17	19:33 (11)	05:15	20:15 (10)	04:43	20:20 (10)
	16:21		17:19		18:13			20:10	5 19:38 (11)	21:03	15 20:30 (10)	21:42	20:32 (10)
15	08:21		07:33		06:29			06:15	19:29 (11)	05:14	20:14 (10)	04:43	20:21 (10)
	16:22		17:21		18:15			20:12	13 19:42 (11)	21:05	17 20:31 (10)	21:43	20:32 (10)
16	08:20		07:31		06:27			06:13	19:26 (11)	05:12	20:13 (10)	04:43	20:22 (10)
	16:24		17:23		18:17			20:13	17 19:43 (11)	21:07	19 20:32 (10)	21:43	20:32 (10)
17	08:19		07:29		06:24			06:10	19:25 (11)	05:10	20:12 (10)	04:43	20:22 (10)
	16:26		17:25		18:19			20:15	19 19:44 (11)	21:08	21 20:33 (10)	21:44	20:32 (10)
18	08:18		07:27		06:22			06:08	19:24 (11)	05:09	20:12 (10)	04:43	20:22 (10)
	16:27		17:27		18:20			20:17	21 19:45 (11)	21:10	22 20:34 (10)	21:44	20:32 (10)
19	08:17		07:25		06:20		17:46 (6)	06:06	19:23 (11)	05:07	20:11 (10)	04:43	20:23 (10)
	16:29		17:29		18:22	8	17:54 (6)	20:19	23 19:46 (11)	21:11	23 20:34 (10)	21:44	9 20:32 (10)
20	08:16		07:22		06:17		17:43 (6)	06:03	19:23 (11)	05:06	20:11 (10)	04:43	20:23 (10)
	16:31		17:31		18:24	14	17:57 (6)	20:21	23 19:46 (11)	21:13	23 20:34 (10)	21:45	9 20:32 (10)
21	08:15		07:20		06:15		17:40 (6)	06:01	19:22 (11)	05:04	20:11 (10)	04:43	20:23 (10)
	16:33		17:33		18:26	17	17:57 (6)	20:23	24 19:46 (11)	21:15	24 20:35 (10)	21:45	9 20:32 (10)
22	08:14		07:18		06:12		17:39 (6)	05:59	19:21 (11)	05:03	20:11 (10)	04:43	20:24 (10)
	16:35		17:35		18:28	20	17:59 (6)	20:24	24 19:45 (11)	21:16	23 20:34 (10)	21:45	9 20:33 (10)
23	08:12		07:16		06:10		17:38 (6)	05:57	19:21 (11)	05:01	20:11 (10)	04:43	20:24 (10)
	16:36		17:37		18:30	21	17:59 (6)	20:26	24 19:45 (11)	21:18	24 20:35 (10)	21:45	9 20:33 (10)
24	08:11		07:14		06:07		17:37 (6)	05:55	19:21 (11)	05:00	20:11 (10)	04:44	20:24 (10)
	16:38		17:39		18:32	22	17:59 (6)	20:28	24 19:45 (11)	21:19	24 20:35 (10)	21:45	9 20:33 (10)
25	08:10		07:11		06:05		17:36 (6)	05:52	19:22 (11)	04:59	20:11 (10)	04:44	20:24 (10)
	16:40		17:41		18:33	23	17:59 (6)	20:30	22 19:44 (11)	21:21	24 20:35 (10)	21:46	10 20:34 (10)
26	08:08		07:09		06:03		17:36 (6)	05:50	19:22 (11)	04:58	20:11 (10)	04:44	20:24 (10)
	16:42		17:43		18:35	23	17:59 (6)	20:32	22 19:44 (11)	21:22	24 20:35 (10)	21:45	10 20:34 (10)
27	08:07		07:07	17:06 (2)	06:00		17:37 (6)	05:48	19:23 (11)	04:56	20:12 (10)	04:45	20:23 (10)
	16:44		17:45	11 17:17 (2)	18:37	22	17:59 (6)	20:33	20 19:43 (11)	21:23	23 20:35 (10)	21:45	11 20:34 (10)
28	08:05		07:05	17:04 (2)	05:58		17:36 (6)	05:46	19:23 (11)	04:55	20:12 (10)	04:45	20:24 (10)
	16:46		17:47	15 17:19 (2)	18:39	22	17:58 (6)	20:35	19 19:42 (11)	21:25	23 20:35 (10)	21:45	11 20:35 (10)
29	08:04				06:55		18:37 (6)	05:44	19:24 (11)	04:54	20:12 (10)	04:46	20:24 (10)
	16:48				19:41	20	18:57 (6)	20:37	17 19:41 (11)	21:26	23 20:35 (10)	21:45	12 20:36 (10)
30	08:02				06:53		18:37 (6)	05:42	19:26 (11)	04:53	20:12 (10)	04:47	20:23 (10)
	16:50				19:42	18	18:55 (6)	20:39	13 19:39 (11)	21:27	23 20:35 (10)	21:45	13 20:36 (10)
31	08:01				06:51		18:39 (6)			04:52	20:13 (10)		
	16:52				19:44	15	18:54 (6)			21:29	22 20:35 (10)		
Sonnenscheinstunden	252		274		367			419		492		508	
astr.max.mögl.Beschattung			26			441			341		422		401
Red.Sonnenscheinwahrsch.			0.24			0.31			0.41		0.51		0.45
Reduktion Betriebsdauer			0.91			0.91			0.91		0.91		0.91
Reduktion Windrichtung			0.68			0.69			0.67		0.65		0.65
Gesamte Reduktion			0.15			0.20			0.25		0.31		0.27
Met.wahrsch.Beschattung			4			87			86		129		109

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BI - IO61

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober		November	Dezember
1 | 04:47		20:23 (10) | 05:26		20:32 (10) | 06:20		| 07:12		| 07:10	| 08:04
| 21:45	14	20:37 (10) | 21:10	3	20:35 (10) | 20:04		| 18:51		| 16:42	| 15:58
2 | 04:48		20:23 (10) | 05:28		| 06:22		| 07:14		17:46 (2) | 07:12	| 08:05
| 21:44	15	20:38 (10) | 21:08		| 20:02		| 18:49	4	17:50 (2) | 16:40	| 15:57
3 | 04:49		20:22 (10) | 05:30		| 06:23		| 07:16		17:42 (2) | 07:14	| 08:07
| 21:44	16	20:38 (10) | 21:06		| 20:00		| 18:46	11	17:53 (2) | 16:38	| 15:57
4 | 04:49		20:22 (10) | 05:31		| 06:25		| 07:18		17:40 (2) | 07:15	| 08:08
| 21:43	17	20:39 (10) | 21:05		| 19:57		| 18:44	15	17:55 (2) | 16:36	| 15:56
5 | 04:50		20:22 (10) | 05:33		| 06:27		| 07:19		17:38 (2) | 07:17	| 08:10
| 21:43	18	20:40 (10) | 21:03		| 19:55		| 18:42	18	17:56 (2) | 16:34	| 15:55
6 | 04:51		20:22 (10) | 05:35		| 06:29		| 07:21		17:37 (2) | 07:19	| 08:11
| 21:42	18	20:40 (10) | 21:01		| 19:52		| 18:39	20	17:57 (2) | 16:32	| 15:55
7 | 04:52		20:22 (10) | 05:36		| 06:30		| 07:23		17:36 (2) | 07:21	| 08:12
| 21:42	19	20:41 (10) | 20:59		| 19:50		| 18:37	20	17:56 (2) | 16:30	| 15:54
8 | 04:53		20:22 (10) | 05:38		| 06:32		| 07:25		17:35 (2) | 07:23	| 08:14
| 21:41	20	20:42 (10) | 20:57		| 19:47		| 18:35	21	17:56 (2) | 16:28	| 15:54
9 | 04:54		20:22 (10) | 05:40		| 06:34		| 07:27		17:35 (2) | 07:25	| 08:15
| 21:40	20	20:42 (10) | 20:55		| 19:45		| 18:32	21	17:56 (2) | 16:27	| 15:54
10 | 04:55		20:22 (10) | 05:42		| 06:35		| 07:28		17:35 (2) | 07:27	| 08:16
| 21:39	21	20:43 (10) | 20:53		| 19:43		| 18:30	21	17:56 (2) | 16:25	| 15:53
11 | 04:56		20:21 (10) | 05:43		| 06:37	18:34 (6)	| 07:30		17:35 (2) | 07:29	| 08:17
| 21:38	22	20:43 (10) | 20:51		| 19:40	10 18:44 (6)	| 18:27	20	17:55 (2) | 16:23	| 15:53
12 | 04:58		20:21 (10) | 05:45		19:36 (11) | 06:39	18:30 (6)	| 07:32		17:36 (2) | 07:31	| 08:18
| 21:38	22	20:43 (10) | 20:49	9	19:45 (11) | 19:38	15 18:45 (6)	| 18:25	18	17:54 (2) | 16:22	| 15:53
13 | 04:59		20:21 (10) | 05:47		19:34 (11) | 06:41	18:29 (6)	| 07:34		17:37 (2) | 07:33	| 08:19
| 21:37	23	20:44 (10) | 20:47	14	19:48 (11) | 19:35	17 18:46 (6)	| 18:23	16	17:53 (2) | 16:20	| 15:53
14 | 05:00		20:21 (10) | 05:48		19:32 (11) | 06:42	18:28 (6)	| 07:36		17:38 (2) | 07:34	| 08:20
| 21:36	23	20:44 (10) | 20:45	16	19:48 (11) | 19:33	19 18:47 (6)	| 18:20	13	17:51 (2) | 16:18	| 15:53
15 | 05:01		20:20 (10) | 05:50		19:31 (11) | 06:44	18:27 (6)	| 07:38		17:40 (2) | 07:36	| 08:21
| 21:34	24	20:44 (10) | 20:43	19	19:50 (11) | 19:30	21 18:48 (6)	| 18:18	9	17:49 (2) | 16:17	| 15:53
16 | 05:02		20:20 (10) | 05:52		19:30 (11) | 06:46	18:25 (6)	| 07:39		| 07:38	| 08:22
| 21:33	24	20:44 (10) | 20:41	21	19:51 (11) | 19:28	22 18:47 (6)	| 18:16		| 16:15	| 15:53
17 | 05:04		20:21 (10) | 05:54		19:28 (11) | 06:48	18:25 (6)	| 07:41		| 07:40	| 08:23
| 21:32	24	20:45 (10) | 20:38	23	19:51 (11) | 19:26	22 18:47 (6)	| 18:14		| 16:14	| 15:53
18 | 05:05		20:21 (10) | 05:55		19:28 (11) | 06:49	18:25 (6)	| 07:43		| 07:42	| 08:24
| 21:31	24	20:45 (10) | 20:36	23	19:51 (11) | 19:23	22 18:47 (6)	| 18:11		| 16:12	| 15:53
19 | 05:07		20:21 (10) | 05:57		19:27 (11) | 06:51	18:24 (6)	| 07:45		| 07:44	| 08:25
| 21:30	24	20:45 (10) | 20:34	24	19:51 (11) | 19:21	22 18:46 (6)	| 18:09		| 16:11	| 15:54
20 | 05:08		20:20 (10) | 05:59		19:27 (11) | 06:53	18:24 (6)	| 07:47		| 07:45	| 08:25
| 21:28	24	20:44 (10) | 20:32	24	19:51 (11) | 19:18	21 18:45 (6)	| 18:07		| 16:10	| 15:54
21 | 05:09		20:21 (10) | 06:01		19:27 (11) | 06:55	18:25 (6)	| 07:49		| 07:47	| 08:26
| 21:27	24	20:45 (10) | 20:30	24	19:51 (11) | 19:16	20 18:45 (6)	| 18:05		| 16:08	| 15:54
22 | 05:11		20:21 (10) | 06:02		19:26 (11) | 06:56	18:26 (6)	| 07:51		| 07:49	| 08:26
| 21:26	24	20:45 (10) | 20:27	24	19:50 (11) | 19:13	17 18:43 (6)	| 18:02		| 16:07	| 15:55
23 | 05:12		20:21 (10) | 06:04		19:27 (11) | 06:58	18:26 (6)	| 07:53		| 07:51	| 08:27
| 21:24	23	20:44 (10) | 20:25	23	19:50 (11) | 19:11	15 18:41 (6)	| 18:00		| 16:06	| 15:55
24 | 05:14		20:22 (10) | 06:06		19:27 (11) | 07:00	18:28 (6)	| 07:54		| 07:53	| 08:27
| 21:23	22	20:44 (10) | 20:23	22	19:49 (11) | 19:08	10 18:38 (6)	| 17:58		| 16:05	| 15:56
25 | 05:15		20:22 (10) | 06:08		19:27 (11) | 07:02		| 06:56		| 07:54	| 08:28
| 21:21	22	20:44 (10) | 20:21	21	19:48 (11) | 19:06		| 16:56		| 16:04	| 15:56
26 | 05:17		20:23 (10) | 06:09		19:28 (11) | 07:03		| 06:58		| 07:56	| 08:28
| 21:20	21	20:44 (10) | 20:18	19	19:47 (11) | 19:03		| 16:54		| 16:03	| 15:57
27 | 05:18		20:23 (10) | 06:11		19:29 (11) | 07:05		| 07:00		| 07:58	| 08:28
| 21:18	20	20:43 (10) | 20:16	16	19:45 (11) | 19:01		| 16:52		| 16:02	| 15:58
28 | 05:20		20:24 (10) | 06:13		19:30 (11) | 07:07		| 07:02		| 07:59	| 08:28
| 21:17	19	20:43 (10) | 20:14	12	19:42 (11) | 18:59		| 16:50		| 16:01	| 15:59
29 | 05:22		20:25 (10) | 06:15		19:34 (11) | 07:09		| 07:04		| 08:01	| 08:29
| 21:15	16	20:41 (10) | 20:11	4	19:38 (11) | 18:56		| 16:48		| 16:00	| 16:00
30 | 05:23		20:27 (10) | 06:16		| 07:10		| 07:06		| 08:02	| 08:29
| 21:13	13	20:40 (10) | 20:09		| 18:54		| 16:46		| 15:59	| 16:01
31 | 05:25		20:28 (10) | 06:18				| 07:08			| 08:29
| 21:12	10	20:38 (10) | 20:07				| 16:44			| 16:02
Sonnenscheinstunden |	510	| 459		| 382		| 329		| 260	| 235
astr.max.mögl.Beschattung |	626	|	341	|	253	|	227	|	|
Red.Sonnenscheinwahrsch. |	0.45	|	0.49	|	0.40	|	0.33	|	|
Reduktion Betriebsdauer |	0.91	|	0.91	|	0.91	|	0.91	|	|
Reduktion Windrichtung |	0.65	|	0.67	|	0.70	|	0.68	|	|
Gesamte Reduktion |	0.27	|	0.30	|	0.26	|	0.21	|	|
Met.wahrsch.Beschattung |	167	|	101	|	65	|	47	|	|

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BJ - IO62

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März			April			Mai			Juni		
1	08:29	07:59		07:02			06:48		18:42 (6)	05:40		19:29 (11)	04:51		20:17 (10)
	16:03	16:54		17:48			19:46	20	19:02 (6)	20:41	18	19:47 (11)	21:30	23	20:40 (10)
2	08:28	07:57		07:00	17:12 (2)		06:46		18:43 (6)	05:38		19:30 (11)	04:50		20:17 (10)
	16:04	16:55	11	17:50	17:23 (2)		19:48	18	19:01 (6)	20:42	15	19:45 (11)	21:31	22	20:39 (10)
3	08:28	07:56		06:58	17:11 (2)		06:43		18:45 (6)	05:36		19:32 (11)	04:49		20:18 (10)
	16:05	16:57	14	17:52	17:25 (2)		19:50	14	18:59 (6)	20:44	11	19:43 (11)	21:32	22	20:40 (10)
4	08:28	07:54		06:55	17:09 (2)		06:41		18:46 (6)	05:34		19:35 (11)	04:48		20:18 (10)
	16:06	16:59	18	17:54	17:27 (2)		19:52	10	18:56 (6)	20:46	4	19:39 (11)	21:33	22	20:40 (10)
5	08:28	07:52		06:53	17:08 (2)		06:38			05:32			04:48		20:18 (10)
	16:08	17:01	19	17:56	17:27 (2)		19:53			20:48			21:34	21	20:39 (10)
6	08:27	07:50		06:51	17:07 (2)		06:36			05:30			04:47		20:19 (10)
	16:09	17:03	20	17:58	17:27 (2)		19:55			20:50			21:35	21	20:40 (10)
7	08:27	07:49		06:48	17:06 (2)		06:34			05:28			04:46		20:19 (10)
	16:10	17:05	21	18:00	17:27 (2)		19:57			20:51			21:36	20	20:39 (10)
8	08:26	07:47		06:46	17:06 (2)		06:31			05:26			04:46		20:20 (10)
	16:12	17:07	21	18:02	17:27 (2)		19:59			20:53			21:37	20	20:40 (10)
9	08:26	07:45		06:44	17:06 (2)		06:29			05:24			04:45		20:20 (10)
	16:13	17:09	20	18:04	17:26 (2)		20:01			20:55			21:38	19	20:39 (10)
10	08:25	07:43		06:41	17:06 (2)		06:27			05:22			04:45		20:21 (10)
	16:15	17:11	20	18:06	17:26 (2)		20:03			20:57			21:39	18	20:39 (10)
11	08:25	07:41		06:39	17:07 (2)		06:24			05:20			04:44		20:21 (10)
	16:16	17:13	18	18:07	17:25 (2)		20:04			20:58			21:40	19	20:40 (10)
12	08:24	07:39		06:37	17:08 (2)		06:22			05:19			04:44		20:22 (10)
	16:18	17:15	16	18:09	17:24 (2)		20:06			21:00			21:41	18	20:40 (10)
13	08:23	07:37		06:34	17:09 (2)		06:20			05:17			04:43		20:22 (10)
	16:19	17:17	13	18:11	17:22 (2)		20:08			21:02			21:41	17	20:39 (10)
14	08:22	07:35		06:32	17:12 (2)		06:17			05:15		20:26 (10)	04:43		20:22 (10)
	16:21	17:19	6	18:13	17:18 (2)		20:10			21:03	1	20:27 (10)	21:42	17	20:39 (10)
15	08:21	07:33		06:29			06:15			05:14		20:22 (10)	04:43		20:23 (10)
	16:22	17:21		18:15			20:12			21:05	10	20:32 (10)	21:43	16	20:39 (10)
16	08:20	07:31		06:27			06:13			05:12		20:20 (10)	04:43		20:23 (10)
	16:24	17:23		18:17			20:13			21:07	13	20:33 (10)	21:43	16	20:39 (10)
17	08:19	07:29		06:24			06:10		19:36 (11)	05:10		20:19 (10)	04:43		20:24 (10)
	16:26	17:25		18:19			20:15	8	19:44 (11)	21:08	16	20:35 (10)	21:44	15	20:39 (10)
18	08:18	07:27		06:22			06:08		19:34 (11)	05:09		20:19 (10)	04:43		20:24 (10)
	16:27	17:27		18:20			20:17	13	19:47 (11)	21:10	17	20:36 (10)	21:44	15	20:39 (10)
19	08:17	07:25		06:20			06:06		19:32 (11)	05:07		20:17 (10)	04:43		20:24 (10)
	16:29	17:29		18:22			20:19	17	19:49 (11)	21:11	19	20:36 (10)	21:44	16	20:40 (10)
20	08:16	07:22		06:17			06:03		19:31 (11)	05:06		20:17 (10)	04:43		20:24 (10)
	16:31	17:31		18:24			20:21	19	19:50 (11)	21:13	20	20:37 (10)	21:45	16	20:40 (10)
21	08:15	07:20		06:15			06:01		19:30 (11)	05:04		20:17 (10)	04:43		20:25 (10)
	16:33	17:33		18:26			20:23	21	19:51 (11)	21:15	21	20:38 (10)	21:45	15	20:40 (10)
22	08:14	07:18		06:12	17:52 (6)		05:59		19:28 (11)	05:03		20:16 (10)	04:43		20:25 (10)
	16:35	17:35		18:28	18:00 (6)	8	20:24	22	19:50 (11)	21:16	22	20:38 (10)	21:45	16	20:41 (10)
23	08:12	07:16		06:10	17:48 (6)		05:57		19:28 (11)	05:01		20:16 (10)	04:43		20:25 (10)
	16:36	17:37	14	18:30	18:02 (6)		20:26	22	19:50 (11)	21:18	22	20:38 (10)	21:45	16	20:41 (10)
24	08:11	07:14		06:07	17:46 (6)		05:55		19:27 (11)	05:00		20:16 (10)	04:44		20:25 (10)
	16:38	17:39	17	18:32	18:03 (6)		20:28	24	19:51 (11)	21:19	23	20:39 (10)	21:45	16	20:41 (10)
25	08:10	07:11		06:05	17:44 (6)		05:52		19:27 (11)	04:59		20:16 (10)	04:44		20:26 (10)
	16:40	17:41	20	18:33	18:04 (6)		20:30	24	19:51 (11)	21:21	23	20:39 (10)	21:46	15	20:41 (10)
26	08:08	07:09		06:03	17:44 (6)		05:50		19:27 (11)	04:58		20:16 (10)	04:44		20:26 (10)
	16:42	17:43	21	18:35	18:05 (6)		20:32	23	19:50 (11)	21:22	24	20:40 (10)	21:45	15	20:41 (10)
27	08:07	07:07		06:00	17:43 (6)		05:48		19:27 (11)	04:56		20:16 (10)	04:45		20:25 (10)
	16:44	17:45	22	18:37	18:05 (6)		20:33	23	19:50 (11)	21:23	24	20:40 (10)	21:45	16	20:41 (10)
28	08:05	07:05		05:58	17:42 (6)		05:46		19:27 (11)	04:55		20:16 (10)	04:45		20:26 (10)
	16:46	17:47	22	18:39	18:04 (6)		20:35	22	19:49 (11)	21:25	24	20:40 (10)	21:45	16	20:42 (10)
29	08:04			06:55	18:42 (6)		05:44		19:28 (11)	04:54		20:17 (10)	04:46		20:26 (10)
	16:48		23	19:41	19:05 (6)		20:37	21	19:49 (11)	21:26	23	20:40 (10)	21:45	17	20:43 (10)
30	08:02			06:53	18:42 (6)		05:42		19:28 (11)	04:53		20:17 (10)	04:47		20:25 (10)
	16:50		21	19:42	19:03 (6)		20:39	20	19:48 (11)	21:27	23	20:40 (10)	21:45	18	20:43 (10)
31	08:01			06:51	18:42 (6)					04:52		20:17 (10)			
	16:52		21	19:44	19:03 (6)					21:29	23	20:40 (10)			
Sonnenscheinstunden	252	274		367			419			492			508		
astr.max.mögl.Beschattung					406			341			396			533	
Red.Sonnenscheinwahrsch.					0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer					0.91			0.91			0.91			0.91	
Reduktion Windrichtung					0.69			0.67			0.65			0.65	
Gesamte Reduktion					0.20			0.25			0.31			0.27	
Met.wahrsch.Beschattung					80			86			121			144	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BJ - IO62

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		20:26 (10)	05:26			06:20			07:12		17:47 (2)	07:10	08:04
	21:45	18	20:44 (10)	21:10			20:04			18:51	15	18:02 (2)	16:42	15:58
2	04:48		20:26 (10)	05:28			06:22			07:14		17:46 (2)	07:12	08:05
	21:44	18	20:44 (10)	21:08			20:02			18:49	17	18:03 (2)	16:40	15:57
3	04:49		20:25 (10)	05:30			06:23			07:16		17:45 (2)	07:14	08:07
	21:44	19	20:44 (10)	21:06			20:00			18:46	19	18:04 (2)	16:38	15:57
4	04:49		20:25 (10)	05:31			06:25			07:18		17:44 (2)	07:15	08:08
	21:43	20	20:45 (10)	21:05			19:57			18:44	20	18:04 (2)	16:36	15:56
5	04:50		20:25 (10)	05:33			06:27			07:19		17:44 (2)	07:17	08:10
	21:43	20	20:45 (10)	21:03			19:55			18:42	20	18:04 (2)	16:34	15:55
6	04:51		20:25 (10)	05:35			06:29			07:21		17:43 (2)	07:19	08:11
	21:42	21	20:46 (10)	21:01			19:52			18:39	21	18:04 (2)	16:32	15:55
7	04:52		20:26 (10)	05:36			06:30			07:23		17:42 (2)	07:21	08:12
	21:42	20	20:46 (10)	20:59			19:50			18:37	21	18:03 (2)	16:30	15:54
8	04:53		20:26 (10)	05:38			06:32		18:42 (6)	07:25		17:43 (2)	07:23	08:14
	21:41	21	20:47 (10)	20:57			19:47	9	18:51 (6)	18:35	19	18:02 (2)	16:28	15:54
9	04:54		20:25 (10)	05:40		19:43 (11)	06:34		18:38 (6)	07:27		17:43 (2)	07:25	08:15
	21:40	22	20:47 (10)	20:55	7	19:50 (11)	19:45	14	18:52 (6)	18:32	18	18:01 (2)	16:27	15:54
10	04:55		20:25 (10)	05:42		19:41 (11)	06:35		18:37 (6)	07:28		17:44 (2)	07:27	08:16
	21:39	23	20:48 (10)	20:53	12	19:53 (11)	19:43	17	18:54 (6)	18:30	16	18:00 (2)	16:25	15:53
11	04:56		20:25 (10)	05:43		19:38 (11)	06:37		18:36 (6)	07:30		17:45 (2)	07:29	08:17
	21:38	23	20:48 (10)	20:51	16	19:54 (11)	19:40	19	18:55 (6)	18:27	13	17:58 (2)	16:23	15:53
12	04:58		20:25 (10)	05:45		19:37 (11)	06:39		18:34 (6)	07:32		17:48 (2)	07:31	08:18
	21:38	23	20:48 (10)	20:49	18	19:55 (11)	19:38	20	18:54 (6)	18:25	8	17:56 (2)	16:22	15:53
13	04:59		20:25 (10)	05:47		19:37 (11)	06:41		18:33 (6)	07:34			07:33	08:19
	21:37	23	20:48 (10)	20:47	20	19:57 (11)	19:35	22	18:55 (6)	18:23			16:20	15:53
14	05:00		20:25 (10)	05:48		19:35 (11)	06:42		18:33 (6)	07:36			07:34	08:20
	21:36	23	20:48 (10)	20:45	21	19:56 (11)	19:33	22	18:55 (6)	18:20			16:18	15:53
15	05:01		20:25 (10)	05:50		19:35 (11)	06:44		18:32 (6)	07:38			07:36	08:21
	21:34	23	20:48 (10)	20:43	22	19:57 (11)	19:30	22	18:54 (6)	18:18			16:17	15:53
16	05:02		20:25 (10)	05:52		19:35 (11)	06:46		18:32 (6)	07:39			07:38	08:22
	21:33	23	20:48 (10)	20:41	23	19:58 (11)	19:28	22	18:54 (6)	18:16			16:15	15:53
17	05:04		20:26 (10)	05:54		19:34 (11)	06:48		18:32 (6)	07:41			07:40	08:23
	21:32	23	20:49 (10)	20:38	23	19:57 (11)	19:26	21	18:53 (6)	18:14			16:14	15:53
18	05:05		20:26 (10)	05:55		19:34 (11)	06:49		18:33 (6)	07:43			07:42	08:24
	21:31	23	20:49 (10)	20:36	23	19:57 (11)	19:23	19	18:52 (6)	18:11			16:12	15:53
19	05:07		20:26 (10)	05:57		19:33 (11)	06:51		18:33 (6)	07:45			07:44	08:25
	21:30	23	20:49 (10)	20:34	23	19:56 (11)	19:21	17	18:50 (6)	18:09			16:11	15:54
20	05:08		20:26 (10)	05:59		19:33 (11)	06:53		18:34 (6)	07:47			07:45	08:25
	21:28	22	20:48 (10)	20:32	23	19:56 (11)	19:18	15	18:49 (6)	18:07			16:10	15:54
21	05:09		20:26 (10)	06:01		19:34 (11)	06:55		18:36 (6)	07:49			07:47	08:26
	21:27	23	20:49 (10)	20:30	22	19:56 (11)	19:16	10	18:46 (6)	18:05			16:08	15:54
22	05:11		20:27 (10)	06:02		19:34 (11)	06:56			07:51			07:49	08:26
	21:26	21	20:48 (10)	20:27	20	19:54 (11)	19:13			18:02			16:07	15:55
23	05:12		20:27 (10)	06:04		19:35 (11)	06:58			07:53			07:51	08:27
	21:24	20	20:47 (10)	20:25	18	19:53 (11)	19:11			18:00			16:06	15:55
24	05:14		20:28 (10)	06:06		19:36 (11)	07:00			07:54			07:53	08:27
	21:23	19	20:47 (10)	20:23	16	19:52 (11)	19:08			17:58			16:05	15:56
25	05:15		20:28 (10)	06:08		19:37 (11)	07:02			06:56			07:54	08:28
	21:21	18	20:46 (10)	20:21	13	19:50 (11)	19:06			16:56			16:04	15:56
26	05:17		20:29 (10)	06:09		19:40 (11)	07:03			06:58			07:56	08:28
	21:20	17	20:46 (10)	20:18	7	19:47 (11)	19:03			16:54			16:03	15:57
27	05:18		20:30 (10)	06:11			07:05			07:00			07:58	08:28
	21:18	15	20:45 (10)	20:16			19:01			16:52			16:02	15:58
28	05:20		20:32 (10)	06:13			07:07			07:02			07:59	08:28
	21:17	12	20:44 (10)	20:14			18:59			16:50			16:01	15:59
29	05:22		20:34 (10)	06:15			07:09			07:04			08:01	08:29
	21:15	7	20:41 (10)	20:11			18:56			16:48			16:00	16:00
30	05:23			06:16			07:10		17:50 (2)	07:06			08:02	08:29
	21:13			20:09			18:54	11	18:01 (2)	16:46			15:59	16:01
31	05:25			06:18						07:08				08:29
	21:12			20:07						16:44				16:02
Sonnenscheinstunden	510			459			382			329			260	235
astr.max.mögl.Beschattung		583			327			260			207			
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91			
Reduktion Windrichtung		0.65			0.66			0.70			0.69			
Gesamte Reduktion		0.27			0.30			0.26			0.21			
Met.wahrsch.Beschattung		155			97			67			43			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BK - IO63

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März			April			Mai			Juni		
1	08:29		07:59		07:02			06:48			18:45 (6)	05:40		19:32 (11)	04:51	
	16:03		16:54		17:48			19:46	22		19:07 (6)	20:41	22	19:54 (11)	21:30	23
2	08:28		07:57		07:00			06:46			18:45 (6)	05:38		19:32 (11)	04:50	
	16:04		16:55		17:50			19:48	22		19:07 (6)	20:42	22	19:54 (11)	21:31	23
3	08:28		07:56		06:58		17:20 (2)	06:43			18:46 (6)	05:36		19:33 (11)	04:49	
	16:05		16:57		17:52	3	17:23 (2)	19:50	21		19:07 (6)	20:44	20	19:53 (11)	21:32	23
4	08:28		07:54		06:55		17:16 (2)	06:41			18:46 (6)	05:34		19:33 (11)	04:48	
	16:06		16:59		17:54	11	17:27 (2)	19:52	19		19:05 (6)	20:46	19	19:52 (11)	21:33	23
5	08:28		07:52		06:53		17:13 (2)	06:38			18:47 (6)	05:32		19:35 (11)	04:48	
	16:08		17:01		17:56	15	17:28 (2)	19:53	17		19:04 (6)	20:48	16	19:51 (11)	21:34	24
6	08:27		07:50		06:51		17:12 (2)	06:36			18:49 (6)	05:30		19:36 (11)	04:47	
	16:09		17:03		17:58	18	17:30 (2)	19:55	13		19:02 (6)	20:50	14	19:50 (11)	21:35	24
7	08:27		07:49		06:48		17:10 (2)	06:34			18:52 (6)	05:28		19:38 (11)	04:46	
	16:10		17:05		18:00	20	17:30 (2)	19:57	6		18:58 (6)	20:51	9	19:47 (11)	21:36	23
8	08:26		07:47		06:46		17:10 (2)	06:31				05:26			04:46	
	16:12		17:07		18:02	20	17:30 (2)	19:59				20:53			21:37	23
9	08:26		07:45		06:44		17:09 (2)	06:29				05:24			04:45	
	16:13		17:09		18:04	21	17:30 (2)	20:01				20:55			21:38	23
10	08:25		07:43		06:41		17:09 (2)	06:27				05:22			04:45	
	16:15		17:11		18:06	21	17:30 (2)	20:03				20:57			21:39	23
11	08:25		07:41		06:39		17:09 (2)	06:24				05:20			04:44	
	16:16		17:13		18:07	21	17:30 (2)	20:04				20:58			21:40	22
12	08:24		07:39		06:37		17:09 (2)	06:22				05:19			04:44	
	16:18		17:15		18:09	20	17:29 (2)	20:06				21:00			21:41	23
13	08:23		07:37		06:34		17:10 (2)	06:20				05:17			04:43	
	16:19		17:17		18:11	18	17:28 (2)	20:08				21:02			21:41	22
14	08:22		07:35		06:32		17:10 (2)	06:17				05:15			04:43	
	16:21		17:19		18:13	16	17:26 (2)	20:10				21:03			21:42	22
15	08:21		07:33		06:29		17:12 (2)	06:15				05:14			04:43	
	16:22		17:21		18:15	13	17:25 (2)	20:12				21:05			21:43	21
16	08:20		07:31		06:27		17:14 (2)	06:13				05:12			04:43	
	16:24		17:23		18:17	7	17:21 (2)	20:13				21:07			21:43	22
17	08:19		07:29		06:24			06:10				05:10			04:43	
	16:26		17:25		18:19			20:15				21:08			21:44	22
18	08:18		07:27		06:22			06:08				05:09		20:32 (10)	04:43	
	16:27		17:27		18:20			20:17				21:10	3	20:35 (10)	21:44	21
19	08:17		07:25		06:20			06:06				05:07		20:28 (10)	04:43	
	16:29		17:29		18:22			20:19				21:11	9	20:37 (10)	21:44	21
20	08:16		07:22		06:17			06:03			19:41 (11)	05:06		20:26 (10)	04:43	
	16:31		17:31		18:24			20:21	9		19:50 (11)	21:13	13	20:39 (10)	21:45	21
21	08:15		07:20		06:15			06:01			19:38 (11)	05:04		20:26 (10)	04:43	
	16:33		17:33		18:26			20:23	14		19:52 (11)	21:15	15	20:41 (10)	21:45	21
22	08:14		07:18		06:12			05:59			19:36 (11)	05:03		20:24 (10)	04:43	
	16:35		17:35		18:28			20:24	17		19:53 (11)	21:16	17	20:41 (10)	21:45	21
23	08:12		07:16		06:10			05:57			19:35 (11)	05:01		20:23 (10)	04:43	
	16:36		17:37		18:30			20:26	19		19:54 (11)	21:18	19	20:42 (10)	21:45	21
24	08:11		07:14		06:07		17:57 (6)	05:55			19:34 (11)	05:00		20:23 (10)	04:44	
	16:38		17:39		18:32	5	18:02 (6)	20:28	21		19:55 (11)	21:19	20	20:43 (10)	21:45	21
25	08:10		07:11		06:05		17:52 (6)	05:52			19:33 (11)	04:59		20:23 (10)	04:44	
	16:40		17:41		18:33	13	18:05 (6)	20:30	22		19:55 (11)	21:21	21	20:44 (10)	21:46	22
26	08:08		07:09		06:03		17:50 (6)	05:50			19:32 (11)	04:58		20:23 (10)	04:44	
	16:42		17:43		18:35	17	18:07 (6)	20:32	23		19:55 (11)	21:22	21	20:44 (10)	21:45	22
27	08:07		07:07		06:00		17:49 (6)	05:48			19:32 (11)	04:56		20:23 (10)	04:45	
	16:44		17:45		18:37	19	18:08 (6)	20:33	24		19:56 (11)	21:23	22	20:45 (10)	21:45	22
28	08:05		07:05		05:58		17:47 (6)	05:46			19:32 (11)	04:55		20:22 (10)	04:45	
	16:46		17:47		18:39	21	18:08 (6)	20:35	23		19:55 (11)	21:25	23	20:45 (10)	21:45	22
29	08:04				06:55		18:47 (6)	05:44			19:32 (11)	04:54		20:22 (10)	04:46	
	16:48				19:41	22	19:09 (6)	20:37	23		19:55 (11)	21:26	23	20:45 (10)	21:45	22
30	08:02				06:53		18:46 (6)	05:42			19:32 (11)	04:53		20:22 (10)	04:47	
	16:50				19:42	22	19:08 (6)	20:39	23		19:55 (11)	21:27	23	20:45 (10)	21:45	22
31	08:01				06:51		18:46 (6)					04:52		20:22 (10)		
	16:52				19:44	22	19:08 (6)					21:29	23	20:45 (10)		
Sonnenscheinstunden	252		274		367			419				492			508	
astr.max.mögl.Beschattung						365			338				374			665
Red.Sonnenscheinwahrsch.						0.31			0.41				0.51			0.45
Reduktion Betriebsdauer						0.91			0.91				0.91			0.91
Reduktion Windrichtung						0.69			0.68				0.65			0.65
Gesamte Reduktion						0.20			0.25				0.31			0.27
Met.wahrsch.Beschattung						72			86				114			179

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BK - IO63

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli			August			September			Oktober			November	Dezember
1	04:47		20:29 (10)	05:26			06:20			07:12		17:48 (2)	07:10	08:04
	21:45	22	20:51 (10)	21:10			20:04			18:51	20	18:08 (2)	16:42	15:58
2	04:48		20:29 (10)	05:28			06:22			07:14		17:48 (2)	07:12	08:05
	21:44	23	20:52 (10)	21:08			20:02			18:49	20	18:08 (2)	16:40	15:57
3	04:49		20:29 (10)	05:30			06:23			07:16		17:47 (2)	07:14	08:07
	21:44	23	20:52 (10)	21:06			20:00			18:46	21	18:08 (2)	16:38	15:57
4	04:49		20:29 (10)	05:31			06:25			07:18		17:47 (2)	07:15	08:08
	21:43	23	20:52 (10)	21:05			19:57			18:44	21	18:08 (2)	16:36	15:56
5	04:50		20:29 (10)	05:33		19:50 (11)	06:27		18:49 (6)	07:19		17:47 (2)	07:17	08:10
	21:43	23	20:52 (10)	21:03	5	19:55 (11)	19:55	6	18:55 (6)	18:42	21	18:08 (2)	16:34	15:55
6	04:51		20:30 (10)	05:35		19:47 (11)	06:29		18:45 (6)	07:21		17:47 (2)	07:19	08:11
	21:42	23	20:53 (10)	21:01	11	19:58 (11)	19:52	12	18:57 (6)	18:39	20	18:07 (2)	16:32	15:55
7	04:52		20:30 (10)	05:36		19:45 (11)	06:30		18:43 (6)	07:23		17:47 (2)	07:21	08:12
	21:42	23	20:53 (10)	20:59	15	20:00 (11)	19:50	16	18:59 (6)	18:37	18	18:05 (2)	16:30	15:54
8	04:53		20:30 (10)	05:38		19:44 (11)	06:32		18:41 (6)	07:25		17:47 (2)	07:23	08:14
	21:41	23	20:53 (10)	20:57	17	20:01 (11)	19:47	19	19:00 (6)	18:35	17	18:04 (2)	16:28	15:54
9	04:54		20:30 (10)	05:40		19:42 (11)	06:34		18:39 (6)	07:27		17:49 (2)	07:25	08:15
	21:40	24	20:54 (10)	20:55	20	20:02 (11)	19:45	21	19:00 (6)	18:32	13	18:02 (2)	16:27	15:54
10	04:55		20:30 (10)	05:42		19:42 (11)	06:35		18:39 (6)	07:28		17:51 (2)	07:27	08:16
	21:39	24	20:54 (10)	20:53	21	20:03 (11)	19:43	21	19:00 (6)	18:30	9	18:00 (2)	16:25	15:53
11	04:56		20:30 (10)	05:43		19:40 (11)	06:37		18:38 (6)	07:30			07:29	08:17
	21:38	24	20:54 (10)	20:51	22	20:02 (11)	19:40	22	19:00 (6)	18:27			16:23	15:53
12	04:58		20:30 (10)	05:45		19:40 (11)	06:39		18:37 (6)	07:32			07:31	08:18
	21:38	24	20:54 (10)	20:49	23	20:03 (11)	19:38	23	19:00 (6)	18:25			16:22	15:53
13	04:59		20:31 (10)	05:47		19:40 (11)	06:41		18:37 (6)	07:34			07:33	08:19
	21:37	23	20:54 (10)	20:47	24	20:04 (11)	19:35	22	18:59 (6)	18:23			16:20	15:53
14	05:00		20:31 (10)	05:48		19:39 (11)	06:42		18:37 (6)	07:36			07:34	08:20
	21:36	23	20:54 (10)	20:45	24	20:03 (11)	19:33	22	18:59 (6)	18:20			16:18	15:53
15	05:01		20:31 (10)	05:50		19:39 (11)	06:44		18:37 (6)	07:38			07:36	08:21
	21:34	23	20:54 (10)	20:43	24	20:03 (11)	19:30	20	18:57 (6)	18:18			16:17	15:53
16	05:02		20:31 (10)	05:52		19:40 (11)	06:46		18:37 (6)	07:39			07:38	08:22
	21:33	22	20:53 (10)	20:41	23	20:03 (11)	19:28	20	18:57 (6)	18:16			16:15	15:53
17	05:04		20:32 (10)	05:54		19:39 (11)	06:48		18:38 (6)	07:41			07:40	08:23
	21:32	22	20:54 (10)	20:38	23	20:02 (11)	19:26	17	18:55 (6)	18:14			16:14	15:53
18	05:05		20:32 (10)	05:55		19:40 (11)	06:49		18:40 (6)	07:43			07:42	08:24
	21:31	21	20:53 (10)	20:36	22	20:02 (11)	19:23	14	18:54 (6)	18:11			16:12	15:53
19	05:07		20:33 (10)	05:57		19:39 (11)	06:51		18:42 (6)	07:45			07:44	08:25
	21:30	20	20:53 (10)	20:34	21	20:00 (11)	19:21	8	18:50 (6)	18:09			16:11	15:54
20	05:08		20:33 (10)	05:59		19:40 (11)	06:53			07:47			07:45	08:25
	21:28	19	20:52 (10)	20:32	19	19:59 (11)	19:18			18:07			16:10	15:54
21	05:09		20:34 (10)	06:01		19:42 (11)	06:55			07:49			07:47	08:26
	21:27	18	20:52 (10)	20:30	16	19:58 (11)	19:16			18:05			16:08	15:54
22	05:11		20:35 (10)	06:02		19:42 (11)	06:56			07:51			07:49	08:26
	21:26	16	20:51 (10)	20:27	14	19:56 (11)	19:13			18:02			16:07	15:55
23	05:12		20:35 (10)	06:04		19:45 (11)	06:58			07:53			07:51	08:27
	21:24	15	20:50 (10)	20:25	8	19:53 (11)	19:11			18:00			16:06	15:55
24	05:14		20:37 (10)	06:06			07:00			07:54			07:52	08:27
	21:23	12	20:49 (10)	20:23			19:08			17:58			16:05	15:56
25	05:15		20:39 (10)	06:08			07:02			06:56			07:54	08:28
	21:21	8	20:47 (10)	20:21			19:06			16:56			16:04	15:56
26	05:17			06:09			07:03			06:58			07:56	08:28
	21:20			20:18			19:03			16:54			16:03	15:57
27	05:18			06:11			07:05		17:59 (2)	07:00			07:58	08:28
	21:18			20:16			19:01	1	18:00 (2)	16:52			16:02	15:58
28	05:20			06:13			07:07		17:54 (2)	07:02			07:59	08:28
	21:17			20:14			18:59	11	18:05 (2)	16:50			16:01	15:59
29	05:22			06:15			07:09		17:52 (2)	07:04			08:01	08:29
	21:15			20:11			18:56	15	18:07 (2)	16:48			16:00	16:00
30	05:23			06:16			07:10		17:50 (2)	07:06			08:02	08:29
	21:13			20:09			18:54	18	18:08 (2)	16:46			15:59	16:01
31	05:25			06:18						07:08				08:29
	21:12			20:07						16:44				16:02
Sonnenscheinstunden		510			459			382			329			260	235
astr.max.mögl.Beschattung			521			352			308			180			
Red.Sonnenscheinwahrsch.			0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer			0.91			0.91			0.91			0.91			
Reduktion Windrichtung			0.65			0.66			0.69			0.69			
Gesamte Reduktion			0.26			0.30			0.26			0.21			
Met.wahrsch.Beschattung			137			104			79			37			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BL - IO64

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März			April			Mai			Juni		
1	08:29	07:59		07:02			06:48			18:47 (6)	05:40		19:34 (11)	04:51		20:27 (10)
	16:03	16:54		17:48			19:46	23		19:10 (6)	20:41	24	19:58 (11)	21:30	22	20:49 (10)
2	08:28	07:57		07:00			06:46			18:47 (6)	05:38		19:34 (11)	04:50		20:26 (10)
	16:04	16:55		17:50			19:48	23		19:10 (6)	20:42	24	19:58 (11)	21:31	23	20:49 (10)
3	08:28	07:56		06:58			06:43			18:47 (6)	05:36		19:34 (11)	04:49		20:27 (10)
	16:05	16:57		17:52			19:50	23		19:10 (6)	20:44	24	19:58 (11)	21:32	23	20:50 (10)
4	08:28	07:54		06:55		17:20 (2)	06:41			18:47 (6)	05:34		19:35 (11)	04:48		20:27 (10)
	16:06	16:59		17:54	5	17:25 (2)	19:52	21		19:08 (6)	20:46	22	19:57 (11)	21:33	23	20:50 (10)
5	08:28	07:52		06:53		17:16 (2)	06:38			18:48 (6)	05:32		19:36 (11)	04:48		20:26 (10)
	16:08	17:01		17:56	12	17:28 (2)	19:53	20		19:08 (6)	20:48	21	19:57 (11)	21:34	24	20:50 (10)
6	08:27	07:50		06:51		17:14 (2)	06:36			18:49 (6)	05:30		19:36 (11)	04:47		20:27 (10)
	16:09	17:03		17:58	16	17:30 (2)	19:55	18		19:07 (6)	20:50	20	19:56 (11)	21:35	24	20:51 (10)
7	08:27	07:49		06:48		17:12 (2)	06:34			18:49 (6)	05:28		19:37 (11)	04:46		20:27 (10)
	16:10	17:05		18:00	18	17:30 (2)	19:57	15		19:04 (6)	20:51	18	19:55 (11)	21:36	24	20:51 (10)
8	08:26	07:47		06:46		17:12 (2)	06:31			18:51 (6)	05:26		19:38 (11)	04:46		20:27 (10)
	16:12	17:07		18:02	19	17:31 (2)	19:59	11		19:02 (6)	20:53	16	19:54 (11)	21:37	24	20:51 (10)
9	08:26	07:45		06:44		17:11 (2)	06:29				05:24		19:40 (11)	04:45		20:27 (10)
	16:13	17:09		18:04	21	17:32 (2)	20:01				20:55	13	19:53 (11)	21:38	24	20:51 (10)
10	08:25	07:43		06:41		17:10 (2)	06:27				05:22		19:42 (11)	04:45		20:28 (10)
	16:15	17:11		18:06	22	17:32 (2)	20:03				20:57	8	19:50 (11)	21:39	23	20:51 (10)
11	08:25	07:41		06:39		17:10 (2)	06:24				05:20			04:44		20:28 (10)
	16:16	17:13		18:07	22	17:32 (2)	20:04				20:58			21:40	24	20:52 (10)
12	08:24	07:39		06:37		17:10 (2)	06:22				05:19			04:44		20:29 (10)
	16:18	17:15		18:09	21	17:31 (2)	20:06				21:00			21:41	23	20:52 (10)
13	08:23	07:37		06:34		17:10 (2)	06:20				05:17			04:43		20:28 (10)
	16:19	17:17		18:11	21	17:31 (2)	20:08				21:02			21:41	24	20:52 (10)
14	08:22	07:35		06:32		17:10 (2)	06:17				05:15			04:43		20:28 (10)
	16:21	17:19		18:13	19	17:29 (2)	20:10				21:03			21:42	24	20:52 (10)
15	08:21	07:33		06:29		17:11 (2)	06:15				05:14			04:43		20:29 (10)
	16:22	17:21		18:15	17	17:28 (2)	20:12				21:05			21:43	23	20:52 (10)
16	08:20	07:31		06:27		17:12 (2)	06:13				05:12			04:43		20:29 (10)
	16:24	17:23		18:17	14	17:26 (2)	20:13				21:07			21:43	24	20:53 (10)
17	08:19	07:29		06:24		17:15 (2)	06:10				05:10			04:43		20:29 (10)
	16:26	17:25		18:19	8	17:23 (2)	20:15				21:08			21:44	24	20:53 (10)
18	08:18	07:27		06:22			06:08				05:09			04:43		20:30 (10)
	16:27	17:27		18:20			20:17				21:10			21:44	23	20:53 (10)
19	08:17	07:25		06:20			06:06				05:07			04:43		20:30 (10)
	16:29	17:29		18:22			20:19				21:11			21:44	23	20:53 (10)
20	08:16	07:22		06:17			06:03				05:06			04:43		20:30 (10)
	16:31	17:31		18:24			20:21				21:13			21:45	23	20:53 (10)
21	08:15	07:20		06:15			06:01				05:04			04:43		20:30 (10)
	16:33	17:33		18:26			20:23				21:15			21:45	23	20:53 (10)
22	08:14	07:18		06:12			05:59			19:43 (11)	05:03		20:32 (10)	04:43		20:31 (10)
	16:35	17:35		18:28			20:24	9		19:52 (11)	21:16	9	20:41 (10)	21:45	23	20:54 (10)
23	08:12	07:16		06:10			05:57			19:41 (11)	05:01		20:31 (10)	04:43		20:31 (10)
	16:36	17:37		18:30			20:26	14		19:55 (11)	21:18	12	20:43 (10)	21:45	23	20:54 (10)
24	08:11	07:14		06:08			05:55			19:39 (11)	05:00		20:30 (10)	04:44		20:31 (10)
	16:38	17:39		18:32			20:28	17		19:56 (11)	21:19	14	20:44 (10)	21:45	23	20:54 (10)
25	08:10	07:11		06:05			05:52			19:38 (11)	04:59		20:29 (10)	04:44		20:31 (10)
	16:40	17:41		18:33			20:30	19		19:57 (11)	21:21	16	20:45 (10)	21:46	24	20:55 (10)
26	08:08	07:09		06:03		17:55 (6)	05:50			19:37 (11)	04:58		20:29 (10)	04:44		20:31 (10)
	16:42	17:43		18:35	11	18:06 (6)	20:32	21		19:58 (11)	21:22	17	20:46 (10)	21:45	24	20:55 (10)
27	08:07	07:07		06:00		17:53 (6)	05:48			19:36 (11)	04:56		20:28 (10)	04:45		20:31 (10)
	16:44	17:45		18:37	15	18:08 (6)	20:33	22		19:58 (11)	21:23	19	20:47 (10)	21:45	24	20:55 (10)
28	08:05	07:05		05:58		17:51 (6)	05:46			19:35 (11)	04:55		20:28 (10)	04:45		20:32 (10)
	16:46	17:47		18:39	18	18:09 (6)	20:35	24		19:59 (11)	21:25	20	20:48 (10)	21:45	23	20:55 (10)
29	08:04			06:55		18:50 (6)	05:44			19:35 (11)	04:54		20:27 (10)	04:46		20:32 (10)
	16:48			19:41	20	19:10 (6)	20:37	24		19:59 (11)	21:26	21	20:48 (10)	21:45	24	20:56 (10)
30	08:02			06:53		18:48 (6)	05:42			19:35 (11)	04:53		20:27 (10)	04:47		20:32 (10)
	16:50			19:42	22	19:10 (6)	20:39	24		19:59 (11)	21:27	22	20:49 (10)	21:45	24	20:56 (10)
31	08:01			06:51		18:48 (6)					04:52		20:27 (10)			
	16:52			19:44	22	19:10 (6)					21:29	22	20:49 (10)			
Sonnenscheinstunden	252	274		367			419				492			508		
astr.max.mögl.Beschattung					343			328				362			704	
Red.Sonnenscheinwahrsch.					0.31			0.41				0.51			0.45	
Reduktion Betriebsdauer					0.91			0.91				0.91			0.91	
Reduktion Windrichtung					0.69			0.68				0.65			0.64	
Gesamte Reduktion					0.20			0.26				0.31			0.27	
Met.wahrsch.Beschattung					68			84				111			189	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BL - IO64

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		20:32 (10)	05:26			06:20			07:12		17:49 (2)	07:10	08:04
	21:45	24	20:56 (10)	21:10			20:04			18:51	21	18:10 (2)	16:42	15:58
2	04:48		20:33 (10)	05:28		19:54 (11)	06:22			07:14		17:48 (2)	07:12	08:05
	21:44	24	20:57 (10)	21:08	4	19:58 (11)	20:02			18:49	22	18:10 (2)	16:40	15:57
3	04:49		20:32 (10)	05:30		19:51 (11)	06:23			07:16		17:48 (2)	07:14	08:07
	21:44	24	20:56 (10)	21:06	11	20:02 (11)	20:00			18:46	22	18:10 (2)	16:38	15:57
4	04:49		20:33 (10)	05:31		19:49 (11)	06:25		18:49 (6)	07:18		17:48 (2)	07:15	08:08
	21:43	24	20:57 (10)	21:05	14	20:03 (11)	19:57	10	18:59 (6)	18:44	21	18:09 (2)	16:36	15:56
5	04:50		20:33 (10)	05:33		19:48 (11)	06:27		18:46 (6)	07:19		17:48 (2)	07:17	08:10
	21:43	24	20:57 (10)	21:03	16	20:04 (11)	19:55	16	19:02 (6)	18:42	21	18:09 (2)	16:34	15:55
6	04:51		20:33 (10)	05:35		19:46 (11)	06:29		18:44 (6)	07:21		17:49 (2)	07:19	08:11
	21:42	24	20:57 (10)	21:01	19	20:05 (11)	19:52	18	19:02 (6)	18:39	19	18:08 (2)	16:32	15:55
7	04:52		20:34 (10)	05:36		19:45 (11)	06:30		18:43 (6)	07:23		17:49 (2)	07:21	08:12
	21:42	23	20:57 (10)	20:59	21	20:06 (11)	19:50	20	19:03 (6)	18:37	17	18:06 (2)	16:30	15:54
8	04:53		20:34 (10)	05:38		19:45 (11)	06:32		18:42 (6)	07:25		17:50 (2)	07:23	08:14
	21:41	24	20:58 (10)	20:57	22	20:07 (11)	19:47	21	19:03 (6)	18:35	14	18:04 (2)	16:28	15:54
9	04:54		20:34 (10)	05:40		19:44 (11)	06:34		18:41 (6)	07:27		17:52 (2)	07:25	08:15
	21:40	24	20:58 (10)	20:55	23	20:07 (11)	19:45	22	19:03 (6)	18:32	10	18:02 (2)	16:27	15:54
10	04:55		20:35 (10)	05:42		19:44 (11)	06:35		18:40 (6)	07:28			07:27	08:16
	21:39	23	20:58 (10)	20:53	23	20:07 (11)	19:43	23	19:03 (6)	18:30			16:25	15:53
11	04:56		20:35 (10)	05:43		19:43 (11)	06:37		18:40 (6)	07:30			07:29	08:17
	21:38	23	20:58 (10)	20:51	24	20:07 (11)	19:40	23	19:03 (6)	18:27			16:23	15:53
12	04:58		20:35 (10)	05:45		19:43 (11)	06:39		18:39 (6)	07:32			07:31	08:18
	21:38	22	20:57 (10)	20:49	24	20:07 (11)	19:38	23	19:02 (6)	18:25			16:22	15:53
13	04:59		20:35 (10)	05:47		19:43 (11)	06:41		18:40 (6)	07:34			07:33	08:19
	21:37	22	20:57 (10)	20:47	24	20:07 (11)	19:35	21	19:01 (6)	18:23			16:20	15:53
14	05:00		20:36 (10)	05:48		19:42 (11)	06:42		18:40 (6)	07:36			07:34	08:20
	21:36	21	20:57 (10)	20:45	24	20:06 (11)	19:33	21	19:01 (6)	18:20			16:18	15:53
15	05:01		20:36 (10)	05:50		19:43 (11)	06:44		18:41 (6)	07:38			07:36	08:21
	21:34	20	20:56 (10)	20:43	23	20:06 (11)	19:30	19	19:00 (6)	18:18			16:17	15:53
16	05:02		20:36 (10)	05:52		19:44 (11)	06:46		18:41 (6)	07:39			07:38	08:22
	21:33	20	20:56 (10)	20:41	22	20:06 (11)	19:28	16	18:57 (6)	18:16			16:15	15:53
17	05:04		20:38 (10)	05:54		19:43 (11)	06:48		18:43 (6)	07:41			07:40	08:23
	21:32	18	20:56 (10)	20:38	21	20:04 (11)	19:26	12	18:55 (6)	18:14			16:14	15:53
18	05:05		20:38 (10)	05:55		19:44 (11)	06:49		18:47 (6)	07:43			07:42	08:24
	21:31	17	20:55 (10)	20:36	20	20:04 (11)	19:23	4	18:51 (6)	18:11			16:12	15:53
19	05:07		20:39 (10)	05:57		19:45 (11)	06:51			07:45			07:44	08:25
	21:30	15	20:54 (10)	20:34	16	20:01 (11)	19:21			18:09			16:11	15:54
20	05:08		20:40 (10)	05:59		19:47 (11)	06:53			07:47			07:45	08:25
	21:28	13	20:53 (10)	20:32	13	20:00 (11)	19:18			18:07			16:10	15:54
21	05:09		20:42 (10)	06:01		19:50 (11)	06:55			07:49			07:47	08:26
	21:27	10	20:52 (10)	20:30	7	19:57 (11)	19:16			18:05			16:08	15:54
22	05:11		20:44 (10)	06:02			06:56			07:51			07:49	08:26
	21:26	6	20:50 (10)	20:27			19:13			18:02			16:07	15:55
23	05:12			06:04			06:58			07:53			07:51	08:27
	21:24			20:25			19:11			18:00			16:06	15:55
24	05:14			06:06			07:00			07:54			07:53	08:27
	21:23			20:23			19:08			17:58			16:05	15:56
25	05:15			06:08			07:02			06:56			07:54	08:28
	21:21			20:21			19:06			16:56			16:04	15:56
26	05:17			06:09			07:03		18:00 (2)	06:58			07:56	08:28
	21:20			20:18			19:03	4	18:04 (2)	16:54			16:03	15:57
27	05:18			06:11			07:05		17:55 (2)	07:00			07:58	08:28
	21:18			20:16			19:01	12	18:07 (2)	16:52			16:02	15:58
28	05:20			06:13			07:07		17:53 (2)	07:02			07:59	08:28
	21:17			20:14			18:59	15	18:08 (2)	16:50			16:01	15:59
29	05:22			06:15			07:09		17:51 (2)	07:04			08:01	08:29
	21:15			20:11			18:56	18	18:09 (2)	16:48			16:00	16:00
30	05:23			06:16			07:11		17:50 (2)	07:06			08:02	08:29
	21:13			20:09			18:54	20	18:10 (2)	16:46			15:59	16:01
31	05:25			06:18						07:08				08:29
	21:12			20:07						16:44				16:02
Sonnenscheinstunden	510			459			382			329			260	235
astr.max.mögl.Beschattung		445			371			338			167			
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91			
Reduktion Windrichtung		0.64			0.66			0.69			0.69			
Gesamte Reduktion		0.26			0.30			0.26			0.21			
Met.wahrsch.Beschattung		117			110			86			34			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BM - IO65

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar			Februar			März			April			Mai			Juni		
1	08:29		07:59			07:02		16:48 (1)	06:48		18:41 (6)	05:40		19:41 (7)	04:51		19:48 (11)
	16:03		16:54			17:49	26	17:14 (2)	19:46	26	19:07 (6)	20:41	20	20:01 (7)	21:30	49	20:49 (9)
2	08:29		07:57			07:00		16:48 (1)	06:46		18:40 (6)	05:38		19:41 (7)	04:50		19:50 (11)
	16:04		16:55			17:50	27	17:15 (2)	19:48	28	19:08 (6)	20:42	19	20:00 (7)	21:31	47	20:50 (9)
3	08:28		07:56			06:58		16:49 (1)	06:43		18:40 (6)	05:36		19:42 (7)	04:49		19:50 (11)
	16:05		16:57			17:52	27	17:16 (2)	19:50	29	19:09 (6)	20:44	18	20:00 (7)	21:32	47	20:50 (9)
4	08:28		07:54			06:55		16:51 (1)	06:41		18:38 (6)	05:34		19:42 (7)	04:48		19:50 (11)
	16:06		16:59			17:54	26	17:17 (2)	19:52	30	19:08 (6)	20:46	17	19:59 (7)	21:33	47	20:50 (9)
5	08:28		07:52			06:53		16:51 (2)	06:38		18:38 (6)	05:32		19:44 (7)	04:48		19:50 (11)
	16:08		17:01			17:56	26	17:17 (2)	19:53	30	19:08 (6)	20:48	21	20:05 (11)	21:34	47	20:50 (9)
6	08:27		07:50			06:51		16:51 (2)	06:36		18:38 (6)	05:30		19:45 (7)	04:47		19:51 (11)
	16:09		17:03			17:58	27	17:18 (2)	19:55	31	19:09 (6)	20:50	23	20:08 (11)	21:35	46	20:51 (9)
7	08:27		07:49			06:48		16:50 (2)	06:34		18:37 (6)	05:28		19:47 (7)	04:46		19:52 (11)
	16:10		17:05			18:00	28	17:18 (2)	19:57	36	19:26 (5)	20:51	23	20:10 (11)	21:36	45	20:51 (9)
8	08:26		07:47			06:46		16:50 (2)	06:31		18:37 (6)	05:26		19:50 (11)	04:46		19:53 (11)
	16:12		17:07			18:02	28	17:18 (2)	19:59	43	19:30 (5)	20:53	21	20:11 (11)	21:37	43	20:51 (9)
9	08:26		07:45			06:44		16:50 (2)	06:29		18:38 (6)	05:24		19:50 (11)	04:45		19:54 (11)
	16:13		17:09			18:04	28	17:18 (2)	20:01	45	19:31 (5)	20:55	23	20:13 (11)	21:38	43	20:52 (9)
10	08:25		07:43			06:41		16:50 (2)	06:27		18:37 (6)	05:22		19:48 (11)	04:45		19:54 (11)
	16:15		17:11			18:06	36	17:39 (3)	20:03	48	19:32 (5)	20:57	26	20:14 (11)	21:39	43	20:52 (9)
11	08:25		07:41			06:39		16:50 (2)	06:24		18:38 (6)	05:20		19:47 (11)	04:44		19:55 (11)
	16:16		17:13			18:07	40	17:41 (3)	20:04	48	19:33 (5)	20:58	27	20:14 (11)	21:40	41	20:52 (9)
12	08:24		07:39			06:37		16:50 (2)	06:22		18:39 (6)	05:19		19:47 (11)	04:44		19:56 (11)
	16:18		17:15			18:09	41	17:42 (3)	20:06	47	19:33 (5)	21:00	28	20:15 (11)	21:41	40	20:52 (9)
13	08:23		07:37			06:34		16:51 (2)	06:20		18:39 (6)	05:17		19:46 (11)	04:44		19:55 (11)
	16:19		17:17			18:11	41	17:43 (3)	20:08	46	19:33 (5)	21:02	29	20:15 (11)	21:41	40	20:52 (9)
14	08:22		07:35			06:32		16:52 (2)	06:17		18:41 (6)	05:15		19:45 (11)	04:43		19:56 (11)
	16:21		17:19			18:13	40	17:43 (3)	20:10	42	19:33 (5)	21:03	30	20:15 (11)	21:42	39	20:52 (9)
15	08:21		07:33			06:29		16:53 (2)	06:15		18:43 (6)	05:14		19:45 (11)	04:43		19:57 (11)
	16:22		17:21			18:15	38	17:44 (3)	20:12	38	19:33 (5)	21:05	31	20:16 (11)	21:43	37	20:52 (9)
16	08:20		07:31			06:27		16:55 (2)	06:13		18:47 (6)	05:12		19:44 (11)	04:43		19:58 (11)
	16:24		17:23			18:17	33	17:43 (3)	20:13	31	19:33 (5)	21:07	32	20:16 (11)	21:43	37	20:53 (9)
17	08:19		07:29			06:25		17:01 (2)	06:10		19:09 (5)	05:10		19:45 (11)	04:43		19:58 (11)
	16:26		17:25			18:19	21	17:43 (3)	20:15	23	19:32 (5)	21:08	32	20:17 (11)	21:44	37	20:53 (9)
18	08:18		07:27			06:22		17:24 (3)	06:08		19:10 (5)	05:09		19:45 (11)	04:43		19:58 (11)
	16:27		17:27			18:20	18	17:42 (3)	20:17	21	19:31 (5)	21:10	32	20:17 (11)	21:44	37	20:53 (9)
19	08:17		07:25			06:20		17:25 (3)	06:06		19:10 (5)	05:07		19:44 (11)	04:43		19:59 (11)
	16:29		17:29			18:22	15	17:40 (3)	20:19	20	19:30 (5)	21:11	33	20:17 (11)	21:44	35	20:53 (9)
20	08:16		07:22		16:53 (1)	06:17		17:26 (3)	06:03		19:11 (5)	05:06		19:45 (11)	04:43		19:59 (11)
	16:31		17:31	9	17:02 (1)	18:24	13	17:39 (3)	20:21	18	19:29 (5)	21:13	32	20:17 (11)	21:45	35	20:53 (9)
21	08:15		07:20		16:51 (1)	06:15		17:28 (3)	06:01		19:13 (5)	05:04		19:45 (11)	04:43		19:59 (11)
	16:33		17:33	13	17:04 (1)	18:26	8	17:36 (3)	20:23	15	19:28 (5)	21:15	33	20:18 (11)	21:45	35	20:53 (9)
22	08:14		07:18		16:50 (1)	06:12			05:59		19:14 (5)	05:03		19:44 (11)	04:43		20:00 (11)
	16:35		17:35	16	17:06 (1)	18:28			20:24	17	19:55 (7)	21:16	41	20:41 (9)	21:45	35	20:54 (9)
23	08:12		07:16		16:49 (1)	06:10			05:57		19:46 (7)	05:01		19:45 (11)	04:43		20:00 (11)
	16:36		17:37	18	17:07 (1)	18:30			20:26	11	19:57 (7)	21:18	43	20:43 (9)	21:45	35	20:54 (9)
24	08:11		07:14		16:47 (1)	06:08			05:55		19:45 (7)	05:00		19:45 (11)	04:44		20:00 (11)
	16:38		17:39	20	17:07 (1)	18:32			20:28	14	19:59 (7)	21:19	46	20:45 (9)	21:45	36	20:54 (9)
25	08:10		07:11		16:47 (1)	06:05			05:52		19:44 (7)	04:59		19:46 (11)	04:44		20:00 (11)
	16:40		17:41	21	17:08 (1)	18:33			20:30	16	20:00 (7)	21:21	47	20:46 (9)	21:46	37	20:55 (9)
26	08:08		07:09		16:47 (1)	06:03			05:50		19:43 (7)	04:58		19:46 (11)	04:44		20:00 (11)
	16:42		17:43	21	17:08 (1)	18:35			20:32	18	20:01 (7)	21:22	48	20:47 (9)	21:46	37	20:55 (9)
27	08:07		07:07		16:46 (1)	06:00			05:48		19:42 (7)	04:56		19:46 (11)	04:45		20:00 (11)
	16:44		17:45	21	17:07 (1)	18:37			20:33	19	20:01 (7)	21:23	50	20:48 (9)	21:45	38	20:56 (9)
28	08:05		07:05		16:47 (1)	05:58		17:50 (6)	05:46		19:42 (7)	04:55		19:47 (11)	04:45		20:00 (11)
	16:46		17:47	24	17:11 (2)	18:39	11	18:01 (6)	20:35	20	20:02 (7)	21:25	49	20:48 (9)	21:45	38	20:55 (9)
29	08:04					06:55		18:47 (6)	05:44		19:41 (7)	04:54		19:47 (11)	04:46		20:00 (11)
	16:48					19:41	17	19:04 (6)	20:37	21	20:02 (7)	21:26	50	20:49 (9)	21:45	39	20:56 (9)
30	08:02					06:53		18:44 (6)	05:42		19:41 (7)	04:53		19:48 (11)	04:47		19:59 (11)
	16:50					19:42	21	19:05 (6)	20:39	20	20:01 (7)	21:27	48	20:49 (9)	21:45	40	20:56 (9)
31	08:01					06:51		18:43 (6)				04:52		19:48 (11)			
	16:52					19:44	24	19:07 (6)				21:29	49	20:49 (9)			
Sonnenscheinstunden	252		274			367			419			492			508		
astr.max.mögl.Beschattung				163			660			851			1021			1205	
Red.Sonnenscheinwahrsch.				0.24			0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer				0.91			0.91			0.91			0.91			0.91	
Reduktion Windrichtung				0.69			0.69			0.68			0.66			0.65	
Gesamte Reduktion				0.15			0.20			0.26			0.31			0.27	
Met.wahrsch.Beschattung				24			130			219			315			327	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BM - IO65

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober		November	Dezember
1 | 04:47		19:59 (11) | 05:26		19:58 (11) | 06:20		18:37 (6) | 07:12		17:29 (2) | 07:10	08:04
| 21:45	41	20:56 (9) | 21:10	27	20:25 (11) | 20:04	48	19:32 (5) | 18:51	42	18:22 (3) | 16:42	15:58
2 | 04:48		19:59 (11) | 05:28		19:58 (11) | 06:22		18:36 (6) | 07:14		17:28 (2) | 07:12	08:05
| 21:44	42	20:57 (9) | 21:08	26	20:24 (11) | 20:02	48	19:31 (5) | 18:49	40	18:20 (3) | 16:40	15:57
3 | 04:49		19:58 (11) | 05:30		19:59 (11) | 06:23		18:35 (6) | 07:16		17:28 (2) | 07:14	08:07
| 21:44	43	20:56 (9) | 21:06	25	20:24 (11) | 20:00	45	19:28 (5) | 18:47	38	18:18 (3) | 16:38	15:57
4 | 04:50		19:58 (11) | 05:31		19:59 (11) | 06:25		18:34 (6) | 07:18		17:27 (2) | 07:15	08:08
| 21:43	45	20:57 (9) | 21:05	23	20:22 (11) | 19:57	44	19:27 (5) | 18:44	33	18:15 (3) | 16:36	15:56
5 | 04:50		19:58 (11) | 05:33		20:01 (11) | 06:27		18:34 (6) | 07:19		17:27 (2) | 07:17	08:10
| 21:43	44	20:57 (9) | 21:03	20	20:21 (11) | 19:55	36	19:23 (5) | 18:42	28	17:55 (2) | 16:34	15:55
6 | 04:51		19:58 (11) | 05:35		19:56 (7) | 06:29		18:33 (6) | 07:21		17:27 (2) | 07:19	08:11
| 21:42	45	20:57 (9) | 21:01	23	20:19 (11) | 19:52	31	19:04 (6) | 18:39	28	17:55 (2) | 16:32	15:55
7 | 04:52		19:58 (11) | 05:36		19:54 (7) | 06:30		18:33 (6) | 07:23		17:26 (2) | 07:21	08:12
| 21:42	47	20:58 (9) | 20:59	23	20:17 (11) | 19:50	31	19:04 (6) | 18:37	27	17:53 (2) | 16:30	15:54
8 | 04:53		19:58 (11) | 05:38		19:53 (7) | 06:32		18:33 (6) | 07:25		17:26 (2) | 07:23	08:14
| 21:41	46	20:58 (9) | 20:57	15	20:08 (7) | 19:48	30	19:03 (6) | 18:35	27	17:53 (2) | 16:28	15:54
9 | 04:54		19:57 (11) | 05:40		19:52 (7) | 06:34		18:33 (6) | 07:27		17:27 (1) | 07:25	08:15
| 21:40	48	20:58 (9) | 20:55	16	20:08 (7) | 19:45	29	19:02 (6) | 18:32	25	17:52 (2) | 16:27	15:54
10 | 04:55		19:57 (11) | 05:42		19:51 (7) | 06:36		18:33 (6) | 07:28		17:24 (1) | 07:27	08:16
| 21:39	49	20:58 (9) | 20:53	18	20:09 (7) | 19:43	28	19:01 (6) | 18:30	27	17:51 (2) | 16:25	15:53
11 | 04:56		19:57 (11) | 05:43		19:50 (7) | 06:37		18:34 (6) | 07:30		17:23 (1) | 07:29	08:17
| 21:38	49	20:58 (9) | 20:51	19	20:09 (7) | 19:40	26	19:00 (6) | 18:27	27	17:50 (2) | 16:23	15:53
12 | 04:58		19:57 (11) | 05:45		19:50 (7) | 06:39		18:34 (6) | 07:32		17:21 (1) | 07:31	08:18
| 21:38	48	20:58 (9) | 20:49	20	20:10 (7) | 19:38	24	18:58 (6) | 18:25	27	17:48 (2) | 16:22	15:53
13 | 04:59		19:56 (11) | 05:47		19:50 (7) | 06:41		18:35 (6) | 07:34		17:21 (1) | 07:33	08:19
| 21:37	50	20:58 (9) | 20:47	20	20:10 (7) | 19:35	22	18:57 (6) | 18:23	25	17:46 (2) | 16:20	15:53
14 | 05:00		19:56 (11) | 05:48		19:49 (7) | 06:42		18:37 (6) | 07:36		17:20 (1) | 07:34	08:20
| 21:36	49	20:57 (9) | 20:45	20	20:09 (7) | 19:33	18	18:55 (6) | 18:20	22	17:42 (2) | 16:18	15:53
15 | 05:01		19:55 (11) | 05:50		19:49 (7) | 06:44		18:39 (6) | 07:38		17:20 (1) | 07:36	08:21
| 21:34	50	20:57 (9) | 20:43	20	20:09 (7) | 19:30	13	18:52 (6) | 18:18	20	17:40 (1) | 16:17	15:53
16 | 05:03		19:55 (11) | 05:52		19:50 (7) | 06:46		| 07:39		17:19 (1) | 07:38	08:22
| 21:33	49	20:56 (9) | 20:41	19	20:09 (7) | 19:28		| 18:16	21	17:40 (1) | 16:15	15:53
17 | 05:04		19:56 (11) | 05:54		19:49 (7) | 06:48		| 07:41		17:20 (1) | 07:40	08:23
| 21:32	49	20:57 (9) | 20:38	19	20:08 (7) | 19:26		| 18:14	20	17:40 (1) | 16:14	15:53
18 | 05:05		19:55 (11) | 05:55		19:50 (7) | 06:49		| 07:43		17:19 (1) | 07:42	08:24
| 21:31	48	20:56 (9) | 20:36	17	20:07 (7) | 19:23		| 18:11	19	17:38 (1) | 16:12	15:53
19 | 05:07		19:55 (11) | 05:57		19:51 (7) | 06:51		| 07:45		17:19 (1) | 07:44	08:25
| 21:30	47	20:55 (9) | 20:34	13	20:04 (7) | 19:21		| 18:09	18	17:37 (1) | 16:11	15:54
20 | 05:08		19:54 (11) | 05:59		19:23 (5) | 06:53		| 07:47		17:20 (1) | 07:45	08:25
| 21:29	46	20:54 (9) | 20:32	15	20:03 (7) | 19:18		| 18:07	16	17:36 (1) | 16:10	15:54
21 | 05:09		19:55 (11) | 06:01		19:19 (5) | 06:55		| 07:49		17:22 (1) | 07:47	08:26
| 21:27	42	20:53 (9) | 20:30	16	20:00 (7) | 19:16		| 18:05	12	17:34 (1) | 16:08	15:54
22 | 05:11		19:55 (11) | 06:02		19:16 (5) | 06:56		18:14 (3) | 07:51		17:24 (1) | 07:49	08:26
| 21:26	38	20:51 (9) | 20:27	16	19:32 (5) | 19:13	7	18:21 (3) | 18:02	7	17:31 (1) | 16:07	15:55
23 | 05:12		19:54 (11) | 06:04		19:15 (5) | 06:58		18:10 (3) | 07:53		| 07:51	08:27
| 21:24	33	20:27 (11) | 20:25	18	19:33 (5) | 19:11	12	18:22 (3) | 18:00		| 16:06	15:55
24 | 05:14		19:55 (11) | 06:06		19:14 (5) | 07:00		18:09 (3) | 07:54		| 07:53	08:27
| 21:23	33	20:28 (11) | 20:23	20	19:34 (5) | 19:08	15	18:24 (3) | 17:58		| 16:05	15:56
25 | 05:15		19:55 (11) | 06:08		19:12 (5) | 07:02		18:07 (3) | 06:56		| 07:54	08:28
| 21:21	32	20:27 (11) | 20:21	22	19:34 (5) | 19:06	18	18:25 (3) | 16:56		| 16:04	15:57
26 | 05:17		19:55 (11) | 06:09		19:12 (5) | 07:03		18:07 (3) | 06:58		| 07:56	08:28
| 21:20	33	20:28 (11) | 20:18	22	19:34 (5) | 19:04	18	18:25 (3) | 16:54		| 16:03	15:57
27 | 05:18		19:55 (11) | 06:11		18:48 (6) | 07:05		17:38 (2) | 07:00		| 07:58	08:28
| 21:18	32	20:27 (11) | 20:16	32	19:35 (5) | 19:01	30	18:24 (3) | 16:52		| 16:02	15:58
28 | 05:20		19:56 (11) | 06:13		18:44 (6) | 07:07		17:35 (2) | 07:02		| 07:59	08:28
| 21:17	31	20:27 (11) | 20:14	38	19:34 (5) | 18:59	35	18:24 (3) | 16:50		| 16:01	15:59
29 | 05:22		19:56 (11) | 06:15		18:42 (6) | 07:09		17:33 (2) | 07:04		| 08:01	08:29
| 21:15	31	20:27 (11) | 20:11	42	19:34 (5) | 18:56	39	18:24 (3) | 16:48		| 16:00	16:00
30 | 05:23		19:57 (11) | 06:16		18:40 (6) | 07:11		17:32 (2) | 07:06		| 08:02	08:29
| 21:13	30	20:27 (11) | 20:09	46	19:34 (5) | 18:54	41	18:24 (3) | 16:46		| 15:59	16:01
31 | 05:25		19:56 (11) | 06:18		18:38 (6) |				| 07:08		08:29
| 21:12	30	20:26 (11) | 20:07	47	19:32 (5) |				| 16:44			16:02
Sonnenscheinstunden	510		459		382			329		260		235
astr.max.mögl.Beschattung		1300		717		688			549			
Red.Sonnenscheinwahrsch.		0.45		0.49		0.40			0.33			
Reduktion Betriebsdauer		0.91		0.91		0.91			0.91			
Reduktion Windrichtung		0.66		0.67		0.69			0.69			
Gesamte Reduktion		0.27		0.30		0.25			0.21			
Met.wahrsch.Beschattung		347		215		175			113			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BN - IO66

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar			März			April			Mai			Juni		
1	08:29		07:59			07:02			16:53 (1)	06:48		05:40			19:28 (5)	04:51		20:06 (11)
	16:03		16:54			17:49	22		17:15 (1)	19:46		20:41	21		20:11 (7)	21:30	31	20:37 (11)
2	08:29		07:57			07:00			16:52 (1)	06:46		05:38			19:54 (7)	04:50		20:06 (11)
	16:04		16:56			17:50	22		17:14 (1)	19:48		20:42	17		20:11 (7)	21:31	33	20:39 (11)
3	08:28		07:56			06:58			16:52 (1)	06:43		05:36			19:53 (7)	04:49		20:06 (11)
	16:05		16:57			17:52	22		17:14 (1)	19:50		20:44	19		20:12 (7)	21:32	36	20:55 (9)
4	08:28		07:54			06:55			16:53 (1)	06:41		05:34			19:52 (7)	04:48		20:06 (11)
	16:06		16:59			17:54	21		17:14 (1)	19:52		20:46	20		20:12 (7)	21:33	40	20:57 (9)
5	08:28		07:52			06:53			16:53 (1)	06:38		05:32			19:53 (7)	04:48		20:06 (11)
	16:08		17:01			17:56	25		17:18 (2)	19:53	12	19:14 (6)	20:48	20	20:13 (7)	21:34	44	20:59 (9)
6	08:27		07:50			06:51			16:54 (1)	06:36		18:59 (6)	05:30		19:52 (7)	04:47		20:06 (11)
	16:09		17:03			17:58	28		17:22 (2)	19:55	18	19:17 (6)	20:50	21	20:13 (7)	21:35	45	21:00 (9)
7	08:27		07:49			06:48			16:54 (1)	06:34		18:56 (6)	05:28		19:52 (7)	04:46		20:06 (11)
	16:10		17:05			18:00	29		17:23 (2)	19:57	22	19:18 (6)	20:51	21	20:13 (7)	21:36	46	21:00 (9)
8	08:26		07:47			06:46			16:56 (1)	06:31		18:55 (6)	05:26		19:52 (7)	04:46		20:06 (11)
	16:12		17:07			18:02	29		17:25 (2)	19:59	25	19:20 (6)	20:53	20	20:12 (7)	21:37	48	21:01 (9)
9	08:26		07:45			06:44			17:00 (1)	06:29		18:54 (6)	05:24		19:53 (7)	04:45		20:07 (11)
	16:13		17:09			18:04	26		17:26 (2)	20:01	27	19:21 (6)	20:55	20	20:13 (7)	21:38	48	21:02 (9)
10	08:25		07:43			06:41			17:00 (2)	06:27		18:52 (6)	05:22		19:53 (7)	04:45		20:06 (11)
	16:15		17:11			18:06	26		17:26 (2)	20:03	29	19:21 (6)	20:57	19	20:12 (7)	21:39	49	21:02 (9)
11	08:25		07:41			06:39			16:59 (2)	06:24		18:51 (6)	05:20		19:53 (7)	04:44		20:07 (11)
	16:16		17:13			18:07	28		17:27 (2)	20:04	30	19:21 (6)	20:58	18	20:11 (7)	21:40	50	21:03 (9)
12	08:24		07:39			06:37			16:58 (2)	06:22		18:51 (6)	05:19		19:54 (7)	04:44		20:07 (11)
	16:18		17:15			18:09	29		17:27 (2)	20:06	31	19:22 (6)	21:00	17	20:11 (7)	21:41	51	21:04 (9)
13	08:23		07:37			06:34			16:58 (2)	06:20		18:49 (6)	05:17		19:55 (7)	04:44		20:07 (11)
	16:19		17:17			18:11	29		17:27 (2)	20:08	32	19:21 (6)	21:02	14	20:09 (7)	21:41	52	21:04 (9)
14	08:22		07:35			06:32			16:57 (2)	06:17		18:49 (6)	05:15		19:56 (7)	04:43		20:07 (11)
	16:21		17:19			18:13	38		17:46 (3)	20:10	43	19:39 (5)	21:03	13	20:09 (7)	21:42	51	21:04 (9)
15	08:21		07:33			06:29			16:57 (2)	06:15		18:49 (6)	05:14		19:58 (7)	04:43		20:07 (11)
	16:22		17:21			18:15	44		17:49 (3)	20:12	47	19:41 (5)	21:05	9	20:07 (7)	21:43	52	21:05 (9)
16	08:20		07:31			06:27			16:56 (2)	06:13		18:49 (6)	05:12		20:01 (7)	04:43		20:08 (11)
	16:24		17:23			18:17	46		17:49 (3)	20:13	51	19:43 (5)	21:07	3	20:04 (7)	21:43	52	21:05 (9)
17	08:19		07:29			06:25			16:57 (2)	06:10		18:48 (6)	05:10			04:43		20:08 (11)
	16:26		17:25			18:19	47		17:50 (3)	20:15	52	19:43 (5)	21:08			21:44	52	21:05 (9)
18	08:18		07:27			06:22			16:58 (2)	06:08		18:49 (6)	05:09		20:18 (11)	04:43		20:08 (11)
	16:27		17:27			18:21	46		17:51 (3)	20:17	53	19:44 (5)	21:10	5	20:23 (11)	21:44	53	21:06 (9)
19	08:17		07:25			06:20			16:58 (2)	06:06		18:49 (6)	05:07		20:14 (11)	04:43		20:08 (11)
	16:29		17:29			18:22	45		17:51 (3)	20:19	54	19:44 (5)	21:11	12	20:26 (11)	21:44	53	21:06 (9)
20	08:16		07:22			06:17			16:59 (2)	06:03		18:50 (6)	05:06		20:13 (11)	04:43		20:08 (11)
	16:31		17:31			18:24	44		17:51 (3)	20:21	53	19:45 (5)	21:13	16	20:29 (11)	21:45	53	21:06 (9)
21	08:15		07:20			06:15			17:00 (2)	06:01		18:50 (6)	05:04		20:12 (11)	04:43		20:08 (11)
	16:33		17:33			18:26	40		17:50 (3)	20:23	52	19:45 (5)	21:15	19	20:31 (11)	21:45	53	21:06 (9)
22	08:14		07:18			06:12			17:02 (2)	05:59		18:50 (6)	05:03		20:10 (11)	04:43		20:09 (11)
	16:35		17:35			18:28	37		17:50 (3)	20:24	51	19:44 (5)	21:16	21	20:31 (11)	21:45	53	21:07 (9)
23	08:12		07:16		17:04 (1)	06:10			17:04 (2)	05:57		18:51 (6)	05:01		20:09 (11)	04:43		20:09 (11)
	16:36		17:37	2	17:06 (1)	18:30	29		17:48 (3)	20:26	49	19:44 (5)	21:18	23	20:32 (11)	21:45	53	21:07 (9)
24	08:11		07:14		16:58 (1)	06:08			17:31 (3)	05:55		18:53 (6)	05:00		20:08 (11)	04:44		20:09 (11)
	16:38		17:39	11	17:09 (1)	18:32	16		17:47 (3)	20:28	44	19:43 (5)	21:19	25	20:33 (11)	21:45	53	21:07 (9)
25	08:10		07:11		16:57 (1)	06:05			17:32 (3)	05:52		18:54 (6)	04:59		20:08 (11)	04:44		20:10 (11)
	16:40		17:41	15	17:12 (1)	18:33	13		17:45 (3)	20:30	41	19:43 (5)	21:21	26	20:34 (11)	21:46	53	21:08 (9)
26	08:08		07:09		16:55 (1)	06:03			17:35 (3)	05:50		18:57 (6)	04:58		20:08 (11)	04:44		20:10 (11)
	16:42		17:43	18	17:13 (1)	18:35	7		17:42 (3)	20:32	34	19:42 (5)	21:22	27	20:35 (11)	21:46	52	21:07 (9)
27	08:07		07:07		16:54 (1)	06:00				05:48		19:21 (5)	04:56		20:07 (11)	04:45		20:11 (11)
	16:44		17:45	19	17:13 (1)	18:37				20:33	20	19:41 (5)	21:23	29	20:36 (11)	21:45	52	21:08 (9)
28	08:05		07:05		16:53 (1)	05:58				05:46		19:22 (5)	04:55		20:07 (11)	04:45		20:10 (11)
	16:46		17:47	21	17:14 (1)	18:39				20:35	18	19:40 (5)	21:25	29	20:36 (11)	21:45	51	21:07 (9)
29	08:04					06:55				05:44		19:23 (5)	04:54		20:07 (11)	04:46		20:11 (11)
	16:48					19:41				20:37	26	20:08 (7)	21:26	30	20:37 (11)	21:45	52	21:08 (9)
30	08:02					06:53				05:42		19:25 (5)	04:53		20:06 (11)	04:47		20:11 (11)
	16:50					19:42				20:39	25	20:09 (7)	21:27	31	20:37 (11)	21:45	50	21:07 (9)
31	08:01					06:51							04:52		20:06 (11)			
	16:52					19:44							21:29	31	20:37 (11)			
Sonnenscheinstunden	252		274			367				419			492			508		
astr.max.mögl.Beschattung				86			788				939			596			1461	
Red.Sonnenscheinwahrsch.				0.24			0.31				0.41			0.51			0.45	
Reduktion Betriebsdauer				0.91			0.91				0.91			0.91			0.91	
Reduktion Windrichtung				0.69			0.69				0.68			0.66			0.64	
Gesamte Reduktion				0.15			0.20				0.26			0.31			0.27	
Met.wahrsch.Beschattung				13			155				240			183			392	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BN - IO66

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober		November	Dezember
1 | 04:47		20:11 (11) | 05:26		20:04 (7) | 06:20		18:50 (6) | 07:12		17:37 (2) | 07:10	08:04
| 21:45	51	21:08 (9) | 21:10	17	20:21 (7) | 20:04	30	19:20 (6) | 18:51	29	18:06 (2) | 16:42	15:58
2 | 04:48		20:12 (11) | 05:28		20:03 (7) | 06:22		18:51 (6) | 07:14		17:37 (2) | 07:12	08:05
| 21:44	49	21:08 (9) | 21:08	19	20:22 (7) | 20:02	29	19:20 (6) | 18:49	28	18:05 (2) | 16:40	15:57
3 | 04:49		20:11 (11) | 05:30		20:03 (7) | 06:23		18:51 (6) | 07:16		17:37 (2) | 07:14	08:07
| 21:44	49	21:07 (9) | 21:06	19	20:22 (7) | 20:00	27	19:18 (6) | 18:47	28	18:05 (2) | 16:38	15:57
4 | 04:50		20:12 (11) | 05:31		20:02 (7) | 06:25		18:52 (6) | 07:18		17:38 (2) | 07:15	08:08
| 21:43	48	21:07 (9) | 21:05	20	20:22 (7) | 19:57	25	19:17 (6) | 18:44	26	18:04 (2) | 16:36	15:56
5 | 04:50		20:12 (11) | 05:33		20:02 (7) | 06:27		18:53 (6) | 07:19		17:34 (1) | 07:17	08:10
| 21:43	48	21:07 (9) | 21:03	21	20:23 (7) | 19:55	22	19:15 (6) | 18:42	28	18:02 (2) | 16:34	15:55
6 | 04:51		20:12 (11) | 05:35		20:01 (7) | 06:29		18:54 (6) | 07:21		17:32 (1) | 07:19	08:11
| 21:42	46	21:06 (9) | 21:01	21	20:22 (7) | 19:52	18	19:12 (6) | 18:39	29	18:01 (2) | 16:32	15:55
7 | 04:52		20:13 (11) | 05:36		20:02 (7) | 06:30		18:57 (6) | 07:23		17:29 (1) | 07:21	08:12
| 21:42	44	21:06 (9) | 20:59	20	20:22 (7) | 19:50	12	19:09 (6) | 18:37	29	17:58 (2) | 16:30	15:54
8 | 04:53		20:13 (11) | 05:38		20:02 (7) | 06:32		| 07:25		17:28 (1) | 07:23	08:14
| 21:41	41	21:05 (9) | 20:57	20	20:22 (7) | 19:48		| 18:35	27	17:55 (2) | 16:28	15:54
9 | 04:54		20:13 (11) | 05:40		20:02 (7) | 06:34		| 07:27		17:27 (1) | 07:25	08:15
| 21:40	39	21:04 (9) | 20:55	19	20:21 (7) | 19:45		| 18:32	21	17:48 (1) | 16:27	15:54
10 | 04:55		20:14 (11) | 05:42		20:03 (7) | 06:36		| 07:28		17:27 (1) | 07:27	08:16
| 21:39	32	20:46 (11) | 20:53	18	20:21 (7) | 19:43		| 18:30	21	17:48 (1) | 16:25	15:53
11 | 04:56		20:14 (11) | 05:43		20:02 (7) | 06:37		| 07:30		17:26 (1) | 07:29	08:17
| 21:38	32	20:46 (11) | 20:51	18	20:20 (7) | 19:40		| 18:27	22	17:48 (1) | 16:23	15:53
12 | 04:58		20:14 (11) | 05:45		19:35 (5) | 06:39		| 07:32		17:26 (1) | 07:31	08:18
| 21:38	32	20:46 (11) | 20:49	23	20:19 (7) | 19:38		| 18:25	22	17:48 (1) | 16:22	15:53
13 | 04:59		20:15 (11) | 05:47		19:33 (5) | 06:41		| 07:34		17:26 (1) | 07:33	08:19
| 21:37	31	20:46 (11) | 20:47	25	20:17 (7) | 19:35		| 18:23	22	17:48 (1) | 16:20	15:53
14 | 05:00		20:15 (11) | 05:48		19:30 (5) | 06:42		| 07:36		17:27 (1) | 07:34	08:20
| 21:36	30	20:45 (11) | 20:45	25	20:15 (7) | 19:33		| 18:20	20	17:47 (1) | 16:18	15:53
15 | 05:01		20:15 (11) | 05:50		19:29 (5) | 06:44		| 07:38		17:27 (1) | 07:36	08:21
| 21:34	30	20:45 (11) | 20:43	19	19:48 (5) | 19:30		| 18:18	19	17:46 (1) | 16:17	15:53
16 | 05:03		20:16 (11) | 05:52		19:08 (6) | 06:46		| 07:39		17:28 (1) | 07:38	08:22
| 21:33	28	20:44 (11) | 20:41	26	19:49 (5) | 19:28		| 18:16	17	17:45 (1) | 16:15	15:53
17 | 05:04		20:17 (11) | 05:54		19:03 (6) | 06:48		18:25 (3) | 07:41		17:29 (1) | 07:40	08:23
| 21:32	28	20:45 (11) | 20:38	35	19:49 (5) | 19:26	4	18:29 (3) | 18:14	14	17:43 (1) | 16:14	15:53
18 | 05:05		20:17 (11) | 05:55		19:01 (6) | 06:49		18:21 (3) | 07:43		17:31 (1) | 07:42	08:24
| 21:31	27	20:44 (11) | 20:36	42	19:50 (5) | 19:23	12	18:33 (3) | 18:11	9	17:40 (1) | 16:12	15:53
19 | 05:07		20:18 (11) | 05:57		18:58 (6) | 06:51		18:18 (3) | 07:45		| 07:44	08:25
| 21:30	25	20:43 (11) | 20:34	46	19:49 (5) | 19:21	15	18:33 (3) | 18:09		| 16:11	15:54
20 | 05:08		20:18 (11) | 05:59		18:57 (6) | 06:53		17:52 (2) | 07:47		| 07:45	08:25
| 21:29	24	20:42 (11) | 20:32	48	19:49 (5) | 19:18	25	18:34 (3) | 18:07		| 16:10	15:54
21 | 05:09		20:20 (11) | 06:01		18:56 (6) | 06:55		17:48 (2) | 07:49		| 07:47	08:26
| 21:27	22	20:42 (11) | 20:30	51	19:50 (5) | 19:16	35	18:35 (3) | 18:05		| 16:08	15:54
22 | 05:11		20:21 (11) | 06:02		18:54 (6) | 06:56		17:46 (2) | 07:51		| 07:49	08:26
| 21:26	20	20:41 (11) | 20:27	53	19:49 (5) | 19:13	39	18:36 (3) | 18:02		| 16:07	15:55
23 | 05:12		20:23 (11) | 06:04		18:53 (6) | 06:58		17:43 (2) | 07:53		| 07:51	08:27
| 21:24	17	20:40 (11) | 20:25	53	19:48 (5) | 19:11	44	18:35 (3) | 18:00		| 16:06	15:55
24 | 05:14		20:24 (11) | 06:06		18:53 (6) | 07:00		17:42 (2) | 07:54		| 07:53	08:27
| 21:23	14	20:38 (11) | 20:23	53	19:48 (5) | 19:08	45	18:34 (3) | 17:58		| 16:05	15:56
25 | 05:15		20:26 (11) | 06:08		18:51 (6) | 07:02		17:41 (2) | 06:56		| 07:54	08:28
| 21:21	10	20:36 (11) | 20:21	53	19:46 (5) | 19:06	47	18:34 (3) | 16:56		| 16:04	15:57
26 | 05:17		| 06:09		18:51 (6) | 07:03		17:40 (2) | 06:58		| 07:56	08:28
| 21:20		| 20:18	52	19:46 (5) | 19:04	46	18:33 (3) | 16:54		| 16:03	15:57
27 | 05:18		| 06:11		18:51 (6) | 07:05		17:38 (2) | 07:00		| 07:58	08:28
| 21:18		| 20:16	49	19:44 (5) | 19:01	46	18:31 (3) | 16:52		| 16:02	15:58
28 | 05:20		20:10 (7) | 06:13		18:50 (6) | 07:07		17:38 (2) | 07:02		| 07:59	08:28
| 21:17	6	20:16 (7) | 20:14	47	19:42 (5) | 18:59	45	18:30 (3) | 16:50		| 16:01	15:59
29 | 05:22		20:07 (7) | 06:15		18:50 (6) | 07:09		17:38 (2) | 07:04		| 08:01	08:29
| 21:15	11	20:18 (7) | 20:11	40	19:39 (5) | 18:56	40	18:28 (3) | 16:48		| 16:00	16:00
30 | 05:23		20:06 (7) | 06:16		18:50 (6) | 07:11		17:38 (2) | 07:06		| 08:02	08:29
| 21:13	14	20:20 (7) | 20:09	32	19:22 (6) | 18:54	29	18:07 (2) | 16:46		| 15:59	16:01
31 | 05:25		20:05 (7) | 06:18		18:50 (6)			| 07:08			08:29
| 21:12	15	20:20 (7) | 20:07	31	19:21 (6)			| 16:44			16:02
Sonnenscheinstunden	510	| 459		382			| 329		| 260	235
astr.max.mögl.Beschattung	863	|	1015		635		|	411	|	
Red.Sonnenscheinwahrsch.	0.45	|	0.49		0.40		|	0.33	|	
Reduktion Betriebsdauer	0.91	|	0.91		0.91		|	0.91	|	
Reduktion Windrichtung	0.65	|	0.67		0.69		|	0.69	|	
Gesamte Reduktion	0.26	|	0.30		0.25		|	0.21	|	
Met.wahrsch.Beschattung	228	|	305		161		|	85	|	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BO - IO67

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April		Mai		Juni	
1	08:29		07:59		07:02		06:48		05:40		04:51	
	16:03		16:54		17:49		19:46		20:41	19	21:30	55
2	08:28		07:57		07:00		06:46		05:38		04:50	
	16:04		16:56		17:50		19:48	8	19:18 (3)	18	21:31	56
3	08:28		07:56		06:58		06:43		05:36		04:49	
	16:05		16:57		17:52		19:50	28	19:21 (3)	16	21:32	58
4	08:28		07:54		06:55		06:41		05:34		04:48	
	16:06		16:59		17:54		19:52	34	19:22 (3)	14	21:33	60
5	08:28		07:52		06:53		06:39		05:32		04:48	
	16:08		17:01		17:56		19:53	37	19:23 (3)	10	21:34	60
6	08:27		07:50		06:51		06:36		05:30		04:47	
	16:09		17:03		17:58		19:55	39	19:24 (3)	3	21:35	60
7	08:27		07:49		06:48		06:34		05:28		04:46	
	16:10		17:05		18:00		19:57	42	19:24 (3)		21:36	62
8	08:26		07:47		06:46		06:31		05:26		04:46	
	16:12		17:07		18:02		19:59	43	19:24 (3)		21:37	62
9	08:26		07:45		06:44		06:29		05:24		04:45	
	16:13		17:09		18:04		20:01	43	19:24 (3)		21:38	63
10	08:25		07:43		06:41		06:27		05:22		04:45	
	16:15		17:11		18:06		20:03	44	19:23 (3)		21:39	62
11	08:25		07:41		06:39		06:24		05:20		04:44	
	16:16		17:13		18:08		20:04	45	19:23 (3)		21:40	63
12	08:24		07:39		06:37		06:22		05:19		04:44	
	16:18		17:15		18:09		20:06	45	19:23 (3)		21:41	63
13	08:23		07:37		06:34	17:32 (1)	06:20		05:17		04:44	
	16:19		17:17		18:11	6 17:38 (1)	20:08	44	19:21 (3)		21:41	62
14	08:22		07:35		06:32	17:27 (1)	06:17		05:15		04:43	
	16:21		17:19		18:13	14 17:41 (1)	20:10	43	19:20 (3)		21:42	63
15	08:21		07:33		06:29	17:25 (1)	06:15		05:14		04:43	
	16:22		17:21		18:15	18 17:43 (1)	20:12	42	19:19 (3)		21:43	63
16	08:20		07:31		06:27	17:23 (1)	06:13		05:12		04:43	
	16:24		17:23		18:17	21 17:44 (1)	20:13	40	19:17 (3)		21:43	64
17	08:19		07:29		06:25	17:22 (1)	06:10		05:10		04:43	
	16:26		17:25		18:19	23 17:45 (1)	20:15	37	19:13 (2)		21:44	63
18	08:18		07:27		06:22	17:22 (1)	06:08		05:09		04:43	
	16:28		17:27		18:21	24 17:46 (1)	20:17	37	19:13 (2)		21:44	62
19	08:17		07:25		06:20	17:20 (1)	06:06		05:07		04:43	
	16:29		17:29		18:22	26 17:46 (1)	20:19	36	19:13 (2)		21:44	62
20	08:16		07:22		06:17	17:20 (1)	06:03		05:06		04:43	
	16:31		17:31		18:24	26 17:46 (1)	20:21	35	19:12 (2)		21:45	62
21	08:15		07:20		06:15	17:19 (1)	06:01		05:04		04:43	
	16:33		17:33		18:26	27 17:46 (1)	20:23	42	19:55 (4)		21:45	62
22	08:14		07:18		06:12	17:19 (1)	05:59		05:03		04:43	
	16:35		17:35		18:28	27 17:46 (1)	20:24	45	19:56 (4)		21:45	62
23	08:12		07:16		06:10	17:19 (1)	05:57		05:01		04:43	
	16:36		17:37		18:30	26 17:45 (1)	20:26	46	19:57 (4)		21:45	62
24	08:11		07:14		06:08	17:19 (1)	05:55		05:00		04:44	
	16:38		17:39		18:32	25 17:44 (1)	20:28	46	19:59 (4)		21:45	62
25	08:10		07:11		06:05	17:19 (1)	05:52		04:59		04:44	
	16:40		17:41		18:33	24 17:43 (1)	20:30	44	19:59 (4)		21:46	62
26	08:08		07:09		06:03	17:20 (1)	05:50		04:58		04:44	
	16:42		17:43		18:35	22 17:42 (1)	20:32	41	19:59 (4)		21:46	63
27	08:07		07:07		06:00	17:22 (1)	05:48		04:56		04:45	
	16:44		17:45		18:37	19 17:41 (1)	20:33	37	19:59 (4)		21:45	63
28	08:05		07:05		05:58	17:23 (1)	05:46		04:55		04:45	
	16:46		17:47		18:39	15 17:38 (1)	20:35	30	19:59 (4)		21:45	63
29	08:04				06:55	18:26 (1)	05:44		19:39 (4)		04:46	
	16:48				19:41	9 18:35 (1)	20:37	20	19:59 (4)		21:45	64
30	08:02				06:53		05:42		19:39 (4)		04:47	
	16:50				19:43		20:39	20	19:59 (4)		21:45	62
31	08:01				06:51							
	16:52				19:44							
Sonnenscheinstunden	252		274		367		419		492		508	
astr.max.mögl.Beschattung					352		1093		713		1850	
Red.Sonnenscheinwahrsch.					0.31		0.41		0.51		0.45	
Reduktion Betriebsdauer					0.91		0.91		0.91		0.91	
Reduktion Windrichtung					0.70		0.69		0.65		0.65	
Gesamte Reduktion					0.20		0.26		0.31		0.27	
Met.wahrsch.Beschattung					70		282		218		499	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BO - IO67

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober	November	Dezember
1 | 04:47		20:01 (6) | 05:26		| 06:20		18:17 (2) | 07:12	| 07:10	| 08:04
| 21:45	62	21:06 (7) | 21:10		| 20:04	45	19:22 (3) | 18:51	| 16:42	| 15:58
2 | 04:48		20:01 (6) | 05:28		| 06:22		18:38 (2) | 07:14	| 07:12	| 08:05
| 21:44	63	21:07 (7) | 21:08		| 20:02	44	19:22 (3) | 18:49	| 16:40	| 15:57
3 | 04:49		20:01 (6) | 05:30		| 06:23		18:38 (2) | 07:16	| 07:14	| 08:07
| 21:44	62	21:06 (7) | 21:06		| 20:00	43	19:21 (3) | 18:47	| 16:38	| 15:57
4 | 04:50		20:01 (6) | 05:31		| 06:25		18:38 (2) | 07:18	| 07:15	| 08:08
| 21:43	62	21:06 (7) | 21:05		| 19:57	43	19:21 (3) | 18:44	| 16:36	| 15:56
5 | 04:50		20:01 (6) | 05:33		| 06:27		18:39 (2) | 07:19	| 07:17	| 08:10
| 21:43	61	21:06 (7) | 21:03		| 19:55	42	19:21 (3) | 18:42	| 16:34	| 15:55
6 | 04:51		20:02 (6) | 05:35		| 06:29		18:40 (2) | 07:21	| 07:19	| 08:11
| 21:42	62	21:07 (7) | 21:01		| 19:52	39	19:19 (3) | 18:39	| 16:32	| 15:55
7 | 04:52		20:02 (6) | 05:36	19:54 (4)	| 06:30		18:41 (2) | 07:23	| 07:21	| 08:12
| 21:42	60	21:06 (7) | 20:59	7 20:01 (4)	| 19:50	37	19:18 (3) | 18:37	| 16:30	| 15:54
8 | 04:53		20:02 (6) | 05:38	19:52 (4)	| 06:32		18:43 (2) | 07:25	| 07:23	| 08:14
| 21:41	61	21:06 (7) | 20:57	12 20:04 (4)	| 19:48	34	19:17 (3) | 18:35	| 16:28	| 15:54
9 | 04:54		20:03 (6) | 05:40	19:50 (4)	| 06:34		18:45 (2) | 07:27	| 07:25	| 08:15
| 21:40	59	21:06 (7) | 20:55	14 20:04 (4)	| 19:45	29	19:15 (3) | 18:32	| 16:27	| 15:54
10 | 04:55		20:03 (6) | 05:42	19:49 (4)	| 06:36		19:03 (3) | 07:29	| 07:27	| 08:16
| 21:39	57	21:05 (7) | 20:53	17 20:06 (4)	| 19:43	9	19:12 (3) | 18:30	| 16:25	| 15:53
11 | 04:56		20:03 (6) | 05:43	19:48 (4)	| 06:37		| 07:30	| 07:29	| 08:17
| 21:38	56	21:04 (7) | 20:51	18 20:06 (4)	| 19:40		| 18:27	| 16:23	| 15:53
12 | 04:58		20:04 (6) | 05:45	19:47 (4)	| 06:39		| 07:32	| 07:31	| 08:18
| 21:38	53	21:03 (7) | 20:49	20 20:07 (4)	| 19:38		| 18:25	| 16:22	| 15:53
13 | 04:59		20:04 (6) | 05:47	19:47 (4)	| 06:41		| 07:34	| 07:33	| 08:19
| 21:37	52	21:03 (7) | 20:47	20 20:07 (4)	| 19:35		| 18:23	| 16:20	| 15:53
14 | 05:00		20:04 (6) | 05:48	19:46 (4)	| 06:42		18:17 (1) | 07:36	| 07:34	| 08:20
| 21:36	49	21:02 (7) | 20:45	21 20:07 (4)	| 19:33	8	18:25 (1) | 18:21	| 16:18	| 15:53
15 | 05:01		20:04 (6) | 05:50	18:55 (2)	| 06:44		18:14 (1) | 07:38	| 07:36	| 08:21
| 21:34	42	20:46 (5) | 20:43	33 20:07 (4)	| 19:30	14	18:28 (1) | 18:18	| 16:17	| 15:53
16 | 05:03		20:05 (6) | 05:52	18:52 (2)	| 06:46		18:11 (1) | 07:40	| 07:38	| 08:22
| 21:33	41	20:46 (5) | 20:41	39 20:07 (4)	| 19:28	18	18:29 (1) | 18:16	| 16:15	| 15:53
17 | 05:04		20:06 (6) | 05:54	18:49 (2)	| 06:48		18:09 (1) | 07:41	| 07:40	| 08:23
| 21:32	41	20:47 (5) | 20:38	42 20:06 (4)	| 19:26	21	18:30 (1) | 18:14	| 16:14	| 15:53
18 | 05:05		20:06 (6) | 05:55	18:47 (2)	| 06:49		18:08 (1) | 07:43	| 07:42	| 08:24
| 21:31	41	20:47 (5) | 20:36	46 20:06 (4)	| 19:23	23	18:31 (1) | 18:11	| 16:12	| 15:53
19 | 05:07		20:06 (6) | 05:57	18:46 (2)	| 06:51		18:06 (1) | 07:45	| 07:44	| 08:25
| 21:30	40	20:46 (5) | 20:34	46 20:05 (4)	| 19:21	25	18:31 (1) | 18:09	| 16:11	| 15:54
20 | 05:08		20:07 (6) | 05:59	18:44 (2)	| 06:53		18:05 (1) | 07:47	| 07:45	| 08:25
| 21:29	39	20:46 (5) | 20:32	46 20:03 (4)	| 19:18	26	18:31 (1) | 18:07	| 16:10	| 15:54
21 | 05:09		20:08 (6) | 06:01	18:43 (2)	| 06:55		18:05 (1) | 07:49	| 07:47	| 08:26
| 21:27	38	20:46 (5) | 20:30	44 20:01 (4)	| 19:16	26	18:31 (1) | 18:05	| 16:08	| 15:54
22 | 05:11		20:09 (6) | 06:02	18:41 (2)	| 06:56		18:05 (1) | 07:51	| 07:49	| 08:26
| 21:26	37	20:46 (5) | 20:27	42 19:58 (4)	| 19:13	26	18:31 (1) | 18:02	| 16:07	| 15:55
23 | 05:12		20:10 (6) | 06:04	18:41 (2)	| 06:58		18:04 (1) | 07:53	| 07:51	| 08:27
| 21:24	36	20:46 (5) | 20:25	35 19:16 (2)	| 19:11	26	18:30 (1) | 18:00	| 16:06	| 15:55
24 | 05:14		20:11 (6) | 06:06	18:40 (2)	| 07:00		18:04 (1) | 07:54	| 07:53	| 08:27
| 21:23	34	20:45 (5) | 20:23	37 19:17 (2)	| 19:08	26	18:30 (1) | 17:58	| 16:05	| 15:56
25 | 05:15		20:12 (6) | 06:08	18:39 (2)	| 07:02		18:04 (1) | 06:56	| 07:54	| 08:28
| 21:21	32	20:44 (5) | 20:21	37 19:16 (2)	| 19:06	25	18:29 (1) | 16:56	| 16:04	| 15:57
26 | 05:17		20:14 (6) | 06:09	18:39 (2)	| 07:03		18:05 (1) | 06:58	| 07:56	| 08:28
| 21:20	29	20:43 (5) | 20:18	37 19:16 (2)	| 19:04	23	18:28 (1) | 16:54	| 16:03	| 15:57
27 | 05:18		20:16 (6) | 06:11	18:39 (2)	| 07:05		18:05 (1) | 07:00	| 07:58	| 08:28
| 21:18	26	20:42 (5) | 20:16	40 19:19 (3)	| 19:01	21	18:26 (1) | 16:52	| 16:02	| 15:58
28 | 05:20		20:20 (6) | 06:13	18:38 (2)	| 07:07		18:06 (1) | 07:02	| 07:59	| 08:28
| 21:17	20	20:41 (5) | 20:14	42 19:20 (3)	| 18:59	19	18:25 (1) | 16:50	| 16:01	| 15:59
29 | 05:22		20:29 (5) | 06:15	18:38 (2)	| 07:09		18:07 (1) | 07:04	| 08:01	| 08:29
| 21:15	10	20:39 (5) | 20:11	43 19:21 (3)	| 18:56	16	18:23 (1) | 16:48	| 16:00	| 16:00
30 | 05:23		| 06:16	18:38 (2)	| 07:11		18:10 (1) | 07:06	| 08:02	| 08:29
| 21:13		| 20:09	44 19:22 (3)	| 18:54	10	18:20 (1) | 16:46	| 15:59	| 16:01
31 | 05:25		| 06:18	18:37 (2)				| 07:08		| 08:29
| 21:12		| 20:07	45 19:22 (3)				| 16:44		| 16:02
Sonnenscheinstunden	510	459		382		329	260	235
astr.max.mögl.Beschattung	1325	827		718				
Red.Sonnenscheinwahrsch.	0.45	0.49		0.40				
Reduktion Betriebsdauer	0.91	0.91		0.91				
Reduktion Windrichtung	0.65	0.68		0.69				
Gesamte Reduktion	0.26	0.30		0.25				
Met.wahrsch.Beschattung	351	251		183				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BP - IO68

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März			April			Mai			Juni		
1	08:29	07:59		07:02			06:48		18:31 (1)	05:40		18:51 (2)	04:51		20:07 (6)
	16:03	16:54		17:49			19:46	11	18:42 (1)	20:41	43	20:04 (4)	21:30	37	20:44 (5)
2	08:28	07:57		07:00			06:46			05:38		18:52 (2)	04:50		20:07 (6)
	16:04	16:56		17:50			19:48			20:42	39	20:03 (4)	21:31	39	20:56 (7)
3	08:28	07:56		06:58			06:43			05:36		18:55 (2)	04:49		20:07 (6)
	16:05	16:57		17:52			19:50			20:44	34	20:03 (4)	21:32	43	20:58 (7)
4	08:28	07:54		06:55			06:41			05:34		18:59 (2)	04:48		20:06 (6)
	16:06	16:59		17:54			19:52			20:46	24	20:02 (4)	21:33	47	20:59 (7)
5	08:28	07:52		06:53			06:39		19:14 (3)	05:32		19:45 (4)	04:48		20:07 (6)
	16:08	17:01		17:56			19:53	10	19:24 (3)	20:48	17	20:02 (4)	21:34	48	21:00 (7)
6	08:27	07:50		06:51			06:36		19:12 (3)	05:30		19:45 (4)	04:47		20:06 (6)
	16:09	17:03		17:58			19:55	14	19:26 (3)	20:50	16	20:01 (4)	21:35	51	21:01 (7)
7	08:27	07:49		06:48			06:34		19:03 (2)	05:28		19:46 (4)	04:46		20:06 (6)
	16:10	17:05		18:00			19:57	24	19:27 (3)	20:51	13	19:59 (4)	21:36	52	21:01 (7)
8	08:26	07:47		06:46			06:31		18:59 (2)	05:26		19:48 (4)	04:46		20:06 (6)
	16:12	17:07		18:02			19:59	29	19:28 (3)	20:53	9	19:57 (4)	21:37	53	21:03 (7)
9	08:26	07:45		06:44			06:29		18:56 (2)	05:24		19:52 (4)	04:45		20:07 (6)
	16:13	17:09		18:04			20:01	33	19:29 (3)	20:55	2	19:54 (4)	21:38	54	21:04 (7)
10	08:25	07:43		06:41			06:27		18:53 (2)	05:22			04:45		20:06 (6)
	16:15	17:11		18:06			20:03	36	19:29 (3)	20:57			21:39	55	21:04 (7)
11	08:25	07:41		06:39			06:24		18:52 (2)	05:21			04:44		20:06 (6)
	16:16	17:13		18:08			20:04	37	19:29 (3)	20:58			21:40	57	21:05 (7)
12	08:24	07:39		06:37			06:22		18:51 (2)	05:19			04:44		20:07 (6)
	16:18	17:15		18:09			20:06	38	19:29 (3)	21:00			21:41	56	21:06 (7)
13	08:23	07:37		06:34			06:20		18:49 (2)	05:17			04:44		20:06 (6)
	16:19	17:17		18:11			20:08	39	19:28 (3)	21:02			21:41	57	21:05 (7)
14	08:22	07:35		06:32			06:17		18:48 (2)	05:15			04:43		20:06 (6)
	16:21	17:19		18:13			20:10	40	19:28 (3)	21:03			21:42	58	21:06 (7)
15	08:21	07:33		06:29			06:15		18:47 (2)	05:14			04:43		20:07 (6)
	16:22	17:21		18:15			20:12	40	19:27 (3)	21:05			21:43	57	21:06 (7)
16	08:20	07:31		06:27		17:38 (1)	06:13		18:47 (2)	05:12			04:43		20:07 (6)
	16:24	17:23		18:17	4	17:42 (1)	20:13	40	19:27 (3)	21:07			21:43	58	21:07 (7)
17	08:19	07:29		06:25		17:34 (1)	06:10		18:45 (2)	05:10			04:43		20:07 (6)
	16:26	17:25		18:19	13	17:47 (1)	20:15	40	19:25 (3)	21:08			21:44	59	21:07 (7)
18	08:18	07:27		06:22		17:32 (1)	06:08		18:45 (2)	05:09		20:26 (5)	04:43		20:07 (6)
	16:28	17:27		18:21	17	17:49 (1)	20:17	38	19:23 (2)	21:10	7	20:33 (5)	21:44	58	21:07 (7)
19	08:17	07:25		06:20		17:29 (1)	06:06		18:45 (2)	05:07		20:23 (5)	04:43		20:07 (6)
	16:29	17:29		18:22	21	17:50 (1)	20:19	38	19:23 (2)	21:11	12	20:35 (5)	21:44	58	21:07 (7)
20	08:16	07:22		06:17		17:28 (1)	06:03		18:45 (2)	05:06		20:22 (5)	04:43		20:07 (6)
	16:31	17:31		18:24	23	17:51 (1)	20:21	38	19:23 (2)	21:13	15	20:37 (5)	21:45	59	21:08 (7)
21	08:15	07:20		06:15		17:27 (1)	06:01		18:45 (2)	05:04		20:21 (5)	04:43		20:07 (6)
	16:33	17:33		18:26	24	17:51 (1)	20:23	38	19:23 (2)	21:15	17	20:38 (5)	21:45	59	21:08 (7)
22	08:14	07:18		06:12		17:26 (1)	05:59		18:44 (2)	05:03		20:16 (6)	04:43		20:08 (6)
	16:35	17:35		18:28	26	17:52 (1)	20:24	37	19:21 (2)	21:16	23	20:39 (5)	21:45	59	21:09 (7)
23	08:12	07:16		06:10		17:25 (1)	05:57		18:44 (2)	05:01		20:14 (6)	04:43		20:08 (6)
	16:36	17:37		18:30	26	17:51 (1)	20:26	43	19:57 (4)	21:18	26	20:40 (5)	21:45	59	21:09 (7)
24	08:11	07:14		06:08		17:25 (1)	05:55		18:45 (2)	05:00		20:12 (6)	04:44		20:08 (6)
	16:38	17:39		18:32	27	17:52 (1)	20:28	47	19:59 (4)	21:19	29	20:41 (5)	21:45	58	21:08 (7)
25	08:10	07:11		06:05		17:24 (1)	05:52		18:45 (2)	04:59		20:11 (6)	04:44		20:09 (6)
	16:40	17:41		18:33	27	17:51 (1)	20:30	49	20:01 (4)	21:21	30	20:41 (5)	21:46	58	21:09 (7)
26	08:08	07:09		06:03		17:25 (1)	05:50		18:46 (2)	04:58		20:10 (6)	04:44		20:09 (6)
	16:42	17:43		18:35	26	17:51 (1)	20:32	50	20:03 (4)	21:22	32	20:42 (5)	21:46	58	21:09 (7)
27	08:07	07:07		06:00		17:25 (1)	05:48		18:46 (2)	04:56		20:09 (6)	04:45		20:10 (6)
	16:44	17:45		18:37	25	17:50 (1)	20:33	50	20:03 (4)	21:23	33	20:42 (5)	21:45	58	21:10 (7)
28	08:05	07:05		05:58		17:25 (1)	05:46		18:47 (2)	04:55		20:09 (6)	04:45		20:10 (6)
	16:46	17:47		18:39	24	17:49 (1)	20:35	50	20:04 (4)	21:25	34	20:43 (5)	21:45	57	21:09 (7)
29	08:04			06:55		18:26 (1)	05:44		18:48 (2)	04:54		20:08 (6)	04:46		20:10 (6)
	16:48			19:41	22	18:48 (1)	20:37	48	20:04 (4)	21:26	35	20:43 (5)	21:45	58	21:10 (7)
30	08:02			06:53		18:26 (1)	05:42		18:49 (2)	04:53		20:08 (6)	04:47		20:10 (6)
	16:50			19:43	20	18:46 (1)	20:39	47	20:04 (4)	21:27	35	20:43 (5)	21:45	56	21:09 (7)
31	08:01			06:51		18:28 (1)				04:52		20:07 (6)			
	16:52			19:44	16	18:44 (1)				21:29	36	20:43 (5)			
Sonnenscheinstunden		252	274	367			419			492			508		
astr.max.mögl.Beschattung					341			1004			561			1636	
Red.Sonnenscheinwahrsch.					0.31			0.41			0.51			0.45	
Reduktion Betriebsdauer					0.91			0.91			0.91			0.91	
Reduktion Windrichtung					0.70			0.68			0.66			0.65	
Gesamte Reduktion					0.20			0.26			0.31			0.27	
Met.wahrsch.Beschattung					68			257			172			438	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BP - IO68

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober	November	Dezember
1	04:47		20:11 (6)	05:26		06:20	18:51 (2)	07:12	07:10	08:04
	21:45	56	21:09 (7)	21:10		20:04 37	19:28 (3)	18:51	16:42	15:58
2	04:48		20:11 (6)	05:28		06:22	18:52 (2)	07:14	07:12	08:05
	21:44	55	21:09 (7)	21:08		20:02 36	19:28 (3)	18:49	16:40	15:57
3	04:49		20:11 (6)	05:30		06:23	18:53 (2)	07:16	07:14	08:07
	21:44	54	21:08 (7)	21:06		20:00 33	19:26 (3)	18:47	16:38	15:57
4	04:50		20:11 (6)	05:31	20:00 (4)	06:25	18:56 (2)	07:18	07:15	08:08
	21:43	53	21:08 (7)	21:05	6 20:06 (4)	19:57 29	19:25 (3)	18:44	16:36	15:56
5	04:50		20:12 (6)	05:33	19:57 (4)	06:27	19:00 (2)	07:19	07:17	08:10
	21:43	53	21:08 (7)	21:03	11 20:08 (4)	19:55 24	19:24 (3)	18:42	16:34	15:55
6	04:51		20:12 (6)	05:35	19:55 (4)	06:29	19:07 (3)	07:21	07:19	08:11
	21:42	51	21:07 (7)	21:01	14 20:09 (4)	19:52 15	19:22 (3)	18:39	16:32	15:55
7	04:52		20:13 (6)	05:36	19:55 (4)	06:30	19:09 (3)	07:23	07:21	08:12
	21:42	49	21:07 (7)	20:59	16 20:11 (4)	19:50 10	19:19 (3)	18:37	16:30	15:54
8	04:53		20:13 (6)	05:38	19:54 (4)	06:32		07:25	07:23	08:14
	21:41	48	21:06 (7)	20:57	18 20:12 (4)	19:48		18:35	16:28	15:54
9	04:54		20:14 (6)	05:40	19:06 (2)	06:34		07:27	07:25	08:15
	21:40	45	21:06 (7)	20:55	28 20:12 (4)	19:45		18:32	16:27	15:54
10	04:55		20:14 (6)	05:42	19:03 (2)	06:36		07:29	07:27	08:16
	21:39	43	21:05 (7)	20:53	36 20:12 (4)	19:43		18:30	16:25	15:53
11	04:56		20:15 (6)	05:43	19:00 (2)	06:37	18:24 (1)	07:30	07:29	08:17
	21:38	37	20:52 (5)	20:51	41 20:12 (4)	19:40 10	18:34 (1)	18:27	16:23	15:53
12	04:58		20:15 (6)	05:45	18:59 (2)	06:39	18:20 (1)	07:32	07:31	08:18
	21:38	37	20:52 (5)	20:49	43 20:12 (4)	19:38 15	18:35 (1)	18:25	16:22	15:53
13	04:59		20:16 (6)	05:47	18:57 (2)	06:41	18:18 (1)	07:34	07:33	08:19
	21:37	36	20:52 (5)	20:47	47 20:12 (4)	19:35 19	18:37 (1)	18:23	16:20	15:53
14	05:00		20:16 (6)	05:48	18:55 (2)	06:42	18:16 (1)	07:36	07:34	08:20
	21:36	36	20:52 (5)	20:45	49 20:11 (4)	19:33 22	18:38 (1)	18:21	16:18	15:53
15	05:01		20:17 (6)	05:50	18:54 (2)	06:44	18:15 (1)	07:38	07:36	08:21
	21:34	34	20:51 (5)	20:43	50 20:11 (4)	19:30 24	18:39 (1)	18:18	16:17	15:53
16	05:03		20:18 (6)	05:52	18:54 (2)	06:46	18:14 (1)	07:40	07:38	08:22
	21:33	33	20:51 (5)	20:41	51 20:11 (4)	19:28 25	18:39 (1)	18:16	16:15	15:53
17	05:04		20:19 (6)	05:54	18:52 (2)	06:48	18:13 (1)	07:41	07:40	08:23
	21:32	33	20:52 (5)	20:38	51 20:09 (4)	19:26 26	18:39 (1)	18:14	16:14	15:53
18	05:05		20:20 (6)	05:55	18:52 (2)	06:49	18:13 (1)	07:43	07:42	08:24
	21:31	31	20:51 (5)	20:36	48 20:07 (4)	19:23 26	18:39 (1)	18:11	16:12	15:53
19	05:07		20:21 (6)	05:57	18:51 (2)	06:51	18:12 (1)	07:45	07:44	08:25
	21:30	29	20:50 (5)	20:34	46 20:05 (4)	19:21 26	18:38 (1)	18:09	16:11	15:54
20	05:08		20:22 (6)	05:59	18:50 (2)	06:53	18:12 (1)	07:47	07:45	08:25
	21:29	28	20:50 (5)	20:32	42 20:03 (4)	19:18 26	18:38 (1)	18:07	16:10	15:54
21	05:09		20:25 (6)	06:01	18:50 (2)	06:55	18:12 (1)	07:49	07:47	08:26
	21:27	25	20:50 (5)	20:30	37 19:27 (2)	19:16 25	18:37 (1)	18:05	16:08	15:54
22	05:11		20:28 (6)	06:02	18:49 (2)	06:56	18:12 (1)	07:51	07:49	08:26
	21:26	21	20:49 (5)	20:27	37 19:26 (2)	19:13 25	18:37 (1)	18:02	16:07	15:55
23	05:12		20:32 (5)	06:04	18:49 (2)	06:58	18:12 (1)	07:53	07:51	08:27
	21:24	16	20:48 (5)	20:25	38 19:27 (2)	19:11 23	18:35 (1)	18:00	16:06	15:55
24	05:14		20:33 (5)	06:06	18:49 (2)	07:00	18:13 (1)	07:54	07:53	08:27
	21:23	14	20:47 (5)	20:23	38 19:27 (2)	19:08 21	18:34 (1)	17:58	16:05	15:56
25	05:15		20:34 (5)	06:08	18:48 (2)	07:02	18:14 (1)	06:56	07:54	08:28
	21:21	10	20:44 (5)	20:21	38 19:26 (2)	19:06 18	18:32 (1)	16:56	16:04	15:57
26	05:17		20:39 (5)	06:09	18:48 (2)	07:03	18:16 (1)	06:58	07:56	08:28
	21:20	2	20:41 (5)	20:18	40 19:28 (3)	19:04 14	18:30 (1)	16:54	16:03	15:57
27	05:18			06:11	18:49 (2)	07:05	18:18 (1)	07:00	07:58	08:28
	21:18			20:16	40 19:29 (3)	19:01 8	18:26 (1)	16:52	16:02	15:58
28	05:20			06:13	18:48 (2)	07:07		07:02	07:59	08:28
	21:17			20:14	40 19:28 (3)	18:59		16:50	16:01	15:59
29	05:22			06:15	18:49 (2)	07:09		07:04	08:01	08:29
	21:15			20:11	40 19:29 (3)	18:56		16:48	16:00	16:00
30	05:23			06:16	18:50 (2)	07:11		07:06	08:02	08:29
	21:13			20:09	39 19:29 (3)	18:54		16:46	15:59	16:01
31	05:25			06:18	18:49 (2)			07:08		08:29
	21:12			20:07	39 19:28 (3)			16:44		16:02
Sonnenscheinstunden	510			459		382		329	260	235
astr.max.mögl.Beschattung		929		1023		537				
Red.Sonnenscheinwahrsch.		0.45		0.49		0.40				
Reduktion Betriebsdauer		0.91		0.91		0.91				
Reduktion Windrichtung		0.65		0.68		0.69				
Gesamte Reduktion		0.26		0.30		0.25				
Met.wahrsch.Beschattung		245		309		137				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BQ - IO69

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März			April			Mai			Juni		
1	08:29	07:59		07:02			06:48			18:31 (1)	05:40		18:54 (2)	04:51		20:30 (5)
	16:03	16:54		17:49			19:46	24		18:55 (1)	20:41	57	20:10 (4)	21:30	20	20:50 (5)
2	08:28	07:57		07:00			06:46			18:31 (1)	05:38		18:54 (2)	04:50		20:30 (5)
	16:04	16:56		17:50			19:48	23		18:54 (1)	20:42	58	20:10 (4)	21:31	22	20:52 (5)
3	08:28	07:56		06:58			06:43			18:32 (1)	05:36		18:54 (2)	04:49		20:30 (5)
	16:05	16:57		17:52			19:50	21		18:53 (1)	20:44	57	20:10 (4)	21:32	22	20:52 (5)
4	08:28	07:54		06:55			06:41			18:33 (1)	05:34		18:55 (2)	04:48		20:29 (5)
	16:06	16:59		17:54			19:52	17		18:50 (1)	20:46	56	20:10 (4)	21:33	23	20:52 (5)
5	08:28	07:52		06:53			06:39			18:35 (1)	05:32		18:56 (2)	04:48		20:30 (5)
	16:08	17:01		17:56			19:53	13		18:48 (1)	20:48	55	20:11 (4)	21:34	23	20:53 (5)
6	08:27	07:50		06:51			06:36			18:40 (1)	05:30		18:56 (2)	04:47		20:29 (5)
	16:09	17:03		17:58			19:55	3		18:43 (1)	20:50	53	20:10 (4)	21:35	24	20:53 (5)
7	08:27	07:49		06:48			06:34				05:28		18:57 (2)	04:46		20:29 (5)
	16:10	17:05		18:00			19:57				20:51	51	20:10 (4)	21:36	24	20:53 (5)
8	08:26	07:47		06:46			06:31				05:26		18:58 (2)	04:46		20:29 (5)
	16:12	17:07		18:02			19:59				20:53	48	20:09 (4)	21:37	25	20:54 (5)
9	08:26	07:45		06:44			06:29			19:20 (3)	05:24		18:59 (2)	04:45		20:28 (6)
	16:13	17:09		18:04			20:01	11		19:31 (3)	20:55	46	20:09 (4)	21:38	27	20:55 (5)
10	08:25	07:43		06:41			06:27			19:17 (3)	05:22		19:00 (2)	04:45		20:27 (6)
	16:15	17:11		18:06			20:03	15		19:32 (3)	20:57	42	20:08 (4)	21:39	27	20:54 (5)
11	08:25	07:41		06:39			06:24			19:15 (3)	05:21		19:02 (2)	04:44		20:27 (6)
	16:16	17:13		18:08			20:04	19		19:34 (3)	20:58	36	20:07 (4)	21:40	28	20:55 (5)
12	08:24	07:39		06:37			06:22			19:14 (3)	05:19		19:04 (2)	04:44		20:27 (6)
	16:18	17:15		18:09			20:06	21		19:35 (3)	21:00	30	20:06 (4)	21:41	29	20:56 (5)
13	08:23	07:37		06:34			06:20			19:13 (3)	05:17		19:06 (2)	04:44		20:27 (6)
	16:19	17:17		18:11			20:08	22		19:35 (3)	21:02	22	20:04 (4)	21:41	28	20:55 (5)
14	08:22	07:35		06:32			06:17			19:10 (2)	05:15		19:11 (2)	04:43		20:27 (6)
	16:21	17:19		18:13			20:10	25		19:35 (3)	21:03	8	20:02 (4)	21:42	29	20:56 (5)
15	08:21	07:33		06:29			06:15			19:06 (2)	05:14			04:43		20:27 (6)
	16:22	17:21		18:15			20:12	29		19:35 (3)	21:05			21:43	29	20:56 (5)
16	08:20	07:31		06:27			06:13			19:04 (2)	05:12			04:43		20:27 (6)
	16:24	17:23		18:17			20:13	32		19:36 (3)	21:07			21:43	32	21:07 (7)
17	08:19	07:29		06:25			06:10			19:02 (2)	05:10			04:43		20:27 (6)
	16:26	17:25		18:19			20:15	33		19:35 (3)	21:08			21:44	35	21:08 (7)
18	08:18	07:27		06:22			06:08			19:00 (2)	05:09			04:43		20:27 (6)
	16:28	17:27		18:21			20:17	34		19:34 (3)	21:10			21:44	36	21:09 (7)
19	08:17	07:25		06:20			06:06			18:59 (2)	05:07			04:43		20:27 (6)
	16:29	17:29		18:22			20:19	35		19:34 (3)	21:11			21:44	36	21:09 (7)
20	08:16	07:22		06:17		17:42 (1)	06:03			18:58 (2)	05:06			04:43		20:27 (6)
	16:31	17:31		18:24	9	17:51 (1)	20:21	35		19:33 (3)	21:13			21:45	36	21:09 (7)
21	08:15	07:20		06:15		17:38 (1)	06:01			18:57 (2)	05:04			04:43		20:27 (6)
	16:33	17:33		18:26	15	17:53 (1)	20:23	36		19:33 (2)	21:15			21:45	36	21:09 (7)
22	08:14	07:18		06:12		17:36 (1)	05:59			18:56 (2)	05:03			04:43		20:28 (6)
	16:35	17:35		18:28	19	17:55 (1)	20:24	36		19:32 (2)	21:16			21:45	36	21:10 (7)
23	08:12	07:16		06:10		17:34 (1)	05:57			18:55 (2)	05:01			04:43		20:28 (6)
	16:36	17:37		18:30	22	17:56 (1)	20:26	38		19:33 (2)	21:18			21:45	36	21:10 (7)
24	08:11	07:14		06:08		17:33 (1)	05:55			18:55 (2)	05:00			04:44		20:28 (6)
	16:38	17:39		18:32	24	17:57 (1)	20:28	38		19:33 (2)	21:19			21:45	36	21:10 (7)
25	08:10	07:11		06:05		17:31 (1)	05:52			18:54 (2)	04:59			04:44		20:29 (6)
	16:40	17:41		18:33	26	17:57 (1)	20:30	39		19:33 (2)	21:21			21:46	35	21:10 (7)
26	08:08	07:09		06:03		17:31 (1)	05:50			18:54 (2)	04:58			04:44		20:29 (6)
	16:42	17:43		18:35	27	17:58 (1)	20:32	39		19:33 (2)	21:22	9	20:35 (5)	21:45	33	21:10 (7)
27	08:07	07:07		06:00		17:31 (1)	05:48			18:54 (2)	04:56		20:44 (5)	04:45		20:30 (6)
	16:44	17:45		18:37	27	17:58 (1)	20:33	46		20:04 (4)	21:23	12	20:34 (5)	21:45	30	21:09 (7)
28	08:05	07:05		05:58		17:30 (1)	05:46			18:54 (2)	04:55		20:46 (5)	04:45		20:30 (6)
	16:46	17:47		18:39	27	17:57 (1)	20:35	50		20:06 (4)	21:25	14	20:33 (5)	21:45	29	20:59 (5)
29	08:04			06:55		18:30 (1)	05:44			18:54 (2)	04:54		20:47 (5)	04:46		20:31 (6)
	16:48			19:41	27	18:57 (1)	20:37	54		20:08 (4)	21:26	16	20:32 (5)	21:45	28	20:59 (5)
30	08:02			06:53		18:29 (1)	05:42			18:54 (2)	04:53		20:48 (5)	04:47		20:31 (6)
	16:50			19:43	27	18:56 (1)	20:39	56		20:09 (4)	21:27	18	20:31 (5)	21:45	28	20:59 (5)
31	08:01			06:51		18:30 (1)					04:52		20:49 (5)			
	16:52			19:44	26	18:56 (1)					21:29	20	20:30 (5)			
Sonnenscheinstunden		252	274	367			419				492		20:50 (5)	508		
astr.max.mögl.Beschattung					276			844			708				882	
Red.Sonnenscheinwahrsch.					0.31			0.41			0.51				0.45	
Reduktion Betriebsdauer					0.91			0.91			0.91				0.91	
Reduktion Windrichtung					0.70			0.68			0.67				0.64	
Gesamte Reduktion					0.20			0.25			0.31				0.27	
Met.wahrsch.Beschattung					55			215			220				234	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BQ - IO69

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober	November	Dezember
1 | 04:47		20:31 (6) | 05:26		19:14 (2) | 06:20		19:14 (3) | 07:12	| 07:10	| 08:04
| 21:45	28	20:59 (5) | 21:10	33	20:17 (4) | 20:04	19	19:33 (3) | 18:51	| 16:42	| 15:58
2 | 04:48		20:32 (6) | 05:28		19:11 (2) | 06:22		19:16 (3) | 07:14	| 07:12	| 08:05
| 21:44	28	21:00 (5) | 21:08	39	20:18 (4) | 20:02	15	19:31 (3) | 18:49	| 16:40	| 15:57
3 | 04:49		20:32 (6) | 05:30		19:10 (2) | 06:23		19:17 (3) | 07:16	| 07:14	| 08:07
| 21:44	27	20:59 (5) | 21:06	44	20:19 (4) | 20:00	11	19:28 (3) | 18:47	| 16:38	| 15:57
4 | 04:50		20:34 (5) | 05:31		19:08 (2) | 06:25		| 07:18	| 07:15	| 08:08
| 21:43	25	20:59 (5) | 21:05	47	20:19 (4) | 19:57		| 18:44	| 16:36	| 15:56
5 | 04:50		20:35 (5) | 05:33		19:08 (2) | 06:27		| 07:19	| 07:17	| 08:10
| 21:43	25	21:00 (5) | 21:03	50	20:20 (4) | 19:55		| 18:42	| 16:34	| 15:55
6 | 04:51		20:35 (5) | 05:35		19:06 (2) | 06:29		18:35 (1) | 07:21	| 07:19	| 08:11
| 21:42	25	21:00 (5) | 21:01	52	20:19 (4) | 19:52	3	18:38 (1) | 18:39	| 16:32	| 15:55
7 | 04:52		20:36 (5) | 05:36		19:06 (2) | 06:30		18:30 (1) | 07:23	| 07:21	| 08:12
| 21:42	24	21:00 (5) | 20:59	54	20:20 (4) | 19:50	13	18:43 (1) | 18:37	| 16:30	| 15:54
8 | 04:53		20:36 (5) | 05:38		19:05 (2) | 06:32		18:28 (1) | 07:25	| 07:23	| 08:14
| 21:41	24	21:00 (5) | 20:57	56	20:20 (4) | 19:48	17	18:45 (1) | 18:35	| 16:28	| 15:54
9 | 04:54		20:37 (5) | 05:40		19:04 (2) | 06:34		18:25 (1) | 07:27	| 07:25	| 08:15
| 21:40	23	21:00 (5) | 20:55	56	20:19 (4) | 19:45	21	18:46 (1) | 18:32	| 16:27	| 15:54
10 | 04:55		20:37 (5) | 05:42		19:04 (2) | 06:36		18:24 (1) | 07:29	| 07:27	| 08:16
| 21:39	22	20:59 (5) | 20:53	57	20:20 (4) | 19:43	23	18:47 (1) | 18:30	| 16:25	| 15:53
11 | 04:56		20:38 (5) | 05:43		19:02 (2) | 06:37		18:23 (1) | 07:30	| 07:29	| 08:17
| 21:38	21	20:59 (5) | 20:51	57	20:18 (4) | 19:40	25	18:48 (1) | 18:27	| 16:23	| 15:53
12 | 04:58		20:39 (5) | 05:45		19:02 (2) | 06:39		18:21 (1) | 07:32	| 07:31	| 08:18
| 21:38	20	20:59 (5) | 20:49	57	20:18 (4) | 19:38	26	18:47 (1) | 18:25	| 16:22	| 15:53
13 | 04:59		20:39 (5) | 05:47		19:02 (2) | 06:41		18:21 (1) | 07:34	| 07:33	| 08:19
| 21:37	19	20:58 (5) | 20:47	55	20:17 (4) | 19:35	26	18:47 (1) | 18:23	| 16:20	| 15:53
14 | 05:00		20:40 (5) | 05:48		19:01 (2) | 06:42		18:20 (1) | 07:36	| 07:34	| 08:20
| 21:36	17	20:57 (5) | 20:45	53	20:15 (4) | 19:33	28	18:48 (1) | 18:21	| 16:18	| 15:53
15 | 05:01		20:41 (5) | 05:50		19:01 (2) | 06:44		18:20 (1) | 07:38	| 07:36	| 08:21
| 21:34	15	20:56 (5) | 20:43	50	20:13 (4) | 19:30	28	18:48 (1) | 18:18	| 16:17	| 15:53
16 | 05:03		20:42 (5) | 05:52		19:01 (2) | 06:46		18:19 (1) | 07:40	| 07:38	| 08:22
| 21:33	13	20:55 (5) | 20:41	46	20:12 (4) | 19:28	27	18:46 (1) | 18:16	| 16:15	| 15:53
17 | 05:04		20:44 (5) | 05:54		19:01 (2) | 06:48		18:19 (1) | 07:41	| 07:40	| 08:23
| 21:32	11	20:55 (5) | 20:38	39	19:40 (2) | 19:26	27	18:46 (1) | 18:14	| 16:14	| 15:53
18 | 05:05		20:46 (5) | 05:55		19:01 (2) | 06:49		18:20 (1) | 07:43	| 07:42	| 08:24
| 21:31	6	20:52 (5) | 20:36	39	19:40 (2) | 19:23	25	18:45 (1) | 18:11	| 16:12	| 15:53
19 | 05:07		| 05:57		19:01 (2) | 06:51		18:19 (1) | 07:45	| 07:44	| 08:25
| 21:30		| 20:34	39	19:40 (2) | 19:21	25	18:44 (1) | 18:09	| 16:11	| 15:54
20 | 05:08		| 05:59		19:01 (2) | 06:53		18:20 (1) | 07:47	| 07:45	| 08:25
| 21:29		| 20:32	37	19:38 (2) | 19:18	23	18:43 (1) | 18:07	| 16:10	| 15:54
21 | 05:09		| 06:01		19:01 (2) | 06:55		18:21 (1) | 07:49	| 07:47	| 08:26
| 21:27		| 20:30	37	19:38 (2) | 19:16	20	18:41 (1) | 18:05	| 16:08	| 15:54
22 | 05:11		| 06:02		19:01 (2) | 06:56		18:23 (1) | 07:51	| 07:49	| 08:26
| 21:26		| 20:27	36	19:37 (2) | 19:13	16	18:39 (1) | 18:02	| 16:07	| 15:55
23 | 05:12		| 06:04		19:02 (2) | 06:58		18:25 (1) | 07:53	| 07:51	| 08:27
| 21:24		| 20:25	35	19:37 (3) | 19:11	11	18:36 (1) | 18:00	| 16:06	| 15:55
24 | 05:14		| 06:06		19:03 (2) | 07:00		| 07:54	| 07:53	| 08:27
| 21:23		| 20:23	35	19:38 (3) | 19:08		| 17:58	| 16:05	| 15:56
25 | 05:15		| 06:08		19:03 (2) | 07:02		| 06:56	| 07:54	| 08:28
| 21:21		| 20:21	34	19:37 (3) | 19:06		| 16:56	| 16:04	| 15:57
26 | 05:17		| 06:09		19:04 (2) | 07:03		| 06:58	| 07:56	| 08:28
| 21:20		| 20:18	33	19:37 (3) | 19:04		| 16:54	| 16:03	| 15:57
27 | 05:18		| 06:11		19:06 (2) | 07:05		| 07:00	| 07:58	| 08:28
| 21:18		| 20:16	31	19:37 (3) | 19:01		| 16:52	| 16:02	| 15:58
28 | 05:20		| 06:13		19:07 (2) | 07:07		| 07:02	| 07:59	| 08:28
| 21:17		| 20:14	29	19:36 (3) | 18:59		| 16:50	| 16:01	| 15:59
29 | 05:22		| 06:15		19:11 (2) | 07:09		| 07:04	| 08:01	| 08:29
| 21:15		| 20:11	25	19:36 (3) | 18:56		| 16:48	| 16:00	| 16:00
30 | 05:23		19:19 (2) | 06:16		19:13 (3) | 07:11		| 07:06	| 08:02	| 08:29
| 21:13	16	20:14 (4) | 20:09	23	19:36 (3) | 18:54		| 16:46	| 15:59	| 16:01
31 | 05:25		19:15 (2) | 06:18		19:13 (3) |		| 07:08	|	| 08:29
| 21:12	28	20:16 (4) | 20:07	21	19:34 (3) |		| 16:44	|	| 16:02
Sonnenscheinstunden	510	| 459		| 382		| 329	| 260	| 235
astr.max.mögl.Beschattung	417	| 1299		| 429		|	|	|
Red.Sonnenscheinwahrsch.	0.45	| 0.49		| 0.40		|	|	|
Reduktion Betriebsdauer	0.91	| 0.91		| 0.91		|	|	|
Reduktion Windrichtung	0.64	| 0.67		| 0.70		|	|	|
Gesamte Reduktion	0.26	| 0.30		| 0.26		|	|	|
Met.wahrsch.Beschattung	109	| 388		| 110		|	|	|

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BR - IO70

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März			April			Mai			Juni		
1	08:29		07:59		07:02			06:48			18:14 (1)	05:40		19:11 (3)	04:51		18:46 (2)
	16:03		16:54		17:49			19:46	37		18:51 (1)	20:41	28	19:39 (3)	21:30	83	20:24 (4)
2	08:29		07:57		07:00			06:46			18:13 (1)	05:38		19:07 (2)	04:50		18:47 (2)
	16:04		16:56		17:50			19:48	37		18:50 (1)	20:42	31	19:38 (3)	21:31	82	20:25 (4)
3	08:28		07:56		06:58			06:43			18:13 (1)	05:36		19:03 (2)	04:49		18:47 (2)
	16:05		16:58		17:52			19:50	37		18:50 (1)	20:44	34	19:37 (3)	21:32	81	20:24 (4)
4	08:28		07:54		06:55			06:41			18:13 (1)	05:34		19:02 (2)	04:49		18:47 (2)
	16:06		16:59		17:54			19:52	35		18:48 (1)	20:46	35	19:37 (3)	21:33	79	20:23 (4)
5	08:28		07:52		06:53			06:39			18:13 (1)	05:32		19:00 (2)	04:48		18:48 (2)
	16:08		17:01		17:56			19:53	35		18:48 (1)	20:48	36	19:36 (2)	21:34	78	20:23 (4)
6	08:27		07:50		06:51			06:36			18:14 (1)	05:30		18:58 (2)	04:47		18:48 (2)
	16:09		17:03		17:58			19:55	33		18:47 (1)	20:50	39	19:37 (2)	21:35	75	20:22 (4)
7	08:27		07:49		06:48			06:34			18:14 (1)	05:28		18:56 (2)	04:46		18:48 (2)
	16:10		17:05		18:00			19:57	32		18:46 (1)	20:51	42	19:38 (2)	21:36	74	20:21 (4)
8	08:26		07:47		06:46			06:31			18:15 (1)	05:26		18:54 (2)	04:46		18:48 (2)
	16:12		17:07		18:02			19:59	30		18:45 (1)	20:53	53	20:17 (4)	21:37	73	20:21 (4)
9	08:26		07:45		06:44			06:29			18:17 (1)	05:24		18:54 (2)	04:45		18:49 (2)
	16:13		17:09		18:04			20:01	27		18:44 (1)	20:55	61	20:21 (4)	21:38	69	20:20 (4)
10	08:25		07:43		06:41			06:27			18:17 (1)	05:22		18:52 (2)	04:45		18:49 (2)
	16:15		17:11		18:06			20:03	24		18:41 (1)	20:57	66	20:22 (4)	21:39	64	20:17 (4)
11	08:25		07:41		06:39			06:24			18:19 (1)	05:21		18:51 (2)	04:44		18:49 (2)
	16:16		17:13		18:08			20:04	20		18:39 (1)	20:58	70	20:23 (4)	21:40	63	19:52 (2)
12	08:24		07:39		06:37			06:22			18:22 (1)	05:19		18:51 (2)	04:44		18:50 (2)
	16:18		17:15		18:09			20:06	14		18:36 (1)	21:00	72	20:24 (4)	21:41	63	19:53 (2)
13	08:23		07:37		06:34			06:20				05:17		18:50 (2)	04:44		18:49 (2)
	16:19		17:17		18:11			20:08				21:02	76	20:24 (4)	21:41	63	19:52 (2)
14	08:22		07:35		06:32			06:17				05:15		18:50 (2)	04:43		18:50 (2)
	16:21		17:19		18:13			20:10				21:03	79	20:26 (4)	21:42	63	19:53 (2)
15	08:21		07:33		06:29			06:15			19:24 (3)	05:14		18:49 (2)	04:43		18:50 (2)
	16:22		17:21		18:15			20:12	9		19:33 (3)	21:05	81	20:26 (4)	21:43	63	19:53 (2)
16	08:20		07:31		06:27			06:13			19:20 (3)	05:12		18:49 (2)	04:43		18:50 (2)
	16:24		17:23		18:17			20:14	16		19:36 (3)	21:07	81	20:26 (4)	21:43	63	19:53 (2)
17	08:19		07:29		06:25			06:10			19:17 (3)	05:10		18:48 (2)	04:43		18:50 (2)
	16:26		17:25		18:19			20:15	20		19:37 (3)	21:08	83	20:26 (4)	21:44	63	19:53 (2)
18	08:18		07:27		06:22			06:08			19:16 (3)	05:09		18:48 (2)	04:43		18:51 (2)
	16:28		17:27		18:21			20:17	23		19:39 (3)	21:10	85	20:27 (4)	21:44	63	19:54 (2)
19	08:17		07:25		06:20			06:06			19:14 (3)	05:07		18:47 (2)	04:43		18:51 (2)
	16:29		17:29		18:22			20:19	26		19:40 (3)	21:12	86	20:26 (4)	21:44	63	19:54 (2)
20	08:16		07:22		06:17		17:34 (1)	06:04			19:13 (3)	05:06		18:47 (2)	04:43		18:51 (2)
	16:31		17:31		18:24	3	17:37 (1)	20:21	28		19:41 (3)	21:13	86	20:27 (4)	21:45	63	19:54 (2)
21	08:15		07:20		06:15		17:27 (1)	06:01			19:13 (3)	05:04		18:47 (2)	04:43		18:51 (2)
	16:33		17:33		18:26	15	17:42 (1)	20:23	28		19:41 (3)	21:15	87	20:27 (4)	21:45	63	19:54 (2)
22	08:14		07:18		06:12		17:24 (1)	05:59			19:11 (3)	05:03		18:46 (2)	04:43		18:52 (2)
	16:35		17:35		18:28	21	17:45 (1)	20:24	30		19:41 (3)	21:16	87	20:26 (4)	21:45	63	19:55 (2)
23	08:12		07:16		06:10		17:22 (1)	05:57			19:11 (3)	05:02		18:46 (2)	04:43		18:52 (2)
	16:36		17:37		18:30	25	17:47 (1)	20:26	30		19:41 (3)	21:18	87	20:26 (4)	21:45	63	19:55 (2)
24	08:11		07:14		06:08		17:20 (1)	05:55			19:10 (3)	05:00		18:46 (2)	04:44		18:52 (2)
	16:38		17:39		18:32	28	17:48 (1)	20:28	31		19:41 (3)	21:19	87	20:26 (4)	21:45	63	19:55 (2)
25	08:10		07:11		06:05		17:18 (1)	05:52			19:10 (3)	04:59		18:46 (2)	04:44		18:53 (2)
	16:40		17:41		18:33	31	17:49 (1)	20:30	31		19:41 (3)	21:21	87	20:26 (4)	21:46	62	19:55 (2)
26	08:08		07:09		06:03		17:17 (1)	05:50			19:10 (3)	04:58		18:46 (2)	04:44		18:52 (2)
	16:42		17:43		18:35	33	17:50 (1)	20:32	31		19:41 (3)	21:22	87	20:26 (4)	21:46	63	19:55 (2)
27	08:07		07:07		06:00		17:17 (1)	05:48			19:10 (3)	04:56		18:46 (2)	04:45		18:53 (2)
	16:44		17:45		18:37	34	17:51 (1)	20:33	31		19:41 (3)	21:23	87	20:26 (4)	21:45	63	19:56 (2)
28	08:05		07:05		05:58		17:15 (1)	05:46			19:10 (3)	04:55		18:46 (2)	04:45		18:53 (2)
	16:46		17:47		18:39	35	17:50 (1)	20:35	31		19:41 (3)	21:25	87	20:26 (4)	21:45	63	19:56 (2)
29	08:04				06:55		18:15 (1)	05:44			19:10 (3)	04:54		18:47 (2)	04:46		18:53 (2)
	16:48				19:41	36	18:51 (1)	20:37	30		19:40 (3)	21:26	85	20:26 (4)	21:45	63	19:56 (2)
30	08:02				06:53		18:14 (1)	05:42			19:10 (3)	04:53		18:47 (2)	04:47		18:53 (2)
	16:50				19:43	36	18:50 (1)	20:39	30		19:40 (3)	21:27	84	20:25 (4)	21:45	63	19:56 (2)
31	08:01				06:51		18:14 (1)					04:52		18:47 (2)			
	16:52				19:44	37	18:51 (1)					21:29	83	20:25 (4)			
Sonnenscheinstunden		252		274		367			419				492			508	
astr.max.mögl.Beschattung						334				786			2172			2017	
Red.Sonnenscheinwahrsch.						0.31				0.41			0.51			0.45	
Reduktion Betriebsdauer						0.91				0.91			0.91			0.91	
Reduktion Windrichtung						0.70				0.68			0.66			0.66	
Gesamte Reduktion						0.20				0.26			0.31			0.28	
Met.wahrsch.Beschattung						67				201			673			556	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BR - IO70

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober	November	Dezember
1 | 04:47		18:53 (2) | 05:26		19:02 (2) | 06:20		18:18 (1) | 07:12	| 07:10	| 08:04
| 21:45	64	19:57 (2) | 21:10	71	20:34 (4) | 20:04	20	18:38 (1) | 18:51	| 16:42	| 15:58
2 | 04:48		18:54 (2) | 05:28		19:02 (2) | 06:22		18:16 (1) | 07:14	| 07:12	| 08:05
| 21:44	63	19:57 (2) | 21:08	68	20:33 (4) | 20:02	24	18:40 (1) | 18:49	| 16:40	| 15:57
3 | 04:49		18:53 (2) | 05:30		19:03 (2) | 06:23		18:14 (1) | 07:16	| 07:14	| 08:07
| 21:44	68	20:23 (4) | 21:06	64	20:32 (4) | 20:00	27	18:41 (1) | 18:47	| 16:38	| 15:57
4 | 04:50		18:54 (2) | 05:31		19:04 (2) | 06:25		18:12 (1) | 07:18	| 07:15	| 08:08
| 21:43	70	20:25 (4) | 21:05	57	20:29 (4) | 19:57	30	18:42 (1) | 18:44	| 16:36	| 15:56
5 | 04:50		18:54 (2) | 05:33		19:05 (2) | 06:27		18:11 (1) | 07:19	| 07:17	| 08:10
| 21:43	73	20:27 (4) | 21:03	49	20:26 (4) | 19:55	32	18:43 (1) | 18:42	| 16:34	| 15:55
6 | 04:51		18:54 (2) | 05:35		19:06 (2) | 06:29		18:09 (1) | 07:21	| 07:19	| 08:11
| 21:42	76	20:28 (4) | 21:01	41	19:47 (2) | 19:52	33	18:42 (1) | 18:39	| 16:32	| 15:55
7 | 04:52		18:54 (2) | 05:36		19:08 (2) | 06:30		18:09 (1) | 07:23	| 07:21	| 08:12
| 21:42	77	20:29 (4) | 20:59	38	19:46 (2) | 19:50	34	18:43 (1) | 18:37	| 16:30	| 15:54
8 | 04:53		18:55 (2) | 05:38		19:10 (2) | 06:32		18:08 (1) | 07:25	| 07:23	| 08:14
| 21:41	78	20:30 (4) | 20:57	35	19:45 (3) | 19:48	35	18:43 (1) | 18:35	| 16:28	| 15:54
9 | 04:54		18:55 (2) | 05:40		19:11 (2) | 06:34		18:06 (1) | 07:27	| 07:25	| 08:15
| 21:40	79	20:31 (4) | 20:55	34	19:45 (3) | 19:45	37	18:43 (1) | 18:32	| 16:27	| 15:54
10 | 04:55		18:55 (2) | 05:42		19:14 (2) | 06:36		18:06 (1) | 07:29	| 07:27	| 08:16
| 21:39	81	20:32 (4) | 20:53	33	19:47 (3) | 19:43	37	18:43 (1) | 18:30	| 16:25	| 15:53
11 | 04:56		18:55 (2) | 05:43		19:16 (2) | 06:37		18:06 (1) | 07:30	| 07:29	| 08:17
| 21:38	82	20:32 (4) | 20:51	31	19:47 (3) | 19:40	37	18:43 (1) | 18:28	| 16:23	| 15:53
12 | 04:58		18:55 (2) | 05:45		19:19 (3) | 06:39		18:05 (1) | 07:32	| 07:31	| 08:18
| 21:38	84	20:33 (4) | 20:49	28	19:47 (3) | 19:38	37	18:42 (1) | 18:25	| 16:22	| 15:53
13 | 04:59		18:55 (2) | 05:47		19:19 (3) | 06:41		18:05 (1) | 07:34	| 07:33	| 08:19
| 21:37	84	20:33 (4) | 20:47	29	19:48 (3) | 19:35	37	18:42 (1) | 18:23	| 16:20	| 15:53
14 | 05:00		18:55 (2) | 05:49		19:18 (3) | 06:43		18:05 (1) | 07:36	| 07:34	| 08:20
| 21:36	85	20:34 (4) | 20:45	30	19:48 (3) | 19:33	36	18:41 (1) | 18:21	| 16:18	| 15:53
15 | 05:01		18:55 (2) | 05:50		19:17 (3) | 06:44		18:05 (1) | 07:38	| 07:36	| 08:21
| 21:35	85	20:34 (4) | 20:43	31	19:48 (3) | 19:31	36	18:41 (1) | 18:18	| 16:17	| 15:53
16 | 05:03		18:55 (2) | 05:52		19:17 (3) | 06:46		18:05 (1) | 07:40	| 07:38	| 08:22
| 21:33	87	20:35 (4) | 20:41	32	19:49 (3) | 19:28	34	18:39 (1) | 18:16	| 16:15	| 15:53
17 | 05:04		18:56 (2) | 05:54		19:16 (3) | 06:48		18:06 (1) | 07:41	| 07:40	| 08:23
| 21:32	87	20:36 (4) | 20:38	32	19:48 (3) | 19:26	32	18:38 (1) | 18:14	| 16:14	| 15:53
18 | 05:05		18:56 (2) | 05:55		19:17 (3) | 06:49		18:06 (1) | 07:43	| 07:42	| 08:24
| 21:31	88	20:36 (4) | 20:36	31	19:48 (3) | 19:23	31	18:37 (1) | 18:11	| 16:12	| 15:53
19 | 05:07		18:56 (2) | 05:57		19:17 (3) | 06:51		18:06 (1) | 07:45	| 07:44	| 08:25
| 21:30	87	20:36 (4) | 20:34	31	19:48 (3) | 19:21	29	18:35 (1) | 18:09	| 16:11	| 15:54
20 | 05:08		18:56 (2) | 05:59		19:16 (3) | 06:53		18:08 (1) | 07:47	| 07:45	| 08:25
| 21:29	87	20:36 (4) | 20:32	31	19:47 (3) | 19:18	26	18:34 (1) | 18:07	| 16:10	| 15:54
21 | 05:09		18:57 (2) | 06:01		19:17 (3) | 06:55		18:09 (1) | 07:49	| 07:47	| 08:26
| 21:27	87	20:37 (4) | 20:30	29	19:46 (3) | 19:16	23	18:32 (1) | 18:05	| 16:08	| 15:54
22 | 05:11		18:57 (2) | 06:02		19:17 (3) | 06:56		18:12 (1) | 07:51	| 07:49	| 08:26
| 21:26	87	20:37 (4) | 20:27	28	19:45 (3) | 19:13	17	18:29 (1) | 18:03	| 16:07	| 15:55
23 | 05:12		18:57 (2) | 06:04		19:17 (3) | 06:58		18:15 (1) | 07:53	| 07:51	| 08:27
| 21:24	87	20:37 (4) | 20:25	27	19:44 (3) | 19:11	9	18:24 (1) | 18:00	| 16:06	| 15:55
24 | 05:14		18:57 (2) | 06:06		19:18 (3) | 07:00			07:54	| 07:53	| 08:27
| 21:23	86	20:37 (4) | 20:23	25	19:43 (3) | 19:08			17:58	| 16:05	| 15:56
25 | 05:15		18:57 (2) | 06:08		19:19 (3) | 07:02			06:56	| 07:54	| 08:28
| 21:21	86	20:37 (4) | 20:21	22	19:41 (3) | 19:06			16:56	| 16:04	| 15:57
26 | 05:17		18:58 (2) | 06:09		19:20 (3) | 07:03			06:58	| 07:56	| 08:28
| 21:20	85	20:37 (4) | 20:18	20	19:40 (3) | 19:04			16:54	| 16:03	| 15:57
27 | 05:18		18:58 (2) | 06:11		19:22 (3) | 07:05			07:00	| 07:58	| 08:28
| 21:18	83	20:36 (4) | 20:16	16	19:38 (3) | 19:01			16:52	| 16:02	| 15:58
28 | 05:20		18:59 (2) | 06:13		19:25 (3) | 07:07			07:02	| 07:59	| 08:28
| 21:17	82	20:37 (4) | 20:14	8	19:33 (3) | 18:59			16:50	| 16:01	| 15:59
29 | 05:22		18:59 (2) | 06:15		| 07:09			07:04	| 08:01	| 08:29
| 21:15	80	20:36 (4) | 20:11		| 18:56			16:48	| 16:00	| 16:00
30 | 05:23		19:00 (2) | 06:16		| 07:11			07:06	| 08:02	| 08:29
| 21:13	78	20:36 (4) | 20:09		| 18:54			16:46	| 15:59	| 16:01
31 | 05:25		19:00 (2) | 06:18		18:21 (1)			07:08		| 08:29
| 21:12	76	20:35 (4) | 20:07	14	18:35 (1)			16:44		| 16:02
Sonnenscheinstunden	510		459		382		329	260	235
astr.max.mögl.Beschattung		2502		985		693			
Red.Sonnenscheinwahrsch.		0.45		0.49		0.40			
Reduktion Betriebsdauer		0.91		0.91		0.91			
Reduktion Windrichtung		0.66		0.67		0.70			
Gesamte Reduktion		0.27		0.30		0.26			
Met.wahrsch.Beschattung		675		292		177			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BS - IO71

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März			April			Mai			Juni		
1	08:29		07:59		07:02			06:48			18:40 (1)	05:40		19:23 (3)	04:51		19:15 (2)
	16:03		16:54		17:49			19:46	27		19:07 (1)	20:41	24	19:47 (3)	21:30	45	20:00 (2)
2	08:28		07:57		07:00			06:46			18:38 (1)	05:38		19:23 (3)	04:50		19:16 (2)
	16:04		16:56		17:50			19:48	29		19:07 (1)	20:42	23	19:46 (2)	21:31	45	20:01 (2)
3	08:28		07:56		06:58			06:43			18:38 (1)	05:36		19:24 (3)	04:49		19:16 (2)
	16:05		16:58		17:52			19:50	30		19:08 (1)	20:44	24	19:48 (2)	21:32	45	20:01 (2)
4	08:28		07:54		06:55			06:41			18:36 (1)	05:34		19:24 (2)	04:48		19:16 (2)
	16:06		16:59		17:54			19:52	31		19:07 (1)	20:46	27	19:51 (2)	21:33	45	20:01 (2)
5	08:28		07:52		06:53			06:39			18:36 (1)	05:32		19:22 (2)	04:48		19:17 (2)
	16:08		17:01		17:56			19:53	32		19:08 (1)	20:48	30	19:52 (2)	21:34	44	20:01 (2)
6	08:27		07:50		06:51			06:36			18:36 (1)	05:30		19:20 (2)	04:47		19:17 (2)
	16:09		17:03		17:58			19:55	32		19:08 (1)	20:50	33	19:53 (2)	21:35	44	20:01 (2)
7	08:27		07:49		06:48			06:34			18:36 (1)	05:28		19:19 (2)	04:46		19:17 (2)
	16:10		17:05		18:00			19:57	31		19:07 (1)	20:51	43	20:20 (4)	21:36	43	20:00 (2)
8	08:26		07:47		06:46			06:31			18:36 (1)	05:26		19:18 (2)	04:46		19:18 (2)
	16:12		17:07		18:02			19:59	30		19:06 (1)	20:53	50	20:22 (4)	21:37	43	20:01 (2)
9	08:26		07:45		06:44			06:29			18:36 (1)	05:24		19:17 (2)	04:45		19:19 (2)
	16:13		17:09		18:04			20:01	30		19:06 (1)	20:55	55	20:24 (4)	21:38	42	20:01 (2)
10	08:25		07:43		06:41			06:27			18:36 (1)	05:22		19:16 (2)	04:45		19:19 (2)
	16:15		17:11		18:06			20:03	29		19:05 (1)	20:57	58	20:24 (4)	21:39	42	20:01 (2)
11	08:25		07:41		06:39			06:24			18:37 (1)	05:21		19:15 (2)	04:44		19:19 (2)
	16:16		17:13		18:08			20:04	27		19:04 (1)	20:58	61	20:25 (4)	21:40	42	20:01 (2)
12	08:24		07:39		06:37			06:22			18:38 (1)	05:19		19:15 (2)	04:44		19:20 (2)
	16:18		17:15		18:09			20:06	25		19:03 (1)	21:00	63	20:26 (4)	21:41	41	20:01 (2)
13	08:23		07:37		06:34			06:20			18:38 (1)	05:17		19:14 (2)	04:44		19:19 (2)
	16:19		17:17		18:11			20:08	23		19:01 (1)	21:02	65	20:26 (4)	21:41	42	20:01 (2)
14	08:22		07:35		06:32			06:17			18:40 (1)	05:15		19:14 (2)	04:43		19:20 (2)
	16:21		17:19		18:13			20:10	19		18:59 (1)	21:03	67	20:27 (4)	21:42	41	20:01 (2)
15	08:21		07:33		06:29			06:15			18:42 (1)	05:14		19:14 (2)	04:43		19:20 (2)
	16:22		17:21		18:15			20:12	15		18:57 (1)	21:05	68	20:27 (4)	21:43	41	20:01 (2)
16	08:20		07:31		06:27			06:13			18:46 (1)	05:12		19:14 (2)	04:43		19:21 (2)
	16:24		17:23		18:17			20:14	8		18:54 (1)	21:07	68	20:27 (4)	21:43	40	20:01 (2)
17	08:19		07:29		06:25			06:10			19:34 (3)	05:10		19:13 (2)	04:43		19:21 (2)
	16:26		17:25		18:19			20:15	6		19:40 (3)	21:08	69	20:27 (4)	21:44	40	20:01 (2)
18	08:18		07:27		06:22			06:08			19:30 (3)	05:09		19:13 (2)	04:43		19:21 (2)
	16:28		17:27		18:21			20:17	13		19:43 (3)	21:10	69	20:27 (4)	21:44	41	20:02 (2)
19	08:17		07:25		06:20			06:06			19:28 (3)	05:07		19:13 (2)	04:43		19:22 (2)
	16:29		17:29		18:22			20:19	17		19:45 (3)	21:11	69	20:26 (4)	21:44	40	20:02 (2)
20	08:16		07:22		06:17			06:04			19:27 (3)	05:06		19:13 (2)	04:43		19:22 (2)
	16:31		17:31		18:24			20:21	20		19:47 (3)	21:13	69	20:27 (4)	21:45	40	20:02 (2)
21	08:15		07:20		06:15			06:01			19:26 (3)	05:04		19:13 (2)	04:43		19:22 (2)
	16:33		17:33		18:26			20:23	22		19:48 (3)	21:15	70	20:27 (4)	21:45	40	20:02 (2)
22	08:14		07:18		06:12			05:59			19:24 (3)	05:03		19:13 (2)	04:43		19:23 (2)
	16:35		17:35		18:28			20:24	24		19:48 (3)	21:16	68	20:26 (4)	21:45	40	20:03 (2)
23	08:12		07:16		06:10			05:57			19:23 (3)	05:01		19:13 (2)	04:43		19:23 (2)
	16:36		17:37		18:30			20:26	25		19:48 (3)	21:18	67	20:26 (4)	21:45	40	20:03 (2)
24	08:11		07:14		06:08			05:55			19:23 (3)	05:00		19:13 (2)	04:44		19:23 (2)
	16:38		17:39		18:32			20:28	25		19:48 (3)	21:19	66	20:25 (4)	21:45	40	20:03 (2)
25	08:10		07:11		06:05			05:52			19:22 (3)	04:59		19:13 (2)	04:44		19:23 (2)
	16:40		17:41		18:33			20:30	27		19:49 (3)	21:21	66	20:25 (4)	21:46	40	20:03 (2)
26	08:08		07:09		06:03			05:50			19:22 (3)	04:58		19:14 (2)	04:44		19:23 (2)
	16:42		17:43		18:35			20:32	27		19:49 (3)	21:22	64	20:25 (4)	21:46	40	20:03 (2)
27	08:07		07:07		06:00		17:52 (1)	05:48			19:22 (3)	04:56		19:14 (2)	04:45		19:24 (2)
	16:44		17:45		18:37	7	17:59 (1)	20:33	27		19:49 (3)	21:23	62	20:24 (4)	21:45	40	20:04 (2)
28	08:05		07:05		05:58		17:47 (1)	05:46			19:22 (3)	04:55		19:14 (2)	04:45		19:23 (2)
	16:46		17:47		18:39	15	18:02 (1)	20:35	26		19:48 (3)	21:25	60	20:23 (4)	21:45	41	20:04 (2)
29	08:04				06:55		18:44 (1)	05:44			19:22 (3)	04:54		19:14 (2)	04:46		19:24 (2)
	16:48				19:41	20	19:04 (1)	20:37	26		19:48 (3)	21:26	58	20:22 (4)	21:45	41	20:05 (2)
30	08:02				06:53		18:42 (1)	05:42			19:22 (3)	04:53		19:15 (2)	04:47		19:23 (2)
	16:50				19:43	23	19:05 (1)	20:39	25		19:47 (3)	21:27	55	20:21 (4)	21:45	41	20:04 (2)
31	08:01				06:51		18:41 (1)					04:52		19:15 (2)			
	16:52				19:44	25	19:06 (1)					21:29	50	20:19 (4)			
Sonnenscheinstunden	252		274		367			419				492			508		
astr.max.mögl.Beschattung						90			728				1721			1249	
Red.Sonnenscheinwahrsch.						0.31			0.41				0.51			0.45	
Reduktion Betriebsdauer						0.91			0.91				0.91			0.91	
Reduktion Windrichtung						0.70			0.68				0.66			0.66	
Gesamte Reduktion						0.20			0.26				0.31			0.28	
Met.wahrsch.Beschattung						18			186				533			345	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BS - IO71

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober	November	Dezember
1	04:47		19:24 (2) / 05:26		19:26 (2) / 06:20		18:36 (1) / 07:12	07:10	08:04
	21:45	41	20:05 (2) / 21:10	62	20:36 (4) / 20:04	27	19:03 (1) / 18:51	16:42	15:58
2	04:48		19:24 (2) / 05:28		19:26 (2) / 06:22		18:35 (1) / 07:14	07:12	08:05
	21:44	42	20:06 (2) / 21:08	60	20:35 (4) / 20:02	29	19:04 (1) / 18:49	16:40	15:57
3	04:49		19:23 (2) / 05:30		19:27 (2) / 06:23		18:33 (1) / 07:16	07:14	08:07
	21:44	42	20:05 (2) / 21:06	57	20:35 (4) / 20:00	30	19:03 (1) / 18:47	16:38	15:57
4	04:50		19:23 (2) / 05:31		19:27 (2) / 06:25		18:33 (1) / 07:18	07:15	08:08
	21:43	43	20:06 (2) / 21:05	53	20:33 (4) / 19:57	30	19:03 (1) / 18:44	16:36	15:56
5	04:50		19:23 (2) / 05:33		19:28 (2) / 06:27		18:33 (1) / 07:19	07:17	08:10
	21:43	43	20:06 (2) / 21:03	48	20:31 (4) / 19:55	31	19:04 (1) / 18:42	16:34	15:55
6	04:51		19:24 (2) / 05:35		19:29 (2) / 06:29		18:31 (1) / 07:21	07:19	08:11
	21:42	43	20:07 (2) / 21:01	40	20:28 (4) / 19:52	32	19:03 (1) / 18:39	16:32	15:55
7	04:52		19:24 (2) / 05:36		19:30 (2) / 06:30		18:31 (1) / 07:23	07:21	08:12
	21:42	43	20:07 (2) / 20:59	32	20:02 (2) / 19:50	32	19:03 (1) / 18:37	16:30	15:54
8	04:53		19:24 (2) / 05:38		19:32 (2) / 06:32		18:32 (1) / 07:25	07:23	08:14
	21:41	44	20:08 (2) / 20:57	29	20:01 (2) / 19:48	30	19:02 (1) / 18:35	16:28	15:54
9	04:54		19:24 (2) / 05:40		19:33 (2) / 06:34		18:31 (1) / 07:27	07:25	08:15
	21:40	44	20:08 (2) / 20:55	26	19:59 (2) / 19:45	30	19:01 (1) / 18:32	16:27	15:54
10	04:55		19:24 (2) / 05:42		19:33 (3) / 06:36		18:31 (1) / 07:29	07:27	08:16
	21:39	45	20:09 (2) / 20:53	24	19:57 (2) / 19:43	29	19:00 (1) / 18:30	16:25	15:53
11	04:56		19:24 (2) / 05:43		19:31 (3) / 06:37		18:32 (1) / 07:30	07:29	08:17
	21:38	45	20:09 (2) / 20:51	23	19:54 (3) / 19:40	28	19:00 (1) / 18:28	16:23	15:53
12	04:58		19:23 (2) / 05:45		19:31 (3) / 06:39		18:32 (1) / 07:32	07:31	08:18
	21:38	46	20:09 (2) / 20:49	24	19:55 (3) / 19:38	26	18:58 (1) / 18:25	16:22	15:53
13	04:59		19:23 (2) / 05:47		19:31 (3) / 06:41		18:33 (1) / 07:34	07:33	08:19
	21:37	53	20:29 (4) / 20:47	25	19:56 (3) / 19:35	23	18:56 (1) / 18:23	16:20	15:53
14	05:00		19:23 (2) / 05:49		19:29 (3) / 06:42		18:34 (1) / 07:36	07:34	08:20
	21:36	56	20:30 (4) / 20:45	26	19:55 (3) / 19:33	21	18:55 (1) / 18:21	16:18	15:53
15	05:01		19:23 (2) / 05:50		19:29 (3) / 06:44		18:36 (1) / 07:38	07:36	08:21
	21:34	58	20:31 (4) / 20:43	27	19:56 (3) / 19:30	17	18:53 (1) / 18:18	16:17	15:53
16	05:03		19:23 (2) / 05:52		19:29 (3) / 06:46		18:39 (1) / 07:40	07:38	08:22
	21:33	60	20:32 (4) / 20:41	27	19:56 (3) / 19:28	9	18:48 (1) / 18:16	16:15	15:53
17	05:04		19:23 (2) / 05:54		19:29 (3) / 06:48		07:41	07:40	08:23
	21:32	63	20:34 (4) / 20:38	26	19:55 (3) / 19:26		18:14	16:14	15:53
18	05:05		19:23 (2) / 05:55		19:29 (3) / 06:49		07:43	07:42	08:24
	21:31	64	20:34 (4) / 20:36	26	19:55 (3) / 19:23		18:11	16:12	15:53
19	05:07		19:23 (2) / 05:57		19:29 (3) / 06:51		07:45	07:44	08:25
	21:30	66	20:35 (4) / 20:34	26	19:55 (3) / 19:21		18:09	16:11	15:54
20	05:08		19:23 (2) / 05:59		19:29 (3) / 06:53		07:47	07:45	08:25
	21:29	66	20:35 (4) / 20:32	25	19:54 (3) / 19:18		18:07	16:10	15:54
21	05:09		19:23 (2) / 06:01		19:30 (3) / 06:55		07:49	07:47	08:26
	21:27	68	20:36 (4) / 20:30	23	19:53 (3) / 19:16		18:05	16:08	15:54
22	05:11		19:23 (2) / 06:02		19:30 (3) / 06:56		07:51	07:49	08:26
	21:26	68	20:36 (4) / 20:27	21	19:51 (3) / 19:13		18:03	16:07	15:55
23	05:12		19:24 (2) / 06:04		19:31 (3) / 06:58		07:53	07:51	08:27
	21:24	68	20:37 (4) / 20:25	19	19:50 (3) / 19:11		18:00	16:06	15:55
24	05:14		19:23 (2) / 06:06		19:32 (3) / 07:00		07:54	07:53	08:27
	21:23	69	20:37 (4) / 20:23	17	19:49 (3) / 19:08		17:58	16:05	15:56
25	05:15		19:23 (2) / 06:08		19:34 (3) / 07:02		06:56	07:54	08:28
	21:21	70	20:37 (4) / 20:21	12	19:46 (3) / 19:06		16:56	16:04	15:57
26	05:17		19:24 (2) / 06:09		19:38 (3) / 07:03		06:58	07:56	08:28
	21:20	69	20:38 (4) / 20:18	3	19:41 (3) / 19:04		16:54	16:03	15:57
27	05:18		19:24 (2) / 06:11		18:47 (1) / 07:05		07:00	07:58	08:28
	21:18	68	20:37 (4) / 20:16	9	18:56 (1) / 19:01		16:52	16:02	15:58
28	05:20		19:24 (2) / 06:13		18:43 (1) / 07:07		07:02	07:59	08:28
	21:17	69	20:38 (4) / 20:14	15	18:58 (1) / 18:59		16:50	16:01	15:59
29	05:22		19:24 (2) / 06:15		18:40 (1) / 07:09		07:04	08:01	08:29
	21:15	67	20:37 (4) / 20:11	20	19:00 (1) / 18:56		16:48	16:00	16:00
30	05:23		19:25 (2) / 06:16		18:39 (1) / 07:11		07:06	08:02	08:29
	21:13	65	20:37 (4) / 20:09	23	19:02 (1) / 18:54		16:46	15:59	16:01
31	05:25		19:25 (2) / 06:18		18:37 (1)		07:08		08:29
	21:12	64	20:36 (4) / 20:07	25	19:02 (1)		16:44		16:02
Sonnenscheinstunden	510		459		382		329	260	235
astr.max.mögl.Beschattung		1752		873		424			
Red.Sonnenscheinwahrsch.		0.45		0.49		0.40			
Reduktion Betriebsdauer		0.91		0.91		0.91			
Reduktion Windrichtung		0.66		0.67		0.70			
Gesamte Reduktion		0.27		0.30		0.26			
Met.wahrsch.Beschattung		472		259		108			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BT - IO72

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März			April			Mai			Juni		
1	08:29		07:59		07:02			06:48			18:44 (1)	05:40		19:19 (2)	04:51	
	16:03		16:54		17:49			19:46	26		19:10 (1)	20:41	32	19:51 (2)	21:30	22
2	08:28		07:57		07:00			06:46			18:43 (1)	05:38		19:18 (2)	04:50	
	16:04		16:56		17:50			19:48	27		19:10 (1)	20:42	34	19:52 (2)	21:31	20
3	08:28		07:56		06:58			06:43			18:43 (1)	05:36		19:17 (2)	04:49	
	16:05		16:57		17:52			19:50	27		19:10 (1)	20:44	37	20:13 (4)	21:32	18
4	08:28		07:54		06:55			06:41			18:41 (1)	05:34		19:16 (2)	04:48	
	16:06		16:59		17:54			19:52	29		19:10 (1)	20:46	45	20:16 (4)	21:33	15
5	08:28		07:52		06:53			06:39			18:41 (1)	05:32		19:16 (2)	04:48	
	16:08		17:01		17:56			19:53	29		19:10 (1)	20:48	50	20:18 (4)	21:34	13
6	08:27		07:50		06:51			06:36			18:42 (1)	05:30		19:15 (2)	04:47	
	16:09		17:03		17:58			19:55	28		19:10 (1)	20:50	54	20:19 (4)	21:35	10
7	08:27		07:49		06:48			06:34			18:41 (1)	05:28		19:15 (2)	04:46	
	16:10		17:05		18:00			19:57	27		19:08 (1)	20:51	57	20:21 (4)	21:36	6
8	08:26		07:47		06:46			06:31			18:42 (1)	05:26		19:14 (2)	04:46	
	16:12		17:07		18:02			19:59	26		19:08 (1)	20:53	59	20:21 (4)	21:37	
9	08:26		07:45		06:44			06:29			18:42 (1)	05:24		19:15 (2)	04:45	
	16:13		17:09		18:04			20:01	25		19:07 (1)	20:55	60	20:22 (4)	21:38	
10	08:25		07:43		06:41			06:27			18:42 (1)	05:22		19:14 (2)	04:45	
	16:15		17:11		18:06			20:03	24		19:06 (1)	20:57	62	20:22 (4)	21:39	
11	08:25		07:41		06:39			06:24			18:43 (1)	05:21		19:14 (2)	04:44	
	16:16		17:13		18:08			20:04	22		19:05 (1)	20:58	61	20:22 (4)	21:40	
12	08:24		07:39		06:37			06:22			18:45 (1)	05:19		19:14 (2)	04:44	
	16:18		17:15		18:09			20:06	18		19:03 (1)	21:00	62	20:22 (4)	21:41	6
13	08:23		07:37		06:34			06:20			18:46 (1)	05:17		19:14 (2)	04:44	
	16:19		17:17		18:11			20:08	14		19:00 (1)	21:02	61	20:22 (4)	21:41	7
14	08:22		07:35		06:32			06:17			18:50 (1)	05:15		19:15 (2)	04:43	
	16:21		17:19		18:13			20:10	6		18:56 (1)	21:03	60	20:22 (4)	21:42	9
15	08:21		07:33		06:29			06:15			19:35 (3)	05:14		19:14 (2)	04:43	
	16:22		17:21		18:15			20:12	4		19:39 (3)	21:05	61	20:22 (4)	21:43	10
16	08:20		07:31		06:27			06:13			19:31 (3)	05:12		19:15 (2)	04:43	
	16:24		17:23		18:17			20:13	12		19:43 (3)	21:07	60	20:22 (4)	21:43	11
17	08:19		07:29		06:25			06:10			19:28 (3)	05:10		19:15 (2)	04:43	
	16:26		17:25		18:19			20:15	16		19:44 (3)	21:08	58	20:21 (4)	21:44	11
18	08:18		07:27		06:22			06:08			19:26 (3)	05:09		19:16 (2)	04:43	
	16:28		17:27		18:21			20:17	19		19:45 (3)	21:10	56	20:21 (4)	21:44	12
19	08:17		07:25		06:20			06:06			19:25 (3)	05:07		19:15 (2)	04:43	
	16:29		17:29		18:22			20:19	21		19:46 (3)	21:11	54	20:19 (4)	21:44	12
20	08:16		07:22		06:17			06:03			19:25 (3)	05:06		19:16 (2)	04:43	
	16:31		17:31		18:24			20:21	22		19:47 (3)	21:13	51	20:19 (4)	21:45	12
21	08:15		07:20		06:15			06:01			19:24 (3)	05:04		19:17 (2)	04:43	
	16:33		17:33		18:26			20:23	23		19:47 (3)	21:15	48	20:18 (4)	21:45	12
22	08:14		07:18		06:12			05:59			19:23 (3)	05:03		19:17 (2)	04:43	
	16:35		17:35		18:28			20:24	24		19:47 (3)	21:16	44	20:16 (4)	21:45	12
23	08:12		07:16		06:10			05:57			19:22 (3)	05:01		19:17 (2)	04:43	
	16:36		17:37		18:30			20:26	25		19:47 (3)	21:18	40	20:14 (4)	21:45	12
24	08:11		07:14		06:08			05:55			19:22 (3)	05:00		19:18 (2)	04:44	
	16:38		17:39		18:32			20:28	25		19:47 (3)	21:19	34	19:52 (2)	21:45	12
25	08:10		07:11		06:05			05:52			19:22 (3)	04:59		19:19 (2)	04:44	
	16:40		17:41		18:33			20:30	24		19:46 (3)	21:21	32	19:51 (2)	21:46	12
26	08:08		07:09		06:03			05:50			19:23 (3)	04:58		19:20 (2)	04:44	
	16:42		17:43		18:35			20:32	23		19:46 (3)	21:22	31	19:51 (2)	21:45	11
27	08:07		07:07		06:00		17:55 (1)	05:48			19:23 (3)	04:56		19:21 (2)	04:45	
	16:44		17:45		18:37	7	18:02 (1)	20:33	22		19:45 (2)	21:23	29	19:50 (2)	21:45	11
28	08:05		07:05		05:58		17:51 (1)	05:46			19:23 (2)	04:55		19:22 (2)	04:45	
	16:46		17:47		18:39	14	18:05 (1)	20:35	24		19:47 (2)	21:25	28	19:50 (2)	21:45	10
29	08:04				06:55		18:49 (1)	05:44			19:22 (2)	04:54		19:22 (2)	04:46	
	16:48				19:41	18	19:07 (1)	20:37	27		19:49 (2)	21:26	27	19:49 (2)	21:45	8
30	08:02				06:53		18:46 (1)	05:42			19:20 (2)	04:53		19:23 (2)	04:47	
	16:50				19:43	22	19:08 (1)	20:39	30		19:50 (2)	21:27	25	19:48 (2)	21:45	6
31	08:01				06:51		18:45 (1)					04:52		19:24 (2)		
	16:52				19:44	24	19:09 (1)					21:29	24	19:48 (2)		
Sonnenscheinstunden	252		274		367			419				492			508	
astr.max.mögl.Beschattung						85			669				1436			300
Red.Sonnenscheinwahrsch.						0.31			0.41				0.51			0.45
Reduktion Betriebsdauer						0.91			0.91				0.91			0.91
Reduktion Windrichtung						0.69			0.68				0.66			0.64
Gesamte Reduktion						0.20			0.26				0.31			0.27
Met.wahrsch.Beschattung						17			171				445			80

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BT - IO72

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober		November	Dezember
1 | 04:47		21:00 (5)	05:26		19:25 (2)	06:20		18:42 (1)	07:12		07:10	08:04
| 21:45	3	21:03 (5)	21:10	61	20:33 (4)	20:04	22	19:04 (1)	18:51		16:42	15:58
2 | 04:48			05:28		19:24 (2)	06:22		18:41 (1)	07:14		07:12	08:05
| 21:44			21:08	62	20:32 (4)	20:02	24	19:05 (1)	18:49		16:40	15:57
3 | 04:49			05:30		19:25 (2)	06:23		18:39 (1)	07:16		07:14	08:07
| 21:44			21:06	60	20:32 (4)	20:00	25	19:04 (1)	18:47		16:38	15:57
4 | 04:50			05:31		19:24 (2)	06:25		18:39 (1)	07:18		07:15	08:08
| 21:43			21:05	59	20:31 (4)	19:57	26	19:05 (1)	18:44		16:36	15:56
5 | 04:50		19:42 (2)	05:33		19:25 (2)	06:27		18:38 (1)	07:19		07:17	08:10
| 21:43	2	19:44 (2)	21:03	57	20:31 (4)	19:55	26	19:06 (1)	18:42		16:34	15:55
6 | 04:51		19:39 (2)	05:35		19:24 (2)	06:29		18:37 (1)	07:21		07:19	08:11
| 21:42	9	19:48 (2)	21:01	56	20:30 (4)	19:52	28	19:05 (1)	18:39		16:32	15:55
7 | 04:52		19:38 (2)	05:36		19:25 (2)	06:30		18:37 (1)	07:23		07:21	08:12
| 21:42	12	19:50 (2)	20:59	52	20:28 (4)	19:50	28	19:05 (1)	18:37		16:30	15:54
8 | 04:53		19:37 (2)	05:38		19:26 (2)	06:32		18:37 (1)	07:25		07:23	08:14
| 21:41	14	19:51 (2)	20:57	49	20:27 (4)	19:48	28	19:05 (1)	18:35		16:28	15:54
9 | 04:54		19:36 (2)	05:40		19:26 (2)	06:34		18:36 (1)	07:27		07:25	08:15
| 21:40	17	19:53 (2)	20:55	43	20:24 (4)	19:45	27	19:03 (1)	18:32		16:27	15:54
10 | 04:55		19:35 (2)	05:42		19:26 (2)	06:36		18:36 (1)	07:29		07:27	08:16
| 21:39	19	19:54 (2)	20:53	35	20:01 (2)	19:43	27	19:03 (1)	18:30		16:25	15:53
11 | 04:56		19:34 (2)	05:43		19:27 (2)	06:37		18:37 (1)	07:30		07:29	08:17
| 21:38	21	19:55 (2)	20:51	33	20:00 (2)	19:40	25	19:02 (1)	18:27		16:23	15:53
12 | 04:58		19:33 (2)	05:45		19:28 (2)	06:39		18:36 (1)	07:32		07:31	08:18
| 21:38	23	19:56 (2)	20:49	31	19:59 (2)	19:38	25	19:01 (1)	18:25		16:22	15:53
13 | 04:59		19:32 (2)	05:47		19:29 (2)	06:41		18:37 (1)	07:34		07:33	08:19
| 21:37	25	19:57 (2)	20:47	29	19:58 (2)	19:35	22	18:59 (1)	18:23		16:20	15:53
14 | 05:00		19:31 (2)	05:48		19:30 (2)	06:42		18:39 (1)	07:36		07:34	08:20
| 21:36	26	19:57 (2)	20:45	26	19:56 (2)	19:33	19	18:58 (1)	18:21		16:18	15:53
15 | 05:01		19:30 (2)	05:50		19:31 (2)	06:44		18:41 (1)	07:38		07:36	08:21
| 21:34	28	19:58 (2)	20:43	23	19:54 (2)	19:30	15	18:56 (1)	18:18		16:17	15:53
16 | 05:03		19:30 (2)	05:52		19:30 (3)	06:46		18:43 (1)	07:40		07:38	08:22
| 21:33	29	19:59 (2)	20:41	23	19:53 (3)	19:28	9	18:52 (1)	18:16		16:15	15:53
17 | 05:04		19:30 (2)	05:54		19:29 (3)	06:48			07:41		07:40	08:23
| 21:32	30	20:00 (2)	20:38	24	19:53 (3)	19:26			18:14		16:14	15:53
18 | 05:05		19:29 (2)	05:55		19:29 (3)	06:49			07:43		07:42	08:24
| 21:31	32	20:01 (2)	20:36	24	19:53 (3)	19:23			18:11		16:12	15:53
19 | 05:07		19:28 (2)	05:57		19:29 (3)	06:51			07:45		07:44	08:25
| 21:30	33	20:01 (2)	20:34	24	19:53 (3)	19:21			18:09		16:11	15:54
20 | 05:08		19:27 (2)	05:59		19:28 (3)	06:53			07:47		07:45	08:25
| 21:29	34	20:01 (2)	20:32	24	19:52 (3)	19:18			18:07		16:10	15:54
21 | 05:09		19:28 (2)	06:01		19:28 (3)	06:55			07:49		07:47	08:26
| 21:27	42	20:26 (4)	20:30	24	19:52 (3)	19:16			18:05		16:08	15:54
22 | 05:11		19:27 (2)	06:02		19:28 (3)	06:56			07:51		07:49	08:26
| 21:26	47	20:27 (4)	20:27	23	19:51 (3)	19:13			18:02		16:07	15:55
23 | 05:12		19:27 (2)	06:04		19:28 (3)	06:58			07:53		07:51	08:27
| 21:24	50	20:29 (4)	20:25	23	19:51 (3)	19:11			18:00		16:06	15:55
24 | 05:14		19:26 (2)	06:06		19:29 (3)	07:00			07:54		07:53	08:27
| 21:23	53	20:30 (4)	20:23	21	19:50 (3)	19:08			17:58		16:05	15:56
25 | 05:15		19:25 (2)	06:08		19:29 (3)	07:02			06:56		07:54	08:28
| 21:21	56	20:30 (4)	20:21	19	19:48 (3)	19:06			16:56		16:04	15:57
26 | 05:17		19:26 (2)	06:09		19:31 (3)	07:03			06:58		07:56	08:28
| 21:20	57	20:31 (4)	20:18	16	19:47 (3)	19:04			16:54		16:03	15:57
27 | 05:18		19:25 (2)	06:11		19:33 (3)	07:05			07:00		07:58	08:28
| 21:18	58	20:31 (4)	20:16	12	19:45 (3)	19:01			16:52		16:02	15:58
28 | 05:20		19:25 (2)	06:13		19:37 (3)	07:07			07:02		07:59	08:28
| 21:17	60	20:32 (4)	20:14	1	19:38 (3)	18:59			16:50		16:01	15:59
29 | 05:22		19:25 (2)	06:15		18:51 (1)	07:09			07:04		08:01	08:29
| 21:15	60	20:32 (4)	20:11	6	18:57 (1)	18:56			16:48		16:00	16:00
30 | 05:23		19:25 (2)	06:16		18:47 (1)	07:11			07:06		08:02	08:29
| 21:13	61	20:33 (4)	20:09	14	19:01 (1)	18:54			16:46		15:59	16:01
31 | 05:25		19:24 (2)	06:18		18:44 (1)				07:08			08:29
| 21:12	62	20:32 (4)	20:07	18	19:02 (1)				16:44			16:02
Sonnenscheinstunden	510		459			382			329	260		235
astr.max.mögl.Beschattung		963		972			378					
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40					
Reduktion Betriebsdauer		0.91		0.91			0.91					
Reduktion Windrichtung		0.66		0.66			0.69					
Gesamte Reduktion		0.27		0.30			0.26					
Met.wahrsch.Beschattung		260		287			96					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BU - IO73

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März		April			Mai			Juni		
1	08:29	07:59		07:02		06:48			05:40		18:54 (1)	04:51		20:24 (4)
	16:03	16:54		17:49		19:46			20:41	30	20:02 (3)	21:30	24	20:48 (4)
2	08:29	07:57		07:00		06:46			05:38		19:42 (3)	04:50		20:25 (4)
	16:04	16:56		17:50		19:48			20:42	21	20:03 (3)	21:31	24	20:49 (4)
3	08:28	07:56		06:58		06:43			05:36		19:40 (3)	04:49		20:25 (4)
	16:05	16:58		17:52		19:50			20:44	24	20:04 (3)	21:32	24	20:49 (4)
4	08:28	07:54		06:55		06:41			05:34		19:40 (3)	04:49		20:24 (4)
	16:06	16:59		17:54		19:52			20:46	26	20:06 (3)	21:33	25	20:49 (4)
5	08:28	07:52		06:53		06:39			05:32		19:39 (3)	04:48		20:25 (4)
	16:08	17:01		17:56		19:53			20:48	27	20:06 (3)	21:34	25	20:50 (4)
6	08:27	07:50		06:51		06:36		19:00 (1)	05:30		19:38 (3)	04:47		20:25 (4)
	16:09	17:03		17:58		19:55	11	19:11 (1)	20:50	28	20:06 (3)	21:35	24	20:49 (4)
7	08:27	07:49		06:48		06:34		18:56 (1)	05:28		19:38 (3)	04:46		20:24 (4)
	16:10	17:05		18:00		19:57	18	19:14 (1)	20:51	29	20:07 (3)	21:36	25	20:49 (4)
8	08:26	07:47		06:46		06:31		18:54 (1)	05:26		19:37 (3)	04:46		20:25 (4)
	16:12	17:07		18:02		19:59	22	19:16 (1)	20:53	30	20:07 (3)	21:37	25	20:50 (4)
9	08:26	07:45		06:44		06:29		18:52 (1)	05:24		19:38 (3)	04:45		20:12 (2)
	16:13	17:09		18:04		20:01	26	19:18 (1)	20:55	29	20:07 (3)	21:38	32	20:50 (4)
10	08:25	07:43		06:41		06:27		18:50 (1)	05:22		19:37 (3)	04:45		20:10 (2)
	16:15	17:11		18:06		20:03	28	19:18 (1)	20:57	30	20:07 (3)	21:39	37	20:50 (4)
11	08:25	07:41		06:39		06:24		18:48 (1)	05:21		19:37 (3)	04:44		20:09 (2)
	16:16	17:13		18:08		20:04	31	19:19 (1)	20:58	30	20:07 (3)	21:40	39	20:50 (4)
12	08:24	07:39		06:37		06:22		18:48 (1)	05:19		19:37 (3)	04:44		20:08 (2)
	16:18	17:15		18:09		20:06	32	19:20 (1)	21:00	30	20:07 (3)	21:41	42	20:51 (4)
13	08:23	07:37		06:34		06:20		18:46 (1)	05:17		19:37 (3)	04:44		20:07 (2)
	16:19	17:17		18:11		20:08	34	19:20 (1)	21:02	30	20:07 (3)	21:41	42	20:50 (4)
14	08:22	07:35		06:32		06:17		18:45 (1)	05:15		19:38 (3)	04:43		20:07 (2)
	16:21	17:19		18:13		20:10	36	19:21 (1)	21:03	29	20:07 (3)	21:42	44	20:51 (4)
15	08:21	07:33		06:29		06:15		18:45 (1)	05:14		19:37 (3)	04:43		20:06 (2)
	16:22	17:21		18:15		20:12	36	19:21 (1)	21:05	30	20:07 (3)	21:43	45	20:51 (4)
16	08:20	07:31		06:27		06:13		18:45 (1)	05:12		19:38 (3)	04:43		20:06 (2)
	16:24	17:23		18:17		20:14	36	19:21 (1)	21:07	29	20:07 (3)	21:43	45	20:51 (4)
17	08:19	07:29		06:25		06:10		18:44 (1)	05:10		19:38 (3)	04:43		20:06 (2)
	16:26	17:25		18:19		20:15	36	19:20 (1)	21:08	28	20:06 (3)	21:44	45	20:51 (4)
18	08:18	07:27		06:22		06:08		18:43 (1)	05:09		19:39 (3)	04:43		20:06 (2)
	16:28	17:27		18:21		20:17	37	19:20 (1)	21:10	27	20:06 (3)	21:44	46	20:52 (4)
19	08:17	07:25		06:20		06:06		18:44 (1)	05:07		19:39 (3)	04:43		20:06 (2)
	16:29	17:29		18:22		20:19	36	19:20 (1)	21:11	26	20:05 (3)	21:44	46	20:52 (4)
20	08:16	07:22		06:17		06:04		18:44 (1)	05:06		19:40 (3)	04:43		20:06 (2)
	16:31	17:31		18:24		20:21	36	19:20 (1)	21:13	25	20:05 (3)	21:45	46	20:52 (4)
21	08:15	07:20		06:15		06:01		18:44 (1)	05:04		19:41 (3)	04:43		20:06 (2)
	16:33	17:33		18:26		20:23	36	19:20 (1)	21:15	31	20:39 (4)	21:45	46	20:52 (4)
22	08:14	07:18		06:12		05:59		18:43 (1)	05:03		19:41 (3)	04:43		20:07 (2)
	16:35	17:35		18:28		20:24	35	19:18 (1)	21:16	34	20:41 (4)	21:45	46	20:53 (4)
23	08:12	07:16		06:10		05:57		18:44 (1)	05:02		19:42 (3)	04:43		20:07 (2)
	16:36	17:37		18:30		20:26	34	19:18 (1)	21:18	34	20:42 (4)	21:45	46	20:53 (4)
24	08:11	07:14		06:08		05:55		18:44 (1)	05:00		19:44 (3)	04:44		20:07 (2)
	16:38	17:39		18:32		20:28	33	19:17 (1)	21:19	33	20:43 (4)	21:45	46	20:53 (4)
25	08:10	07:11		06:05		05:52		18:45 (1)	04:59		19:45 (3)	04:44		20:08 (2)
	16:40	17:41		18:33		20:30	31	19:16 (1)	21:21	34	20:44 (4)	21:46	46	20:54 (4)
26	08:08	07:09		06:03		05:50		18:46 (1)	04:58		19:47 (3)	04:44		20:08 (2)
	16:42	17:43		18:35		20:32	29	19:15 (1)	21:22	31	20:45 (4)	21:46	45	20:53 (4)
27	08:07	07:07		06:00		05:48		18:47 (1)	04:56		19:49 (3)	04:45		20:09 (2)
	16:44	17:45		18:37		20:33	27	19:14 (1)	21:23	30	20:46 (4)	21:45	45	20:54 (4)
28	08:05	07:05		05:58		05:46		18:48 (1)	04:55		20:25 (4)	04:45		20:09 (2)
	16:46	17:47		18:39		20:35	25	19:13 (1)	21:25	21	20:46 (4)	21:45	45	20:54 (4)
29	08:04			06:55		05:44		18:50 (1)	04:54		20:25 (4)	04:46		20:11 (2)
	16:48			19:41		20:37	30	19:58 (3)	21:26	22	20:47 (4)	21:45	43	20:54 (4)
30	08:02			06:53		05:42		18:52 (1)	04:53		20:25 (4)	04:47		20:11 (2)
	16:50			19:43		20:39	32	20:00 (3)	21:27	22	20:47 (4)	21:45	43	20:54 (4)
31	08:01			06:51					04:52		20:24 (4)			
	16:52			19:44					21:29	24	20:48 (4)			
Sonnenscheinstunden		252	274	367		419			492			508		
astr.max.mögl.Beschattung							767			874			1156	
Red.Sonnenscheinwahrsch.							0.41			0.51			0.45	
Reduktion Betriebsdauer							0.91			0.91			0.91	
Reduktion Windrichtung							0.69			0.66			0.65	
Gesamte Reduktion							0.26			0.31			0.27	
Met.wahrsch.Beschattung							198			269			310	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BU - IO73

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober		November	Dezember
1 | 04:47		20:13 (2) | 05:26		19:48 (3) | 06:20		18:47 (1) | 07:12	07:10	08:04
| 21:45	40	20:55 (4) | 21:10	30	20:18 (3) | 20:04	31	19:18 (1) | 18:51	16:42	15:58
2 | 04:48		20:14 (2) | 05:28		19:47 (3) | 06:22		18:48 (1) | 07:14	07:12	08:05
| 21:44	38	20:55 (4) | 21:08	30	20:17 (3) | 20:02	29	19:17 (1) | 18:49	16:40	15:57
3 | 04:49		20:16 (2) | 05:30		19:47 (3) | 06:23		18:49 (1) | 07:16	07:14	08:07
| 21:44	34	20:55 (4) | 21:06	31	20:18 (3) | 20:00	26	19:15 (1) | 18:47	16:38	15:57
4 | 04:50		20:20 (2) | 05:31		19:47 (3) | 06:25		18:51 (1) | 07:18	07:15	08:08
| 21:43	27	20:55 (4) | 21:05	30	20:17 (3) | 19:57	22	19:13 (1) | 18:44	16:36	15:56
5 | 04:50		20:31 (4) | 05:33		19:48 (3) | 06:27		18:53 (1) | 07:19	07:17	08:10
| 21:43	24	20:55 (4) | 21:03	29	20:17 (3) | 19:55	18	19:11 (1) | 18:42	16:34	15:55
6 | 04:51		20:31 (4) | 05:35		19:48 (3) | 06:29		18:55 (1) | 07:21	07:19	08:11
| 21:42	25	20:56 (4) | 21:01	29	20:17 (3) | 19:52	11	19:06 (1) | 18:39	16:32	15:55
7 | 04:52		20:31 (4) | 05:37		19:48 (3) | 06:30		| 07:23	07:21	08:12
| 21:42	25	20:56 (4) | 20:59	28	20:16 (3) | 19:50		| 18:37	16:30	15:54
8 | 04:53		20:32 (4) | 05:38		19:49 (3) | 06:32		| 07:25	07:23	08:14
| 21:41	24	20:56 (4) | 20:57	26	20:15 (3) | 19:48		| 18:35	16:28	15:54
9 | 04:54		20:32 (4) | 05:40		19:49 (3) | 06:34		| 07:27	07:25	08:15
| 21:40	24	20:56 (4) | 20:55	25	20:14 (3) | 19:45		| 18:32	16:27	15:54
10 | 04:55		20:32 (4) | 05:42		19:50 (3) | 06:36		| 07:29	07:27	08:16
| 21:39	24	20:56 (4) | 20:53	23	20:13 (3) | 19:43		| 18:30	16:25	15:53
11 | 04:56		20:32 (4) | 05:43		19:51 (3) | 06:37		| 07:30	07:29	08:17
| 21:38	24	20:56 (4) | 20:51	20	20:11 (3) | 19:40		| 18:28	16:23	15:53
12 | 04:58		20:33 (4) | 05:45		19:02 (1) | 06:39		| 07:32	07:31	08:18
| 21:38	23	20:56 (4) | 20:49	31	20:10 (3) | 19:38		| 18:25	16:22	15:53
13 | 04:59		20:33 (4) | 05:47		18:59 (1) | 06:41		| 07:34	07:33	08:19
| 21:37	23	20:56 (4) | 20:47	32	20:08 (3) | 19:35		| 18:23	16:20	15:53
14 | 05:00		20:33 (4) | 05:49		18:57 (1) | 06:43		| 07:36	07:34	08:20
| 21:36	23	20:56 (4) | 20:45	29	20:04 (3) | 19:33		| 18:21	16:18	15:53
15 | 05:01		20:33 (4) | 05:50		18:55 (1) | 06:44		| 07:38	07:36	08:21
| 21:34	22	20:55 (4) | 20:43	25	19:20 (1) | 19:31		| 18:18	16:17	15:53
16 | 05:03		19:58 (3) | 05:52		18:54 (1) | 06:46		| 07:40	07:38	08:22
| 21:33	28	20:55 (4) | 20:41	28	19:22 (1) | 19:28		| 18:16	16:15	15:53
17 | 05:04		19:57 (3) | 05:54		18:52 (1) | 06:48		| 07:41	07:40	08:23
| 21:32	31	20:55 (4) | 20:38	30	19:22 (1) | 19:26		| 18:14	16:14	15:53
18 | 05:05		19:55 (3) | 05:55		18:51 (1) | 06:49		| 07:43	07:42	08:24
| 21:31	32	20:54 (4) | 20:36	32	19:23 (1) | 19:23		| 18:11	16:12	15:53
19 | 05:07		19:54 (3) | 05:57		18:51 (1) | 06:51		| 07:45	07:44	08:25
| 21:30	34	20:53 (4) | 20:34	33	19:24 (1) | 19:21		| 18:09	16:11	15:54
20 | 05:08		19:53 (3) | 05:59		18:49 (1) | 06:53		| 07:47	07:45	08:25
| 21:29	34	20:53 (4) | 20:32	35	19:24 (1) | 19:18		| 18:07	16:10	15:54
21 | 05:09		19:52 (3) | 06:01		18:49 (1) | 06:55		| 07:49	07:47	08:26
| 21:27	34	20:52 (4) | 20:30	35	19:24 (1) | 19:16		| 18:05	16:08	15:54
22 | 05:11		19:51 (3) | 06:02		18:48 (1) | 06:56		| 07:51	07:49	08:26
| 21:26	33	20:50 (4) | 20:27	36	19:24 (1) | 19:13		| 18:03	16:07	15:55
23 | 05:12		19:51 (3) | 06:04		18:47 (1) | 06:58		| 07:53	07:51	08:27
| 21:24	29	20:48 (4) | 20:25	37	19:24 (1) | 19:11		| 18:00	16:06	15:55
24 | 05:14		19:50 (3) | 06:06		18:47 (1) | 07:00		| 07:54	07:53	08:27
| 21:23	25	20:15 (3) | 20:23	37	19:24 (1) | 19:08		| 17:58	16:05	15:56
25 | 05:15		19:49 (3) | 06:08		18:46 (1) | 07:02		| 06:56	07:54	08:28
| 21:21	26	20:15 (3) | 20:21	37	19:23 (1) | 19:06		| 16:56	16:04	15:57
26 | 05:17		19:49 (3) | 06:09		18:46 (1) | 07:03		| 06:58	07:56	08:28
| 21:20	27	20:16 (3) | 20:18	37	19:23 (1) | 19:04		| 16:54	16:03	15:57
27 | 05:18		19:48 (3) | 06:11		18:47 (1) | 07:05		| 07:00	07:58	08:28
| 21:18	28	20:16 (3) | 20:16	36	19:23 (1) | 19:01		| 16:52	16:02	15:58
28 | 05:20		19:48 (3) | 06:13		18:46 (1) | 07:07		| 07:02	07:59	08:28
| 21:17	29	20:17 (3) | 20:14	36	19:22 (1) | 18:59		| 16:50	16:01	15:59
29 | 05:22		19:48 (3) | 06:15		18:46 (1) | 07:09		| 07:04	08:01	08:29
| 21:15	29	20:17 (3) | 20:11	35	19:21 (1) | 18:56		| 16:48	16:00	16:00
30 | 05:23		19:48 (3) | 06:16		18:47 (1) | 07:11		| 07:06	08:02	08:29
| 21:13	30	20:18 (3) | 20:09	34	19:21 (1) | 18:54		| 16:46	15:59	16:01
31 | 05:25		19:47 (3) | 06:18		18:47 (1) |		| 07:08		08:29
| 21:12	30	20:17 (3) | 20:07	32	19:19 (1) |		| 16:44		16:02
Sonnenscheinstunden |	510	|	459	|	382	|	329	260	235
astr.max.mögl.Beschattung |	879	|	968	|	137	|	|	|
Red.Sonnenscheinwahrsch. |	0.45	|	0.49	|	0.40	|	|	|
Reduktion Betriebsdauer |	0.91	|	0.91	|	0.91	|	|	|
Reduktion Windrichtung |	0.65	|	0.68	|	0.69	|	|	|
Gesamte Reduktion |	0.27	|	0.30	|	0.25	|	|	|
Met.wahrsch.Beschattung |	233	|	292	|	35	|	|	|

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BV - IO74

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40		19:41 (3)	04:51		20:02 (2)
	16:03		16:54		17:49		19:46			20:41	22	20:03 (3)	21:30	43	20:46 (4)
2	08:28		07:57		07:00		06:46			05:38		19:40 (3)	04:50		20:01 (2)
	16:04		16:56		17:50		19:48			20:42	24	20:04 (3)	21:31	46	20:47 (4)
3	08:28		07:56		06:58		06:43			05:36		19:39 (3)	04:49		20:00 (2)
	16:05		16:58		17:52		19:50			20:44	25	20:04 (3)	21:32	47	20:47 (4)
4	08:28		07:54		06:55		06:41			05:34		19:39 (3)	04:49		19:59 (2)
	16:06		16:59		17:54		19:52			20:46	27	20:06 (3)	21:33	48	20:47 (4)
5	08:28		07:52		06:53		06:39			05:32		19:38 (3)	04:48		19:59 (2)
	16:08		17:01		17:56		19:53			20:48	28	20:06 (3)	21:34	48	20:47 (4)
6	08:27		07:50		06:51		06:36		19:01 (1)	05:30		19:38 (3)	04:47		19:58 (2)
	16:09		17:03		17:58		19:55	13	19:14 (1)	20:50	28	20:06 (3)	21:35	49	20:47 (4)
7	08:27		07:49		06:48		06:34		18:57 (1)	05:28		19:37 (3)	04:46		19:57 (2)
	16:10		17:05		18:00		19:57	19	19:16 (1)	20:51	29	20:06 (3)	21:36	50	20:47 (4)
8	08:26		07:47		06:46		06:31		18:55 (1)	05:26		19:37 (3)	04:46		19:57 (2)
	16:12		17:07		18:02		19:59	23	19:18 (1)	20:53	29	20:06 (3)	21:37	50	20:47 (4)
9	08:26		07:45		06:44		06:29		18:54 (1)	05:24		19:37 (3)	04:45		19:57 (2)
	16:13		17:09		18:04		20:01	26	19:20 (1)	20:55	29	20:06 (3)	21:38	51	20:48 (4)
10	08:25		07:43		06:41		06:27		18:52 (1)	05:22		19:37 (3)	04:45		19:56 (2)
	16:15		17:11		18:06		20:03	28	19:20 (1)	20:57	29	20:06 (3)	21:39	51	20:47 (4)
11	08:25		07:41		06:39		06:24		18:51 (1)	05:21		19:37 (3)	04:44		19:56 (2)
	16:16		17:13		18:08		20:04	30	19:21 (1)	20:58	29	20:06 (3)	21:40	52	20:48 (4)
12	08:24		07:39		06:37		06:22		18:50 (1)	05:19		19:38 (3)	04:44		19:56 (2)
	16:18		17:15		18:09		20:06	32	19:22 (1)	21:00	28	20:06 (3)	21:41	52	20:48 (4)
13	08:23		07:37		06:34		06:20		18:48 (1)	05:17		19:37 (3)	04:44		19:55 (2)
	16:19		17:17		18:11		20:08	33	19:21 (1)	21:02	28	20:05 (3)	21:41	53	20:48 (4)
14	08:22		07:35		06:32		06:17		18:48 (1)	05:15		19:38 (3)	04:43		19:56 (2)
	16:21		17:19		18:13		20:10	34	19:22 (1)	21:03	27	20:05 (3)	21:42	52	20:48 (4)
15	08:21		07:33		06:29		06:15		18:47 (1)	05:14		19:38 (3)	04:43		19:56 (2)
	16:22		17:21		18:15		20:12	35	19:22 (1)	21:05	27	20:05 (3)	21:43	52	20:48 (4)
16	08:20		07:31		06:27		06:13		18:47 (1)	05:12		19:39 (3)	04:43		19:56 (2)
	16:24		17:23		18:17		20:14	35	19:22 (1)	21:07	26	20:05 (3)	21:43	52	20:48 (4)
17	08:19		07:29		06:25		06:10		18:46 (1)	05:10		19:39 (3)	04:43		19:56 (2)
	16:26		17:25		18:19		20:15	35	19:21 (1)	21:08	24	20:03 (3)	21:44	53	20:49 (4)
18	08:18		07:27		06:22		06:08		18:46 (1)	05:09		19:41 (3)	04:43		19:56 (2)
	16:28		17:27		18:21		20:17	35	19:21 (1)	21:10	22	20:03 (3)	21:44	53	20:49 (4)
19	08:17		07:25		06:20		06:06		18:46 (1)	05:07		19:41 (3)	04:43		19:56 (2)
	16:29		17:29		18:22		20:19	35	19:21 (1)	21:11	29	20:37 (4)	21:44	53	20:49 (4)
20	08:16		07:22		06:17		06:04		18:47 (1)	05:06		19:42 (3)	04:43		19:56 (2)
	16:31		17:31		18:24		20:21	34	19:21 (1)	21:13	31	20:39 (4)	21:45	53	20:49 (4)
21	08:15		07:20		06:15		06:01		18:47 (1)	05:04		19:44 (3)	04:43		19:56 (2)
	16:33		17:33		18:26		20:23	33	19:20 (1)	21:15	32	20:41 (4)	21:45	53	20:49 (4)
22	08:14		07:18		06:12		05:59		18:47 (1)	05:03		19:44 (3)	04:43		19:57 (2)
	16:35		17:35		18:28		20:24	32	19:19 (1)	21:16	32	20:41 (4)	21:45	53	20:50 (4)
23	08:12		07:16		06:10		05:57		18:47 (1)	05:02		19:46 (3)	04:43		19:57 (2)
	16:36		17:37		18:30		20:26	31	19:18 (1)	21:18	29	20:42 (4)	21:45	53	20:50 (4)
24	08:11		07:14		06:08		05:55		18:48 (1)	05:00		19:49 (3)	04:44		19:57 (2)
	16:38		17:39		18:32		20:28	29	19:17 (1)	21:19	26	20:43 (4)	21:45	53	20:50 (4)
25	08:10		07:11		06:05		05:52		18:49 (1)	04:59		20:23 (4)	04:44		19:58 (2)
	16:40		17:41		18:33		20:30	27	19:16 (1)	21:21	21	20:44 (4)	21:46	53	20:51 (4)
26	08:08		07:09		06:03		05:50		18:50 (1)	04:58		20:23 (4)	04:44		19:58 (2)
	16:42		17:43		18:35		20:32	25	19:15 (1)	21:22	21	20:44 (4)	21:46	52	20:50 (4)
27	08:07		07:07		06:00		05:48		18:51 (1)	04:56		20:23 (4)	04:45		19:59 (2)
	16:44		17:45		18:37		20:33	22	19:13 (1)	21:23	22	20:45 (4)	21:45	52	20:51 (4)
28	08:05		07:05		05:58		05:46		18:53 (1)	04:55		20:23 (4)	04:45		19:59 (2)
	16:46		17:47		18:39		20:35	28	19:58 (3)	21:25	22	20:45 (4)	21:45	52	20:51 (4)
29	08:04				06:55		05:44		18:55 (1)	04:54		20:22 (4)	04:46		19:59 (2)
	16:48				19:41		20:37	29	20:00 (3)	21:26	24	20:46 (4)	21:45	53	20:52 (4)
30	08:02				06:53		05:42		19:00 (1)	04:53		20:07 (2)	04:47		19:59 (2)
	16:50				19:43		20:39	23	20:02 (3)	21:27	33	20:46 (4)	21:45	52	20:51 (4)
31	08:01				06:51					04:52		20:04 (2)			
	16:52				19:44					21:29	39	20:46 (4)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung								726			842			1534	
Red.Sonnenscheinwahrsch.								0.41			0.51			0.45	
Reduktion Betriebsdauer								0.91			0.91			0.91	
Reduktion Windrichtung								0.68			0.66			0.65	
Gesamte Reduktion								0.26			0.31			0.27	
Met.wahrsch.Beschattung								187			259			413	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BV - IO74

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober	November	Dezember
1 | 04:47		20:00 (2) | 05:26		19:48 (3) | 06:20		18:50 (1) | 07:12	07:10	08:04
| 21:45	52	20:52 (4) | 21:10	28	20:16 (3) | 20:04	30	19:20 (1) | 18:51	16:42	15:58
2 | 04:48		20:01 (2) | 05:28		19:47 (3) | 06:22		18:51 (1) | 07:14	07:12	08:05
| 21:44	52	20:53 (4) | 21:08	29	20:16 (3) | 20:02	28	19:19 (1) | 18:49	16:40	15:57
3 | 04:49		20:01 (2) | 05:30		19:47 (3) | 06:23		18:51 (1) | 07:16	07:14	08:07
| 21:44	51	20:52 (4) | 21:06	29	20:16 (3) | 20:00	26	19:17 (1) | 18:47	16:38	15:57
4 | 04:50		20:02 (2) | 05:31		19:47 (3) | 06:25		18:52 (1) | 07:18	07:15	08:08
| 21:43	51	20:53 (4) | 21:05	29	20:16 (3) | 19:57	23	19:15 (1) | 18:44	16:36	15:56
5 | 04:50		20:03 (2) | 05:33		19:47 (3) | 06:27		18:54 (1) | 07:19	07:17	08:10
| 21:43	50	20:53 (4) | 21:03	29	20:16 (3) | 19:55	19	19:13 (1) | 18:42	16:34	15:55
6 | 04:51		20:04 (2) | 05:35		19:47 (3) | 06:29		18:56 (1) | 07:21	07:19	08:11
| 21:42	49	20:53 (4) | 21:01	28	20:15 (3) | 19:52	13	19:09 (1) | 18:39	16:32	15:55
7 | 04:52		20:05 (2) | 05:36		19:47 (3) | 06:30		| 07:23	07:21	08:12
| 21:42	49	20:54 (4) | 20:59	28	20:15 (3) | 19:50		| 18:37	16:30	15:54
8 | 04:53		20:06 (2) | 05:38		19:48 (3) | 06:32		| 07:25	07:23	08:14
| 21:41	48	20:54 (4) | 20:57	27	20:15 (3) | 19:48		| 18:35	16:28	15:54
9 | 04:54		20:07 (2) | 05:40		19:48 (3) | 06:34		| 07:27	07:25	08:15
| 21:40	47	20:54 (4) | 20:55	26	20:14 (3) | 19:45		| 18:32	16:27	15:54
10 | 04:55		20:08 (2) | 05:42		19:49 (3) | 06:36		| 07:29	07:27	08:16
| 21:39	46	20:54 (4) | 20:53	24	20:13 (3) | 19:43		| 18:30	16:25	15:53
11 | 04:56		20:10 (2) | 05:43		19:49 (3) | 06:37		| 07:30	07:29	08:17
| 21:38	44	20:54 (4) | 20:51	23	20:12 (3) | 19:40		| 18:28	16:23	15:53
12 | 04:58		20:11 (2) | 05:45		19:50 (3) | 06:39		| 07:32	07:31	08:18
| 21:38	40	20:54 (4) | 20:49	21	20:11 (3) | 19:38		| 18:25	16:22	15:53
13 | 04:59		20:14 (2) | 05:47		19:07 (1) | 06:41		| 07:34	07:33	08:19
| 21:37	35	20:54 (4) | 20:47	25	20:10 (3) | 19:35		| 18:23	16:20	15:53
14 | 05:00		20:18 (2) | 05:49		19:02 (1) | 06:43		| 07:36	07:34	08:20
| 21:36	26	20:54 (4) | 20:45	29	20:07 (3) | 19:33		| 18:21	16:18	15:53
15 | 05:01		20:31 (4) | 05:50		19:00 (1) | 06:44		| 07:38	07:36	08:21
| 21:34	23	20:54 (4) | 20:43	27	20:04 (3) | 19:30		| 18:18	16:17	15:53
16 | 05:03		20:31 (4) | 05:52		18:58 (1) | 06:46		| 07:40	07:38	08:22
| 21:33	23	20:54 (4) | 20:41	23	19:21 (1) | 19:28		| 18:16	16:15	15:53
17 | 05:04		20:32 (4) | 05:54		18:56 (1) | 06:48		| 07:41	07:40	08:23
| 21:32	22	20:54 (4) | 20:38	26	19:22 (1) | 19:26		| 18:14	16:14	15:53
18 | 05:05		20:33 (4) | 05:55		18:55 (1) | 06:49		| 07:43	07:42	08:24
| 21:31	21	20:54 (4) | 20:36	28	19:23 (1) | 19:23		| 18:11	16:12	15:53
19 | 05:07		20:33 (4) | 05:57		18:54 (1) | 06:51		| 07:45	07:44	08:25
| 21:30	20	20:53 (4) | 20:34	30	19:24 (1) | 19:21		| 18:09	16:11	15:54
20 | 05:08		19:57 (3) | 05:59		18:53 (1) | 06:53		| 07:47	07:45	08:25
| 21:29	28	20:52 (4) | 20:32	31	19:24 (1) | 19:18		| 18:07	16:10	15:54
21 | 05:09		19:56 (3) | 06:01		18:52 (1) | 06:55		| 07:49	07:47	08:26
| 21:27	29	20:52 (4) | 20:30	33	19:25 (1) | 19:16		| 18:05	16:08	15:54
22 | 05:11		19:54 (3) | 06:02		18:51 (1) | 06:56		| 07:51	07:49	08:26
| 21:26	32	20:51 (4) | 20:27	33	19:24 (1) | 19:13		| 18:03	16:07	15:55
23 | 05:12		19:53 (3) | 06:04		18:50 (1) | 06:58		| 07:53	07:51	08:27
| 21:24	32	20:51 (4) | 20:25	35	19:25 (1) | 19:11		| 18:00	16:06	15:55
24 | 05:14		19:52 (3) | 06:06		18:50 (1) | 07:00		| 07:54	07:53	08:27
| 21:23	31	20:49 (4) | 20:23	35	19:25 (1) | 19:08		| 17:58	16:05	15:56
25 | 05:15		19:51 (3) | 06:08		18:49 (1) | 07:02		| 06:56	07:54	08:28
| 21:21	28	20:46 (4) | 20:21	35	19:24 (1) | 19:06		| 16:56	16:04	15:57
26 | 05:17		19:51 (3) | 06:09		18:49 (1) | 07:03		| 06:58	07:56	08:28
| 21:20	23	20:14 (3) | 20:18	35	19:24 (1) | 19:04		| 16:54	16:03	15:57
27 | 05:18		19:49 (3) | 06:11		18:49 (1) | 07:05		| 07:00	07:58	08:28
| 21:18	25	20:14 (3) | 20:16	35	19:24 (1) | 19:01		| 16:52	16:02	15:58
28 | 05:20		19:49 (3) | 06:13		18:48 (1) | 07:07		| 07:02	07:59	08:28
| 21:17	26	20:15 (3) | 20:14	35	19:23 (1) | 18:59		| 16:50	16:01	15:59
29 | 05:22		19:48 (3) | 06:15		18:49 (1) | 07:09		| 07:04	08:01	08:29
| 21:15	27	20:15 (3) | 20:11	34	19:23 (1) | 18:56		| 16:48	16:00	16:00
30 | 05:23		19:49 (3) | 06:16		18:49 (1) | 07:11		| 07:06	08:02	08:29
| 21:13	27	20:16 (3) | 20:09	33	19:22 (1) | 18:54		| 16:46	15:59	16:01
31 | 05:25		19:48 (3) | 06:18		18:49 (1)		| 07:08		08:29
| 21:12	28	20:16 (3) | 20:07	32	19:21 (1)		| 16:44		16:02
Sonnenscheinstunden	510		459		382		329	260	235
astr.max.mögl.Beschattung		1085		915		139			
Red.Sonnenscheinwahrsch.		0.45		0.49		0.40			
Reduktion Betriebsdauer		0.91		0.91		0.91			
Reduktion Windrichtung		0.65		0.68		0.69			
Gesamte Reduktion		0.26		0.30		0.25			
Met.wahrsch.Beschattung		287		275		35			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BW - IO75

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März		April			Mai			Juni		
1	08:29	07:59		07:02		06:48			05:40		19:08 (1)	04:51		20:02 (3)
	16:03	16:54		17:49		19:46			20:41	30	19:38 (1)	21:30	29	20:53 (4)
2	08:28	07:57		07:00		06:46			05:38		19:08 (1)	04:50		20:05 (3)
	16:04	16:56		17:50		19:48			20:42	29	19:37 (1)	21:31	26	20:54 (4)
3	08:28	07:56		06:58		06:43			05:36		19:09 (1)	04:49		20:34 (4)
	16:05	16:58		17:52		19:50			20:44	27	19:36 (1)	21:32	21	20:55 (4)
4	08:28	07:54		06:55		06:41			05:34		19:11 (1)	04:49		20:34 (4)
	16:06	16:59		17:54		19:52			20:46	29	20:09 (3)	21:33	21	20:55 (4)
5	08:28	07:52		06:53		06:39			05:32		19:11 (1)	04:48		20:34 (4)
	16:08	17:01		17:56		19:53			20:48	36	20:13 (3)	21:34	22	20:56 (4)
6	08:27	07:50		06:51		06:36			05:30		19:12 (1)	04:47		20:34 (4)
	16:09	17:03		17:58		19:55			20:50	36	20:14 (3)	21:35	21	20:55 (4)
7	08:27	07:49		06:48		06:34			05:28		19:14 (1)	04:46		20:33 (4)
	16:10	17:05		18:00		19:57			20:51	36	20:15 (3)	21:36	22	20:55 (4)
8	08:26	07:47		06:46		06:31			05:26		19:15 (1)	04:46		20:34 (4)
	16:12	17:07		18:02		19:59			20:53	35	20:16 (3)	21:37	22	20:56 (4)
9	08:26	07:45		06:44		06:29			05:24		19:19 (1)	04:45		20:34 (4)
	16:13	17:09		18:04		20:01			20:55	31	20:18 (3)	21:38	23	20:57 (4)
10	08:25	07:43		06:41		06:27			05:22		19:54 (3)	04:45		20:34 (4)
	16:15	17:11		18:06		20:03			20:57	24	20:18 (3)	21:39	22	20:56 (4)
11	08:25	07:41		06:39		06:24			05:21		19:53 (3)	04:44		20:35 (4)
	16:16	17:13		18:08		20:04			20:58	25	20:18 (3)	21:40	22	20:57 (4)
12	08:24	07:39		06:37		06:22			05:19		19:53 (3)	04:44		20:35 (4)
	16:18	17:15		18:09		20:06			21:00	26	20:19 (3)	21:41	22	20:57 (4)
13	08:23	07:37		06:34		06:20			05:17		19:53 (3)	04:44		20:34 (4)
	16:19	17:17		18:11		20:08			21:02	26	20:19 (3)	21:41	23	20:57 (4)
14	08:22	07:35		06:32		06:17			05:15		19:53 (3)	04:43		20:35 (4)
	16:21	17:19		18:13		20:10			21:03	27	20:20 (3)	21:42	22	20:57 (4)
15	08:21	07:33		06:29		06:15		19:21 (1)	05:14		19:52 (3)	04:43		20:35 (4)
	16:22	17:21		18:15		20:12	11	19:32 (1)	21:05	27	20:19 (3)	21:43	22	20:57 (4)
16	08:20	07:31		06:27		06:13		19:18 (1)	05:12		19:53 (3)	04:43		20:35 (4)
	16:24	17:23		18:17		20:14	17	19:35 (1)	21:07	27	20:20 (3)	21:43	23	20:58 (4)
17	08:19	07:29		06:25		06:10		19:15 (1)	05:10		19:52 (3)	04:43		20:36 (4)
	16:26	17:25		18:19		20:15	21	19:36 (1)	21:08	27	20:19 (3)	21:44	22	20:58 (4)
18	08:18	07:27		06:22		06:08		19:13 (1)	05:09		19:53 (3)	04:43		20:36 (4)
	16:28	17:27		18:21		20:17	24	19:37 (1)	21:10	27	20:20 (3)	21:44	22	20:58 (4)
19	08:17	07:25		06:20		06:06		19:12 (1)	05:07		19:53 (3)	04:43		20:36 (4)
	16:29	17:29		18:22		20:19	26	19:38 (1)	21:11	26	20:19 (3)	21:44	22	20:58 (4)
20	08:16	07:22		06:17		06:04		19:11 (1)	05:06		19:53 (3)	04:43		20:36 (4)
	16:31	17:31		18:24		20:21	28	19:39 (1)	21:13	26	20:19 (3)	21:45	22	20:58 (4)
21	08:15	07:20		06:15		06:01		19:10 (1)	05:04		19:54 (3)	04:43		20:36 (4)
	16:33	17:33		18:26		20:23	30	19:40 (1)	21:15	25	20:19 (3)	21:45	22	20:58 (4)
22	08:14	07:18		06:12		05:59		19:09 (1)	05:03		19:53 (3)	04:43		20:37 (4)
	16:35	17:35		18:28		20:24	30	19:39 (1)	21:16	25	20:18 (3)	21:45	22	20:59 (4)
23	08:12	07:16		06:10		05:57		19:08 (1)	05:02		19:54 (3)	04:43		20:37 (4)
	16:36	17:37		18:30		20:26	32	19:40 (1)	21:18	24	20:18 (3)	21:45	22	20:59 (4)
24	08:11	07:14		06:08		05:55		19:08 (1)	05:00		19:55 (3)	04:44		20:37 (4)
	16:38	17:39		18:32		20:28	32	19:40 (1)	21:19	38	20:45 (4)	21:45	22	20:59 (4)
25	08:10	07:11		06:05		05:52		19:07 (1)	04:59		19:56 (3)	04:44		20:38 (4)
	16:40	17:41		18:33		20:30	33	19:40 (1)	21:21	31	20:47 (4)	21:46	22	21:00 (4)
26	08:08	07:09		06:03		05:50		19:07 (1)	04:58		19:56 (3)	04:44		20:37 (4)
	16:42	17:43		18:35		20:32	33	19:40 (1)	21:22	33	20:49 (4)	21:45	23	21:00 (4)
27	08:07	07:07		06:00		05:48		19:07 (1)	04:56		19:57 (3)	04:45		20:38 (4)
	16:44	17:45		18:37		20:33	33	19:40 (1)	21:23	34	20:50 (4)	21:45	23	21:01 (4)
28	08:05	07:05		05:58		05:46		19:07 (1)	04:55		19:58 (3)	04:45		20:38 (4)
	16:46	17:47		18:39		20:35	33	19:40 (1)	21:25	34	20:51 (4)	21:45	22	21:00 (4)
29	08:04			06:55		05:44		19:07 (1)	04:54		19:59 (3)	04:46		20:39 (4)
	16:48			19:41		20:37	32	19:39 (1)	21:26	33	20:52 (4)	21:45	22	21:01 (4)
30	08:02			06:53		05:42		19:08 (1)	04:53		20:00 (3)	04:47		20:38 (4)
	16:50			19:43		20:39	31	19:39 (1)	21:27	33	20:53 (4)	21:45	23	21:01 (4)
31	08:01			06:51					04:52		20:01 (3)			
	16:52			19:44					21:29	31	20:53 (4)			
Sonnenscheinstunden		252	274	367		419			492			508		
astr.max.mögl.Beschattung							446			908			674	
Red.Sonnenscheinwahrsch.							0.41			0.51			0.45	
Reduktion Betriebsdauer							0.91			0.91			0.91	
Reduktion Windrichtung							0.67			0.66			0.64	
Gesamte Reduktion							0.25			0.31			0.27	
Met.wahrsch.Beschattung							112			280			179	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BW - IO75

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		Septembe	Oktober	November	Dezember
1	04:47		20:39 (4) | 05:26		20:04 (3) | 06:20	07:12	07:10	08:04
	21:45	22	21:01 (4) | 21:10	25	20:29 (3) | 20:04	18:51	16:42	15:58
2	04:48		20:39 (4) | 05:28		20:04 (3) | 06:22	07:14	07:12	08:05
	21:44	23	21:02 (4) | 21:08	24	20:28 (3) | 20:02	18:49	16:40	15:57
3	04:49		20:39 (4) | 05:30		20:05 (3) | 06:23	07:16	07:14	08:07
	21:44	22	21:01 (4) | 21:06	23	20:28 (3) | 20:00	18:47	16:38	15:57
4	04:50		20:39 (4) | 05:31		19:27 (1) | 06:25	07:18	07:15	08:08
	21:43	22	21:01 (4) | 21:05	33	20:27 (3) | 19:57	18:44	16:36	15:56
5	04:50		20:40 (4) | 05:33		19:25 (1) | 06:27	07:19	07:17	08:10
	21:43	22	21:02 (4) | 21:03	35	20:26 (3) | 19:55	18:42	16:34	15:55
6	04:51		20:40 (4) | 05:35		19:22 (1) | 06:29	07:21	07:19	08:11
	21:42	22	21:02 (4) | 21:01	37	20:24 (3) | 19:52	18:39	16:32	15:55
7	04:52		20:40 (4) | 05:36		19:21 (1) | 06:30	07:23	07:21	08:12
	21:42	22	21:02 (4) | 20:59	36	20:23 (3) | 19:50	18:37	16:30	15:54
8	04:53		20:41 (4) | 05:38		19:20 (1) | 06:32	07:25	07:23	08:14
	21:41	21	21:02 (4) | 20:57	35	20:21 (3) | 19:48	18:35	16:28	15:54
9	04:54		20:41 (4) | 05:40		19:19 (1) | 06:34	07:27	07:25	08:15
	21:40	21	21:02 (4) | 20:55	26	19:45 (1) | 19:45	18:32	16:27	15:54
10	04:55		20:14 (3) | 05:42		19:18 (1) | 06:36	07:29	07:27	08:16
	21:39	23	21:02 (4) | 20:53	28	19:46 (1) | 19:43	18:30	16:25	15:53
11	04:56		20:11 (3) | 05:43		19:17 (1) | 06:37	07:30	07:29	08:17
	21:38	29	21:02 (4) | 20:51	29	19:46 (1) | 19:40	18:28	16:23	15:53
12	04:58		20:10 (3) | 05:45		19:16 (1) | 06:39	07:32	07:31	08:18
	21:38	31	21:02 (4) | 20:49	31	19:47 (1) | 19:38	18:25	16:22	15:53
13	04:59		20:09 (3) | 05:47		19:16 (1) | 06:41	07:34	07:33	08:19
	21:37	31	21:01 (4) | 20:47	31	19:47 (1) | 19:35	18:23	16:20	15:53
14	05:00		20:08 (3) | 05:49		19:15 (1) | 06:42	07:36	07:34	08:20
	21:36	33	21:01 (4) | 20:45	32	19:47 (1) | 19:33	18:21	16:18	15:53
15	05:01		20:07 (3) | 05:50		19:15 (1) | 06:44	07:38	07:36	08:21
	21:34	33	21:00 (4) | 20:43	32	19:47 (1) | 19:30	18:18	16:17	15:53
16	05:03		20:06 (3) | 05:52		19:15 (1) | 06:46	07:40	07:38	08:22
	21:33	34	20:59 (4) | 20:41	32	19:47 (1) | 19:28	18:16	16:15	15:53
17	05:04		20:06 (3) | 05:54		19:14 (1) | 06:48	07:41	07:40	08:23
	21:32	33	20:59 (4) | 20:38	33	19:47 (1) | 19:26	18:14	16:14	15:53
18	05:05		20:05 (3) | 05:55		19:14 (1) | 06:49	07:43	07:42	08:24
	21:31	33	20:58 (4) | 20:36	33	19:47 (1) | 19:23	18:11	16:12	15:53
19	05:07		20:05 (3) | 05:57		19:14 (1) | 06:51	07:45	07:44	08:25
	21:30	30	20:56 (4) | 20:34	33	19:47 (1) | 19:21	18:09	16:11	15:54
20	05:08		20:04 (3) | 05:59		19:14 (1) | 06:53	07:47	07:45	08:25
	21:29	23	20:27 (3) | 20:32	31	19:45 (1) | 19:18	18:07	16:10	15:54
21	05:09		20:04 (3) | 06:01		19:14 (1) | 06:55	07:49	07:47	08:26
	21:27	25	20:29 (3) | 20:30	31	19:45 (1) | 19:16	18:05	16:08	15:54
22	05:11		20:04 (3) | 06:02		19:14 (1) | 06:56	07:51	07:49	08:26
	21:26	25	20:29 (3) | 20:27	30	19:44 (1) | 19:13	18:03	16:07	15:55
23	05:12		20:04 (3) | 06:04		19:15 (1) | 06:58	07:53	07:51	08:27
	21:24	26	20:30 (3) | 20:25	28	19:43 (1) | 19:11	18:00	16:06	15:55
24	05:14		20:03 (3) | 06:06		19:16 (1) | 07:00	07:54	07:53	08:27
	21:23	27	20:30 (3) | 20:23	26	19:42 (1) | 19:08	17:58	16:05	15:56
25	05:15		20:03 (3) | 06:08		19:16 (1) | 07:02	06:56	07:54	08:28
	21:21	26	20:29 (3) | 20:21	24	19:40 (1) | 19:06	16:56	16:04	15:57
26	05:17		20:03 (3) | 06:09		19:18 (1) | 07:03	06:58	07:56	08:28
	21:20	27	20:30 (3) | 20:18	20	19:38 (1) | 19:04	16:54	16:03	15:57
27	05:18		20:03 (3) | 06:11		19:20 (1) | 07:05	07:00	07:58	08:28
	21:18	27	20:30 (3) | 20:16	16	19:36 (1) | 19:01	16:52	16:02	15:58
28	05:20		20:03 (3) | 06:13		19:22 (1) | 07:07	07:02	07:59	08:28
	21:17	27	20:30 (3) | 20:14	10	19:32 (1) | 18:59	16:50	16:01	15:59
29	05:22		20:03 (3) | 06:15			07:09	07:04	08:01	08:29
	21:15	27	20:30 (3) | 20:11			18:56	16:48	16:00	16:00
30	05:23		20:04 (3) | 06:16			07:11	07:06	08:02	08:29
	21:13	26	20:30 (3) | 20:09			18:54	16:46	15:59	16:01
31	05:25		20:03 (3) | 06:18				07:08		08:29
	21:12	26	20:29 (3) | 20:07				16:44		16:02
Sonnenscheinstunden	510		459		382	329	260	235	
astr.max.mögl.Beschattung		819		804					
Red.Sonnenscheinwahrsch.		0.45		0.49					
Reduktion Betriebsdauer		0.91		0.91					
Reduktion Windrichtung		0.65		0.67					
Gesamte Reduktion		0.26		0.30					
Met.wahrsch.Beschattung		217		238					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BX - IO76

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April			Mai			Juni		
1	08:29	07:59	07:02	06:48			05:40		19:06 (1)	04:51		20:28 (4)
	16:03	16:54	17:49	19:46			20:41	27	20:03 (3)	21:30	22	20:50 (4)
2	08:28	07:57	07:00	06:46			05:38		19:07 (1)	04:50		20:29 (4)
	16:04	16:56	17:50	19:48			20:42	32	20:07 (3)	21:31	22	20:51 (4)
3	08:28	07:56	06:58	06:43			05:36		19:08 (1)	04:49		20:29 (4)
	16:05	16:58	17:52	19:50			20:44	33	20:09 (3)	21:32	22	20:51 (4)
4	08:28	07:54	06:55	06:41			05:34		19:11 (1)	04:49		20:21 (2)
	16:06	16:59	17:54	19:52			20:46	32	20:11 (3)	21:33	30	20:51 (4)
5	08:28	07:52	06:53	06:39			05:32		19:16 (1)	04:48		20:20 (2)
	16:08	17:01	17:56	19:53			20:48	24	20:12 (3)	21:34	32	20:52 (4)
6	08:27	07:50	06:51	06:36			05:30		19:50 (3)	04:47		20:18 (2)
	16:09	17:03	17:58	19:55			20:50	22	20:12 (3)	21:35	33	20:51 (4)
7	08:27	07:49	06:48	06:34			05:28		19:49 (3)	04:46		20:17 (2)
	16:10	17:05	18:00	19:57			20:51	24	20:13 (3)	21:36	34	20:51 (4)
8	08:26	07:47	06:46	06:31			05:26		19:48 (3)	04:46		20:17 (2)
	16:12	17:07	18:02	19:59			20:53	25	20:13 (3)	21:37	35	20:52 (4)
9	08:26	07:45	06:44	06:29			05:24		19:48 (3)	04:45		20:17 (2)
	16:13	17:09	18:04	20:01			20:55	26	20:14 (3)	21:38	35	20:52 (4)
10	08:25	07:43	06:41	06:27			05:22		19:48 (3)	04:45		20:15 (2)
	16:15	17:11	18:06	20:03			20:57	26	20:14 (3)	21:39	37	20:52 (4)
11	08:25	07:41	06:39	06:24			05:21		19:47 (3)	04:44		20:15 (2)
	16:16	17:13	18:08	20:04			20:58	27	20:14 (3)	21:40	37	20:52 (4)
12	08:24	07:39	06:37	06:22		19:16 (1)	05:19		19:48 (3)	04:44		20:15 (2)
	16:18	17:15	18:09	20:06	11	19:27 (1)	21:00	26	20:14 (3)	21:41	38	20:53 (4)
13	08:23	07:37	06:34	06:20		19:12 (1)	05:17		19:47 (3)	04:44		20:14 (2)
	16:19	17:17	18:11	20:08	17	19:29 (1)	21:02	27	20:14 (3)	21:41	38	20:52 (4)
14	08:22	07:35	06:32	06:17		19:10 (1)	05:15		19:48 (3)	04:43		20:14 (2)
	16:21	17:19	18:13	20:10	21	19:31 (1)	21:03	26	20:14 (3)	21:42	38	20:52 (4)
15	08:21	07:33	06:29	06:15		19:08 (1)	05:14		19:48 (3)	04:43		20:14 (2)
	16:22	17:21	18:15	20:12	25	19:33 (1)	21:05	26	20:14 (3)	21:43	39	20:53 (4)
16	08:20	07:31	06:27	06:13		19:07 (1)	05:12		19:48 (3)	04:43		20:14 (2)
	16:24	17:23	18:17	20:14	27	19:34 (1)	21:07	26	20:14 (3)	21:43	39	20:53 (4)
17	08:19	07:29	06:25	06:10		19:05 (1)	05:10		19:48 (3)	04:43		20:15 (2)
	16:26	17:25	18:19	20:15	29	19:34 (1)	21:08	25	20:13 (3)	21:44	38	20:53 (4)
18	08:18	07:27	06:22	06:08		19:05 (1)	05:09		19:49 (3)	04:43		20:15 (2)
	16:28	17:27	18:21	20:17	29	19:34 (1)	21:10	24	20:13 (3)	21:44	38	20:53 (4)
19	08:17	07:25	06:20	06:06		19:04 (1)	05:07		19:49 (3)	04:43		20:15 (2)
	16:29	17:29	18:22	20:19	31	19:35 (1)	21:11	23	20:12 (3)	21:44	38	20:53 (4)
20	08:16	07:22	06:17	06:04		19:04 (1)	05:06		19:50 (3)	04:43		20:15 (2)
	16:31	17:31	18:24	20:21	31	19:35 (1)	21:13	22	20:12 (3)	21:45	38	20:53 (4)
21	08:15	07:20	06:15	06:01		19:03 (1)	05:04		19:51 (3)	04:43		20:15 (2)
	16:33	17:33	18:26	20:23	32	19:35 (1)	21:15	28	20:42 (4)	21:45	38	20:53 (4)
22	08:14	07:18	06:12	05:59		19:02 (1)	05:03		19:51 (3)	04:43		20:16 (2)
	16:35	17:35	18:28	20:24	32	19:34 (1)	21:16	30	20:43 (4)	21:45	38	20:54 (4)
23	08:12	07:16	06:10	05:57		19:02 (1)	05:02		19:52 (3)	04:43		20:16 (2)
	16:36	17:37	18:30	20:26	32	19:34 (1)	21:18	32	20:45 (4)	21:45	38	20:54 (4)
24	08:11	07:14	06:08	05:55		19:02 (1)	05:00		19:53 (3)	04:44		20:16 (2)
	16:38	17:39	18:32	20:28	32	19:34 (1)	21:19	32	20:46 (4)	21:45	38	20:54 (4)
25	08:10	07:11	06:05	05:52		19:02 (1)	04:59		19:55 (3)	04:44		20:17 (2)
	16:40	17:41	18:33	20:30	32	19:34 (1)	21:21	30	20:47 (4)	21:46	38	20:55 (4)
26	08:08	07:09	06:03	05:50		19:02 (1)	04:58		19:56 (3)	04:44		20:16 (2)
	16:42	17:43	18:35	20:32	31	19:33 (1)	21:22	29	20:48 (4)	21:45	39	20:55 (4)
27	08:07	07:07	06:00	05:48		19:03 (1)	04:56		19:59 (3)	04:45		20:17 (2)
	16:44	17:45	18:37	20:33	30	19:33 (1)	21:23	25	20:48 (4)	21:45	39	20:56 (4)
28	08:05	07:05	05:58	05:46		19:03 (1)	04:55		20:29 (4)	04:45		20:17 (2)
	16:46	17:47	18:39	20:35	29	19:32 (1)	21:25	20	20:49 (4)	21:45	38	20:55 (4)
29	08:04		06:55	05:44		19:04 (1)	04:54		20:29 (4)	04:46		20:18 (2)
	16:48		19:41	20:37	27	19:31 (1)	21:26	20	20:49 (4)	21:45	38	20:56 (4)
30	08:02		06:53	05:42		19:05 (1)	04:53		20:28 (4)	04:47		20:18 (2)
	16:50		19:43	20:39	25	19:30 (1)	21:27	22	20:50 (4)	21:45	38	20:56 (4)
31	08:01		06:51				04:52		20:28 (4)			
	16:52		19:44				21:29	22	20:50 (4)			
Sonnenscheinstunden	252	274	367	419			492			508		
astr.max.mögl.Beschattung					523			813			1065	
Red.Sonnenscheinwahrsch.					0.41			0.51			0.45	
Reduktion Betriebsdauer					0.91			0.91			0.91	
Reduktion Windrichtung					0.68			0.66			0.64	
Gesamte Reduktion					0.25			0.31			0.27	
Met.wahrsch.Beschattung					133			250			284	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BX - IO76

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September	Oktober	November	Dezember
1	04:47		20:19 (2) / 05:26		19:58 (3) / 06:20	07:12	07:10	08:04
	21:45	37	20:56 (4) / 21:10	27	20:25 (3) / 20:04	18:51	16:42	15:58
2	04:48		20:20 (2) / 05:28		19:58 (3) / 06:22	07:14	07:12	08:05
	21:44	37	20:57 (4) / 21:08	26	20:24 (3) / 20:02	18:49	16:40	15:57
3	04:49		20:20 (2) / 05:30		19:58 (3) / 06:23	07:16	07:14	08:07
	21:44	36	20:56 (4) / 21:06	26	20:24 (3) / 20:00	18:47	16:38	15:57
4	04:50		20:22 (2) / 05:31		19:58 (3) / 06:25	07:18	07:15	08:08
	21:43	35	20:57 (4) / 21:05	25	20:23 (3) / 19:57	18:44	16:36	15:56
5	04:50		20:23 (2) / 05:33		19:59 (3) / 06:27	07:19	07:17	08:10
	21:43	34	20:57 (4) / 21:03	24	20:23 (3) / 19:55	18:42	16:34	15:55
6	04:51		20:24 (2) / 05:35		19:59 (3) / 06:29	07:21	07:19	08:11
	21:42	34	20:58 (4) / 21:01	23	20:22 (3) / 19:52	18:39	16:32	15:55
7	04:52		20:26 (2) / 05:36		20:00 (3) / 06:30	07:23	07:21	08:12
	21:42	32	20:58 (4) / 20:59	22	20:22 (3) / 19:50	18:37	16:30	15:54
8	04:53		20:28 (2) / 05:38		19:23 (1) / 06:32	07:25	07:23	08:14
	21:41	30	20:58 (4) / 20:57	27	20:21 (3) / 19:48	18:35	16:28	15:54
9	04:54		20:31 (2) / 05:40		19:19 (1) / 06:34	07:27	07:25	08:15
	21:40	27	20:58 (4) / 20:55	32	20:19 (3) / 19:45	18:32	16:27	15:54
10	04:55		20:36 (4) / 05:42		19:17 (1) / 06:36	07:29	07:27	08:16
	21:39	22	20:58 (4) / 20:53	33	20:18 (3) / 19:43	18:30	16:25	15:53
11	04:56		20:36 (4) / 05:43		19:15 (1) / 06:37	07:30	07:29	08:17
	21:38	22	20:58 (4) / 20:51	31	20:15 (3) / 19:40	18:28	16:23	15:53
12	04:58		20:37 (4) / 05:45		19:14 (1) / 06:39	07:32	07:31	08:18
	21:38	21	20:58 (4) / 20:49	24	19:38 (1) / 19:38	16:25	16:22	15:53
13	04:59		20:37 (4) / 05:47		19:13 (1) / 06:41	07:34	07:33	08:19
	21:37	21	20:58 (4) / 20:47	26	19:39 (1) / 19:35	18:23	16:20	15:53
14	05:00		20:37 (4) / 05:49		19:11 (1) / 06:42	07:36	07:34	08:20
	21:36	21	20:58 (4) / 20:45	28	19:39 (1) / 19:33	18:21	16:18	15:53
15	05:01		20:37 (4) / 05:50		19:11 (1) / 06:44	07:38	07:36	08:21
	21:34	21	20:58 (4) / 20:43	29	19:40 (1) / 19:30	18:18	16:17	15:53
16	05:03		20:38 (4) / 05:52		19:10 (1) / 06:46	07:40	07:38	08:22
	21:33	19	20:57 (4) / 20:41	30	19:40 (1) / 19:28	18:16	16:15	15:53
17	05:04		20:07 (3) / 05:54		19:09 (1) / 06:48	07:41	07:40	08:23
	21:32	27	20:58 (4) / 20:38	31	19:40 (1) / 19:26	18:14	16:14	15:53
18	05:05		20:05 (3) / 05:55		19:09 (1) / 06:49	07:43	07:42	08:24
	21:31	30	20:57 (4) / 20:36	31	19:40 (1) / 19:23	18:11	16:12	15:53
19	05:07		20:03 (3) / 05:57		19:09 (1) / 06:51	07:45	07:44	08:25
	21:30	31	20:56 (4) / 20:34	32	19:41 (1) / 19:21	18:09	16:11	15:54
20	05:08		20:02 (3) / 05:59		19:08 (1) / 06:53	07:47	07:45	08:25
	21:29	32	20:55 (4) / 20:32	32	19:40 (1) / 19:18	18:07	16:10	15:54
21	05:09		20:02 (3) / 06:01		19:08 (1) / 06:55	07:49	07:47	08:26
	21:27	31	20:54 (4) / 20:30	32	19:40 (1) / 19:16	18:05	16:08	15:54
22	05:11		20:01 (3) / 06:02		19:07 (1) / 06:56	07:51	07:49	08:26
	21:26	30	20:53 (4) / 20:27	32	19:39 (1) / 19:13	18:03	16:07	15:55
23	05:12		20:01 (3) / 06:04		19:07 (1) / 06:58	07:53	07:51	08:27
	21:24	26	20:51 (4) / 20:25	32	19:39 (1) / 19:11	18:00	16:06	15:55
24	05:14		20:00 (3) / 06:06		19:08 (1) / 07:00	07:54	07:53	08:27
	21:23	23	20:23 (3) / 20:23	30	19:38 (1) / 19:08	17:58	16:05	15:56
25	05:15		19:59 (3) / 06:08		19:07 (1) / 07:02	06:56	07:54	08:28
	21:21	24	20:23 (3) / 20:21	30	19:37 (1) / 19:06	16:56	16:04	15:57
26	05:17		19:59 (3) / 06:09		19:08 (1) / 07:03	06:58	07:56	08:28
	21:20	25	20:24 (3) / 20:18	28	19:36 (1) / 19:04	16:54	16:03	15:57
27	05:18		19:58 (3) / 06:11		19:09 (1) / 07:05	07:00	07:58	08:28
	21:18	26	20:24 (3) / 20:16	27	19:36 (1) / 19:01	16:52	16:02	15:58
28	05:20		19:59 (3) / 06:13		19:09 (1) / 07:07	07:02	07:59	08:28
	21:17	26	20:25 (3) / 20:14	24	19:33 (1) / 18:59	16:50	16:01	15:59
29	05:22		19:58 (3) / 06:15		19:11 (1) / 07:09	07:04	08:01	08:29
	21:15	26	20:24 (3) / 20:11	21	19:32 (1) / 18:56	16:48	16:00	16:00
30	05:23		19:58 (3) / 06:16		19:13 (1) / 07:11	07:06	08:02	08:29
	21:13	27	20:25 (3) / 20:09	17	19:30 (1) / 18:54	16:46	15:59	16:01
31	05:25		19:58 (3) / 06:18		19:15 (1)	07:08		08:29
	21:12	26	20:24 (3) / 20:07	11	19:26 (1)	16:44		16:02
Sonnenscheinstunden	510		459		382	329	260	235
astr.max.mögl.Beschattung		859		843				
Red.Sonnenscheinwahrsch.		0.45		0.49				
Reduktion Betriebsdauer		0.91		0.91				
Reduktion Windrichtung		0.65		0.67				
Gesamte Reduktion		0.26		0.30				
Met.wahrsch.Beschattung		227		251				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BY - IO77

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März		April			Mai			Juni		
1	08:29	07:59		07:02		06:48			05:40		19:13 (1)	04:51		20:32 (4)
	16:03	16:54		17:49		19:46			20:41	27	19:40 (1)	21:30	20	20:52 (4)
2	08:28	07:57		07:00		06:46			05:38		19:14 (1)	04:50		20:33 (4)
	16:04	16:56		17:50		19:48			20:42	25	19:39 (1)	21:31	20	20:53 (4)
3	08:28	07:56		06:58		06:43			05:36		19:15 (1)	04:49		20:32 (4)
	16:05	16:58		17:52		19:50			20:44	23	19:38 (1)	21:32	21	20:53 (4)
4	08:28	07:54		06:55		06:41			05:34		19:16 (1)	04:49		20:32 (4)
	16:06	16:59		17:54		19:52			20:46	33	20:13 (3)	21:33	21	20:53 (4)
5	08:28	07:52		06:53		06:39			05:32		19:17 (1)	04:48		20:33 (4)
	16:08	17:01		17:56		19:53			20:48	35	20:15 (3)	21:34	21	20:54 (4)
6	08:27	07:50		06:51		06:36			05:30		19:19 (1)	04:47		20:30 (2)
	16:09	17:03		17:58		19:55			20:50	34	20:16 (3)	21:35	24	20:54 (4)
7	08:27	07:49		06:48		06:34			05:28		19:21 (1)	04:46		20:28 (2)
	16:10	17:05		18:00		19:57			20:51	30	20:16 (3)	21:36	25	20:53 (4)
8	08:26	07:47		06:46		06:31			05:26		19:56 (3)	04:46		20:27 (2)
	16:12	17:07		18:02		19:59			20:53	21	20:17 (3)	21:37	27	20:54 (4)
9	08:26	07:45		06:44		06:29			05:24		19:56 (3)	04:45		20:27 (2)
	16:13	17:09		18:04		20:01			20:55	22	20:18 (3)	21:38	28	20:55 (4)
10	08:25	07:43		06:41		06:27			05:22		19:55 (3)	04:45		20:26 (2)
	16:15	17:11		18:06		20:03			20:57	23	20:18 (3)	21:39	28	20:54 (4)
11	08:25	07:41		06:39		06:24			05:21		19:54 (3)	04:44		20:25 (2)
	16:16	17:13		18:08		20:04			20:58	24	20:18 (3)	21:40	30	20:55 (4)
12	08:24	07:39		06:37		06:22			05:19		19:54 (3)	04:44		20:25 (2)
	16:18	17:15		18:09		20:06			21:00	25	20:19 (3)	21:41	30	20:55 (4)
13	08:23	07:37		06:34		06:20			05:17		19:54 (3)	04:44		20:24 (2)
	16:19	17:17		18:11		20:08			21:02	25	20:19 (3)	21:41	30	20:54 (4)
14	08:22	07:35		06:32		06:17			05:15		19:54 (3)	04:43		20:24 (2)
	16:21	17:19		18:13		20:10			21:03	25	20:19 (3)	21:42	31	20:55 (4)
15	08:21	07:33		06:29		06:15		19:29 (1)	05:14		19:54 (3)	04:43		20:24 (2)
	16:22	17:21		18:15		20:12	3	19:32 (1)	21:05	25	20:19 (3)	21:43	31	20:55 (4)
16	08:20	07:31		06:27		06:13		19:24 (1)	05:12		19:54 (3)	04:43		20:24 (2)
	16:24	17:23		18:17		20:13	13	19:37 (1)	21:07	25	20:19 (3)	21:43	31	20:55 (4)
17	08:19	07:29		06:25		06:10		19:20 (1)	05:10		19:54 (3)	04:43		20:24 (2)
	16:26	17:25		18:19		20:15	18	19:38 (1)	21:08	25	20:19 (3)	21:44	31	20:55 (4)
18	08:18	07:27		06:22		06:08		19:19 (1)	05:09		19:55 (3)	04:43		20:24 (2)
	16:28	17:27		18:21		20:17	21	19:40 (1)	21:10	24	20:19 (3)	21:44	32	20:56 (4)
19	08:17	07:25		06:20		06:06		19:17 (1)	05:07		19:54 (3)	04:43		20:24 (2)
	16:29	17:29		18:22		20:19	24	19:41 (1)	21:11	24	20:18 (3)	21:44	32	20:56 (4)
20	08:16	07:22		06:17		06:04		19:16 (1)	05:06		19:55 (3)	04:43		20:24 (2)
	16:31	17:31		18:24		20:21	26	19:42 (1)	21:13	23	20:18 (3)	21:45	32	20:56 (4)
21	08:15	07:20		06:15		06:01		19:15 (1)	05:04		19:56 (3)	04:43		20:24 (2)
	16:33	17:33		18:26		20:23	28	19:43 (1)	21:15	22	20:18 (3)	21:45	32	20:56 (4)
22	08:14	07:18		06:12		05:59		19:14 (1)	05:03		19:56 (3)	04:43		20:25 (2)
	16:35	17:35		18:28		20:24	28	19:42 (1)	21:16	27	20:43 (4)	21:45	32	20:57 (4)
23	08:12	07:16		06:10		05:57		19:13 (1)	05:02		19:57 (3)	04:43		20:25 (2)
	16:36	17:37		18:30		20:26	30	19:43 (1)	21:18	28	20:45 (4)	21:45	32	20:57 (4)
24	08:11	07:14		06:08		05:55		19:13 (1)	05:00		19:58 (3)	04:44		20:25 (2)
	16:38	17:39		18:32		20:28	30	19:43 (1)	21:19	29	20:46 (4)	21:45	32	20:57 (4)
25	08:10	07:11		06:05		05:52		19:13 (1)	04:59		19:59 (3)	04:44		20:26 (2)
	16:40	17:41		18:33		20:30	30	19:43 (1)	21:21	29	20:47 (4)	21:46	32	20:58 (4)
26	08:08	07:09		06:03		05:50		19:12 (1)	04:58		20:00 (3)	04:44		20:26 (2)
	16:42	17:43		18:35		20:32	31	19:43 (1)	21:22	29	20:49 (4)	21:45	31	20:57 (4)
27	08:07	07:07		06:00		05:48		19:12 (1)	04:56		20:01 (3)	04:45		20:27 (2)
	16:44	17:45		18:37		20:33	31	19:43 (1)	21:23	29	20:50 (4)	21:45	31	20:58 (4)
28	08:05	07:05		05:58		05:46		19:13 (1)	04:55		20:03 (3)	04:45		20:27 (2)
	16:46	17:47		18:39		20:35	29	19:42 (1)	21:25	27	20:51 (4)	21:45	31	20:58 (4)
29	08:04			06:55		05:44		19:13 (1)	04:54		20:06 (3)	04:46		20:28 (2)
	16:48			19:41		20:37	29	19:42 (1)	21:26	22	20:51 (4)	21:45	31	20:59 (4)
30	08:02			06:53		05:42		19:13 (1)	04:53		20:32 (4)	04:47		20:28 (2)
	16:50			19:43		20:39	28	19:41 (1)	21:27	20	20:52 (4)	21:45	30	20:58 (4)
31	08:01			06:51					04:52		20:32 (4)			
	16:52			19:44					21:29	20	20:52 (4)			
Sonnenscheinstunden		252		274		367		419			492			508
astr.max.mögl.Beschattung								399			800			859
Red.Sonnenscheinwahrsch.								0.41			0.51			0.45
Reduktion Betriebsdauer								0.91			0.91			0.91
Reduktion Windrichtung								0.67			0.66			0.64
Gesamte Reduktion								0.25			0.31			0.27
Met.wahrsch.Beschattung								100			246			228

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BY - IO77

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		Septembe	Oktober	November	Dezember
1	04:47		20:29 (2)	05:26		20:05 (3)	06:20	07:12	07:10	08:04
	21:45	30	20:59 (4)	21:10	24	20:29 (3)	20:04	18:51	16:42	15:58
2	04:48		20:30 (2)	05:28		20:05 (3)	06:22	07:14	07:12	08:05
	21:44	29	20:59 (4)	21:08	24	20:29 (3)	20:02	18:49	16:40	15:57
3	04:49		20:31 (2)	05:30		20:05 (3)	06:23	07:16	07:14	08:07
	21:44	28	20:59 (4)	21:06	24	20:29 (3)	20:00	18:47	16:38	15:57
4	04:50		20:32 (2)	05:31		20:05 (3)	06:25	07:18	07:15	08:08
	21:43	27	20:59 (4)	21:05	22	20:27 (3)	19:57	18:44	16:36	15:56
5	04:50		20:34 (2)	05:33		19:33 (1)	06:27	07:19	07:17	08:10
	21:43	26	21:00 (4)	21:03	28	20:27 (3)	19:55	18:42	16:34	15:55
6	04:51		20:36 (2)	05:35		19:29 (1)	06:29	07:21	07:19	08:11
	21:42	24	21:00 (4)	21:01	32	20:26 (3)	19:52	18:39	16:32	15:55
7	04:52		20:39 (4)	05:36		19:28 (1)	06:30	07:23	07:21	08:12
	21:42	21	21:00 (4)	20:59	34	20:25 (3)	19:50	18:37	16:30	15:54
8	04:53		20:39 (4)	05:38		19:26 (1)	06:32	07:25	07:23	08:14
	21:41	21	21:00 (4)	20:57	34	20:23 (3)	19:48	18:35	16:28	15:54
9	04:54		20:40 (4)	05:40		19:24 (1)	06:34	07:27	07:25	08:15
	21:40	21	21:01 (4)	20:55	31	20:20 (3)	19:45	18:32	16:27	15:54
10	04:55		20:40 (4)	05:42		19:24 (1)	06:36	07:29	07:27	08:16
	21:39	21	21:01 (4)	20:53	24	19:48 (1)	19:43	18:30	16:25	15:53
11	04:56		20:40 (4)	05:43		19:22 (1)	06:37	07:30	07:29	08:17
	21:38	21	21:01 (4)	20:51	26	19:48 (1)	19:40	18:28	16:23	15:53
12	04:58		20:40 (4)	05:45		19:22 (1)	06:39	07:32	07:31	08:18
	21:38	21	21:01 (4)	20:49	27	19:49 (1)	19:38	18:25	16:22	15:53
13	04:59		20:41 (4)	05:47		19:21 (1)	06:41	07:34	07:33	08:19
	21:37	19	21:00 (4)	20:47	29	19:50 (1)	19:35	18:23	16:20	15:53
14	05:00		20:41 (4)	05:49		19:20 (1)	06:42	07:36	07:34	08:20
	21:36	19	21:00 (4)	20:45	29	19:49 (1)	19:33	18:21	16:18	15:53
15	05:01		20:13 (3)	05:50		19:20 (1)	06:44	07:38	07:36	08:21
	21:34	25	21:00 (4)	20:43	30	19:50 (1)	19:30	18:18	16:17	15:53
16	05:03		20:11 (3)	05:52		19:20 (1)	06:46	07:40	07:38	08:22
	21:33	28	20:59 (4)	20:41	30	19:50 (1)	19:28	18:16	16:15	15:53
17	05:04		20:10 (3)	05:54		19:19 (1)	06:48	07:41	07:40	08:23
	21:32	29	20:59 (4)	20:38	30	19:49 (1)	19:26	18:14	16:14	15:53
18	05:05		20:09 (3)	05:55		19:19 (1)	06:49	07:43	07:42	08:24
	21:31	30	20:58 (4)	20:36	30	19:49 (1)	19:23	18:11	16:12	15:53
19	05:07		20:08 (3)	05:57		19:20 (1)	06:51	07:45	07:44	08:25
	21:30	29	20:56 (4)	20:34	29	19:49 (1)	19:21	18:09	16:11	15:54
20	05:08		20:07 (3)	05:59		19:19 (1)	06:53	07:47	07:45	08:25
	21:28	29	20:55 (4)	20:32	29	19:48 (1)	19:18	18:07	16:10	15:54
21	05:09		20:07 (3)	06:01		19:20 (1)	06:55	07:49	07:47	08:26
	21:27	27	20:54 (4)	20:30	28	19:48 (1)	19:16	18:05	16:08	15:54
22	05:11		20:06 (3)	06:02		19:19 (1)	06:56	07:51	07:49	08:26
	21:26	24	20:53 (4)	20:27	27	19:46 (1)	19:13	18:03	16:07	15:55
23	05:12		20:06 (3)	06:04		19:20 (1)	06:58	07:53	07:51	08:27
	21:24	22	20:28 (3)	20:25	26	19:46 (1)	19:11	18:00	16:06	15:55
24	05:14		20:05 (3)	06:06		19:21 (1)	07:00	07:54	07:53	08:27
	21:23	24	20:29 (3)	20:23	24	19:45 (1)	19:08	17:58	16:05	15:56
25	05:15		20:05 (3)	06:08		19:21 (1)	07:02	06:56	07:54	08:28
	21:21	24	20:29 (3)	20:21	22	19:43 (1)	19:06	16:56	16:04	15:57
26	05:17		20:05 (3)	06:09		19:23 (1)	07:03	06:58	07:56	08:28
	21:20	24	20:29 (3)	20:18	18	19:41 (1)	19:04	16:54	16:03	15:57
27	05:18		20:04 (3)	06:11		19:26 (1)	07:05	07:00	07:58	08:28
	21:18	25	20:29 (3)	20:16	13	19:39 (1)	19:01	16:52	16:02	15:58
28	05:20		20:05 (3)	06:13			07:07	07:02	07:59	08:28
	21:17	25	20:30 (3)	20:14			18:59	16:50	16:01	15:59
29	05:22		20:04 (3)	06:15			07:09	07:04	08:01	08:29
	21:15	25	20:29 (3)	20:11			18:56	16:48	16:00	16:00
30	05:23		20:05 (3)	06:16			07:11	07:06	08:02	08:29
	21:13	25	20:30 (3)	20:09			18:54	16:46	15:59	16:01
31	05:25		20:04 (3)	06:18				07:08		08:29
	21:12	25	20:29 (3)	20:07				16:44		16:02
Sonnenscheinstunden	510			459		382	329	260		235
astr.max.mögl.Beschattung		768			724					
Red.Sonnenscheinwahrsch.		0.45			0.49					
Reduktion Betriebsdauer		0.91			0.91					
Reduktion Windrichtung		0.65			0.67					
Gesamte Reduktion		0.26			0.30					
Met.wahrsch.Beschattung		203			214					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BZ - IO78

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März		April			Mai			Juni		
1	08:29	07:59		07:02		06:48			05:40		19:11 (1)	04:51		20:13 (2)
	16:03	16:54		17:49		19:46			20:41	30	20:07 (3)	21:30	35	20:48 (4)
2	08:28	07:57		07:00		06:46			05:38		19:12 (1)	04:50		20:13 (2)
	16:04	16:56		17:50		19:48			20:42	31	20:09 (3)	21:31	36	20:49 (4)
3	08:28	07:56		06:58		06:43			05:36		19:14 (1)	04:49		20:12 (2)
	16:05	16:58		17:52		19:50			20:44	29	20:10 (3)	21:32	37	20:49 (4)
4	08:28	07:54		06:55		06:41			05:34		19:52 (3)	04:49		20:11 (2)
	16:06	16:59		17:54		19:52			20:46	20	20:12 (3)	21:33	38	20:49 (4)
5	08:28	07:52		06:53		06:39			05:32		19:51 (3)	04:48		20:11 (2)
	16:08	17:01		17:56		19:53			20:48	21	20:12 (3)	21:34	38	20:49 (4)
6	08:27	07:50		06:51		06:36			05:30		19:50 (3)	04:47		20:10 (2)
	16:09	17:03		17:58		19:55			20:50	23	20:13 (3)	21:35	39	20:49 (4)
7	08:27	07:49		06:48		06:34			05:28		19:49 (3)	04:46		20:09 (2)
	16:10	17:05		18:00		19:57			20:51	24	20:13 (3)	21:36	40	20:49 (4)
8	08:26	07:47		06:46		06:31			05:26		19:49 (3)	04:46		20:10 (2)
	16:12	17:07		18:02		19:59			20:53	24	20:13 (3)	21:37	39	20:49 (4)
9	08:26	07:45		06:44		06:29			05:24		19:49 (3)	04:45		20:10 (2)
	16:13	17:09		18:04		20:01			20:55	25	20:14 (3)	21:38	40	20:50 (4)
10	08:25	07:43		06:41		06:27			05:22		19:48 (3)	04:45		20:09 (2)
	16:15	17:11		18:06		20:03			20:57	26	20:14 (3)	21:39	40	20:49 (4)
11	08:25	07:41		06:39		06:24			05:21		19:48 (3)	04:44		20:09 (2)
	16:16	17:13		18:08		20:04			20:58	25	20:13 (3)	21:40	41	20:50 (4)
12	08:24	07:39		06:37		06:22		19:21 (1)	05:19		19:49 (3)	04:44		20:10 (2)
	16:18	17:15		18:09		20:06	8	19:29 (1)	21:00	25	20:14 (3)	21:41	40	20:50 (4)
13	08:23	07:37		06:34		06:20		19:16 (1)	05:17		19:48 (3)	04:44		20:09 (2)
	16:19	17:17		18:11		20:08	15	19:31 (1)	21:02	25	20:13 (3)	21:41	40	20:49 (4)
14	08:22	07:35		06:32		06:17		19:14 (1)	05:15		19:49 (3)	04:43		20:09 (2)
	16:21	17:19		18:13		20:10	19	19:33 (1)	21:03	25	20:14 (3)	21:42	40	20:49 (4)
15	08:21	07:33		06:29		06:15		19:12 (1)	05:14		19:49 (3)	04:43		20:09 (2)
	16:22	17:21		18:15		20:12	23	19:35 (1)	21:05	24	20:13 (3)	21:43	41	20:50 (4)
16	08:20	07:31		06:27		06:13		19:11 (1)	05:12		19:50 (3)	04:43		20:09 (2)
	16:24	17:23		18:17		20:13	25	19:36 (1)	21:07	23	20:13 (3)	21:43	41	20:50 (4)
17	08:19	07:29		06:25		06:10		19:09 (1)	05:10		19:50 (3)	04:43		20:10 (2)
	16:26	17:25		18:19		20:15	27	19:36 (1)	21:08	22	20:12 (3)	21:44	40	20:50 (4)
18	08:18	07:27		06:22		06:08		19:09 (1)	05:09		19:51 (3)	04:43		20:10 (2)
	16:28	17:27		18:21		20:17	28	19:37 (1)	21:10	21	20:12 (3)	21:44	40	20:50 (4)
19	08:17	07:25		06:20		06:06		19:08 (1)	05:07		19:51 (3)	04:43		20:10 (2)
	16:29	17:29		18:22		20:19	29	19:37 (1)	21:11	25	20:39 (4)	21:44	40	20:50 (4)
20	08:16	07:22		06:17		06:04		19:08 (1)	05:06		19:52 (3)	04:43		20:10 (2)
	16:31	17:31		18:24		20:21	29	19:37 (1)	21:13	28	20:41 (4)	21:45	40	20:50 (4)
21	08:15	07:20		06:15		06:01		19:07 (1)	05:04		19:54 (3)	04:43		20:10 (2)
	16:33	17:33		18:26		20:23	30	19:37 (1)	21:15	27	20:42 (4)	21:45	40	20:50 (4)
22	08:14	07:18		06:12		05:59		19:06 (1)	05:03		19:54 (3)	04:43		20:11 (2)
	16:35	17:35		18:28		20:24	30	19:36 (1)	21:16	27	20:43 (4)	21:45	40	20:51 (4)
23	08:12	07:16		06:10		05:57		19:06 (1)	05:02		19:56 (3)	04:43		20:11 (2)
	16:36	17:37		18:30		20:26	30	19:36 (1)	21:18	27	20:45 (4)	21:45	40	20:51 (4)
24	08:11	07:14		06:08		05:55		19:06 (1)	05:00		19:59 (3)	04:44		20:11 (2)
	16:38	17:39		18:32		20:28	30	19:36 (1)	21:19	23	20:46 (4)	21:45	40	20:51 (4)
25	08:10	07:11		06:05		05:52		19:06 (1)	04:59		20:28 (4)	04:44		20:12 (2)
	16:40	17:41		18:33		20:30	30	19:36 (1)	21:21	18	20:46 (4)	21:46	40	20:52 (4)
26	08:08	07:09		06:03		05:50		19:07 (1)	04:58		20:27 (4)	04:44		20:11 (2)
	16:42	17:43		18:35		20:32	28	19:35 (1)	21:22	20	20:47 (4)	21:45	41	20:52 (4)
27	08:07	07:07		06:00		05:48		19:07 (1)	04:56		20:27 (4)	04:45		20:12 (2)
	16:44	17:45		18:37		20:33	28	19:35 (1)	21:23	20	20:47 (4)	21:45	41	20:53 (4)
28	08:05	07:05		05:58		05:46		19:08 (1)	04:55		20:19 (2)	04:45		20:12 (2)
	16:46	17:47		18:39		20:35	26	19:34 (1)	21:25	29	20:48 (4)	21:45	41	20:53 (4)
29	08:04			06:55		05:44		19:08 (1)	04:54		20:17 (2)	04:46		20:13 (2)
	16:48			19:41		20:37	25	19:33 (1)	21:26	31	20:48 (4)	21:45	40	20:53 (4)
30	08:02			06:53		05:42		19:09 (1)	04:53		20:15 (2)	04:47		20:13 (2)
	16:50			19:43		20:39	22	19:31 (1)	21:27	33	20:48 (4)	21:45	40	20:53 (4)
31	08:01			06:51					04:52		20:14 (2)			
	16:52			19:44					21:29	34	20:48 (4)			
Sonnenscheinstunden	252	274		367		419			492			508		
astr.max.mögl.Beschattung						482				785			1188	
Red.Sonnenscheinwahrsch.						0.41				0.51			0.45	
Reduktion Betriebsdauer						0.91				0.91			0.91	
Reduktion Windrichtung						0.67				0.66			0.65	
Gesamte Reduktion						0.25				0.31			0.27	
Met.wahrsch.Beschattung						122				241			318	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** BZ - IO78

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		Septembe	Oktober	November	Dezember
1	04:47		20:14 (2) 05:26		19:59 (3) 06:20	07:12	07:10	08:04
	21:45	40	20:54 (4) 21:10	25	20:24 (3) 20:04	18:51	16:42	15:58
2	04:48		20:14 (2) 05:28		19:58 (3) 06:22	07:14	07:12	08:05
	21:44	40	20:54 (4) 21:08	26	20:24 (3) 20:02	18:49	16:40	15:57
3	04:49		20:14 (2) 05:30		19:59 (3) 06:23	07:16	07:14	08:07
	21:44	40	20:54 (4) 21:06	25	20:24 (3) 20:00	18:47	16:38	15:57
4	04:50		20:15 (2) 05:31		19:58 (3) 06:25	07:18	07:15	08:08
	21:43	39	20:54 (4) 21:05	25	20:23 (3) 19:57	18:44	16:36	15:56
5	04:50		20:16 (2) 05:33		19:59 (3) 06:27	07:19	07:17	08:10
	21:43	39	20:55 (4) 21:03	24	20:23 (3) 19:55	18:42	16:34	15:55
6	04:51		20:16 (2) 05:35		19:59 (3) 06:29	07:21	07:19	08:11
	21:42	39	20:55 (4) 21:01	23	20:22 (3) 19:52	18:39	16:32	15:55
7	04:52		20:17 (2) 05:36		20:00 (3) 06:30	07:23	07:21	08:12
	21:42	39	20:56 (4) 20:59	22	20:22 (3) 19:50	18:37	16:30	15:54
8	04:53		20:18 (2) 05:38		20:01 (3) 06:32	07:25	07:23	08:14
	21:41	38	20:56 (4) 20:57	21	20:22 (3) 19:48	18:35	16:28	15:54
9	04:54		20:19 (2) 05:40		19:27 (1) 06:34	07:27	07:25	08:15
	21:40	37	20:56 (4) 20:55	24	20:20 (3) 19:45	18:32	16:27	15:54
10	04:55		20:20 (2) 05:42		19:23 (1) 06:36	07:29	07:27	08:16
	21:39	37	20:57 (4) 20:53	30	20:19 (3) 19:43	18:30	16:25	15:53
11	04:56		20:21 (2) 05:43		19:20 (1) 06:37	07:30	07:29	08:17
	21:38	36	20:57 (4) 20:51	31	20:17 (3) 19:40	18:27	16:23	15:53
12	04:58		20:22 (2) 05:45		19:19 (1) 06:39	07:32	07:31	08:18
	21:38	35	20:57 (4) 20:49	29	20:15 (3) 19:38	18:25	16:22	15:53
13	04:59		20:23 (2) 05:47		19:18 (1) 06:41	07:34	07:33	08:19
	21:37	34	20:57 (4) 20:47	22	19:40 (1) 19:35	18:23	16:20	15:53
14	05:00		20:24 (2) 05:49		19:16 (1) 06:42	07:36	07:34	08:20
	21:36	33	20:57 (4) 20:45	24	19:40 (1) 19:33	18:21	16:18	15:53
15	05:01		20:26 (2) 05:50		19:15 (1) 06:44	07:38	07:36	08:21
	21:34	30	20:56 (4) 20:43	26	19:41 (1) 19:30	18:18	16:17	15:53
16	05:03		20:31 (2) 05:52		19:15 (1) 06:46	07:40	07:38	08:22
	21:33	22	20:56 (4) 20:41	27	19:42 (1) 19:28	18:16	16:15	15:53
17	05:04		20:37 (4) 05:54		19:13 (1) 06:48	07:41	07:40	08:23
	21:32	20	20:57 (4) 20:38	29	19:42 (1) 19:26	18:14	16:14	15:53
18	05:05		20:37 (4) 05:55		19:13 (1) 06:49	07:43	07:42	08:24
	21:31	19	20:56 (4) 20:36	29	19:42 (1) 19:23	18:11	16:12	15:53
19	05:07		20:37 (4) 05:57		19:13 (1) 06:51	07:45	07:44	08:25
	21:30	19	20:56 (4) 20:34	30	19:43 (1) 19:21	18:09	16:11	15:54
20	05:08		20:07 (3) 05:59		19:12 (1) 06:53	07:47	07:45	08:25
	21:28	25	20:55 (4) 20:32	30	19:42 (1) 19:18	18:07	16:10	15:54
21	05:09		20:06 (3) 06:01		19:12 (1) 06:55	07:49	07:47	08:26
	21:27	26	20:54 (4) 20:30	30	19:42 (1) 19:16	18:05	16:08	15:54
22	05:11		20:04 (3) 06:02		19:11 (1) 06:56	07:51	07:49	08:26
	21:26	28	20:53 (4) 20:27	30	19:41 (1) 19:13	18:03	16:07	15:55
23	05:12		20:04 (3) 06:04		19:11 (1) 06:58	07:53	07:51	08:27
	21:24	27	20:52 (4) 20:25	30	19:41 (1) 19:11	18:00	16:06	15:55
24	05:14		20:02 (3) 06:06		19:12 (1) 07:00	07:54	07:53	08:27
	21:23	27	20:50 (4) 20:23	29	19:41 (1) 19:08	17:58	16:05	15:56
25	05:15		20:01 (3) 06:08		19:11 (1) 07:02	06:56	07:54	08:28
	21:21	23	20:48 (4) 20:21	28	19:39 (1) 19:06	16:56	16:04	15:57
26	05:17		20:01 (3) 06:09		19:12 (1) 07:03	06:58	07:56	08:28
	21:20	21	20:22 (3) 20:18	27	19:39 (1) 19:04	16:54	16:03	15:57
27	05:18		20:00 (3) 06:11		19:13 (1) 07:05	07:00	07:58	08:28
	21:18	23	20:23 (3) 20:16	25	19:38 (1) 19:01	16:52	16:02	15:58
28	05:20		20:00 (3) 06:13		19:13 (1) 07:07	07:02	07:59	08:28
	21:17	23	20:23 (3) 20:14	23	19:36 (1) 18:59	16:50	16:01	15:59
29	05:22		19:59 (3) 06:15		19:15 (1) 07:09	07:04	08:01	08:29
	21:15	24	20:23 (3) 20:11	19	19:34 (1) 18:56	16:48	16:00	16:00
30	05:23		19:59 (3) 06:16		19:17 (1) 07:11	07:06	08:02	08:29
	21:13	25	20:24 (3) 20:09	15	19:32 (1) 18:54	16:46	15:59	16:01
31	05:25		19:59 (3) 06:18		19:20 (1)	07:08		08:29
	21:12	25	20:24 (3) 20:07	7	19:27 (1)	16:44		16:02
Sonnenscheinstunden	510		459		382	329	260	235
astr.max.mögl.Beschattung		933		785				
Red.Sonnenscheinwahrsch.		0.45		0.49				
Reduktion Betriebsdauer		0.91		0.91				
Reduktion Windrichtung		0.65		0.67				
Gesamte Reduktion		0.26		0.30				
Met.wahrsch.Beschattung		246		233				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CA - IO79

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März		April			Mai			Juni		
1	08:29	07:59		07:02		06:48			05:40			19:34 (3)	04:51		19:37 (2)
	16:03	16:54		17:49		19:46			20:41		23	19:57 (3)	21:30	36	20:13 (2)
2	08:28	07:57		07:00		06:46			05:38			19:34 (3)	04:50		19:38 (2)
	16:04	16:56		17:50		19:48			20:42		22	19:56 (3)	21:31	36	20:14 (2)
3	08:28	07:56		06:58		06:43		19:07 (1)	05:36			19:34 (3)	04:49		19:38 (2)
	16:05	16:57		17:52		19:50	9	19:16 (1)	20:44		22	19:56 (3)	21:32	35	20:13 (2)
4	08:28	07:54		06:55		06:41		19:03 (1)	05:34			19:35 (3)	04:48		19:38 (2)
	16:06	16:59		17:54		19:52	15	19:18 (1)	20:46		20	19:55 (3)	21:33	35	20:13 (2)
5	08:28	07:52		06:53		06:39		19:01 (1)	05:32			19:36 (3)	04:48		19:39 (2)
	16:08	17:01		17:56		19:53	19	19:20 (1)	20:48		24	20:00 (2)	21:34	34	20:13 (2)
6	08:27	07:50		06:51		06:36		19:00 (1)	05:30			19:37 (3)	04:47		19:39 (2)
	16:09	17:03		17:58		19:55	22	19:22 (1)	20:50		26	20:03 (2)	21:35	34	20:13 (2)
7	08:27	07:49		06:48		06:34		18:58 (1)	05:28			19:38 (3)	04:46		19:39 (2)
	16:10	17:05		18:00		19:57	24	19:22 (1)	20:51		26	20:04 (2)	21:36	33	20:12 (2)
8	08:26	07:47		06:46		06:31		18:57 (1)	05:26			19:39 (3)	04:46		19:40 (2)
	16:12	17:07		18:02		19:59	26	19:23 (1)	20:53		31	20:22 (4)	21:37	33	20:13 (2)
9	08:26	07:45		06:44		06:29		18:57 (1)	05:24			19:41 (2)	04:45		19:41 (2)
	16:13	17:09		18:04		20:01	26	19:23 (1)	20:55		35	20:24 (4)	21:38	32	20:13 (2)
10	08:25	07:43		06:41		06:27		18:56 (1)	05:22			19:39 (2)	04:45		19:41 (2)
	16:15	17:11		18:06		20:03	27	19:23 (1)	20:57		41	20:26 (4)	21:39	32	20:13 (2)
11	08:25	07:41		06:39		06:24		18:55 (1)	05:21			19:38 (2)	04:44		19:41 (2)
	16:16	17:13		18:08		20:04	28	19:23 (1)	20:58		46	20:27 (4)	21:40	32	20:13 (2)
12	08:24	07:39		06:37		06:22		18:55 (1)	05:19			19:38 (2)	04:44		19:42 (2)
	16:18	17:15		18:09		20:06	28	19:23 (1)	21:00		49	20:29 (4)	21:41	31	20:13 (2)
13	08:23	07:37		06:34		06:20		18:55 (1)	05:17			19:37 (2)	04:44		19:42 (2)
	16:19	17:17		18:11		20:08	27	19:22 (1)	21:02		52	20:30 (4)	21:41	30	20:12 (2)
14	08:22	07:35		06:32		06:17		18:55 (1)	05:15			19:37 (2)	04:43		19:42 (2)
	16:21	17:19		18:13		20:10	26	19:21 (1)	21:03		54	20:31 (4)	21:42	31	20:13 (2)
15	08:21	07:33		06:29		06:15		18:55 (1)	05:14			19:36 (2)	04:43		19:43 (2)
	16:22	17:21		18:15		20:12	26	19:21 (1)	21:05		54	20:30 (4)	21:43	30	20:13 (2)
16	08:20	07:31		06:27		06:13		18:56 (1)	05:12			19:36 (2)	04:43		19:43 (2)
	16:24	17:23		18:17		20:13	24	19:20 (1)	21:07		55	20:31 (4)	21:43	30	20:13 (2)
17	08:19	07:29		06:25		06:10		18:56 (1)	05:10			19:35 (2)	04:43		19:44 (2)
	16:26	17:25		18:19		20:15	22	19:18 (1)	21:08		56	20:31 (4)	21:44	29	20:13 (2)
18	08:18	07:27		06:22		06:08		18:57 (1)	05:09			19:35 (2)	04:43		19:44 (2)
	16:28	17:27		18:21		20:17	20	19:17 (1)	21:10		56	20:31 (4)	21:44	29	20:13 (2)
19	08:17	07:25		06:20		06:06		18:59 (1)	05:07			19:34 (2)	04:43		19:44 (2)
	16:29	17:29		18:22		20:19	17	19:16 (1)	21:11		56	20:30 (4)	21:44	29	20:13 (2)
20	08:16	07:22		06:17		06:03		19:01 (1)	05:06			19:35 (2)	04:43		19:44 (2)
	16:31	17:31		18:24		20:21	13	19:14 (1)	21:13		56	20:31 (4)	21:45	29	20:13 (2)
21	08:15	07:20		06:15		06:01		19:05 (1)	05:04			19:35 (2)	04:43		19:44 (2)
	16:33	17:33		18:26		20:23	13	19:52 (3)	21:15		56	20:31 (4)	21:45	29	20:13 (2)
22	08:14	07:18		06:12		05:59		19:40 (3)	05:03			19:34 (2)	04:43		19:45 (2)
	16:35	17:35		18:28		20:24	13	19:53 (3)	21:16		56	20:30 (4)	21:45	29	20:14 (2)
23	08:12	07:16		06:10		05:57		19:38 (3)	05:01			19:35 (2)	04:43		19:45 (2)
	16:36	17:37		18:30		20:26	17	19:55 (3)	21:18		54	20:29 (4)	21:45	29	20:14 (2)
24	08:11	07:14		06:08		05:55		19:37 (3)	05:00			19:35 (2)	04:44		19:45 (2)
	16:38	17:39		18:32		20:28	19	19:56 (3)	21:19		54	20:29 (4)	21:45	29	20:14 (2)
25	08:10	07:11		06:05		05:52		19:36 (3)	04:59			19:35 (2)	04:44		19:46 (2)
	16:40	17:41		18:33		20:30	21	19:57 (3)	21:21		53	20:29 (4)	21:46	29	20:15 (2)
26	08:08	07:09		06:03		05:50		19:35 (3)	04:58			19:35 (2)	04:44		19:45 (2)
	16:42	17:43		18:35		20:32	22	19:57 (3)	21:22		52	20:28 (4)	21:45	30	20:15 (2)
27	08:07	07:07		06:00		05:48		19:35 (3)	04:56			19:36 (2)	04:45		19:46 (2)
	16:44	17:45		18:37		20:33	22	19:57 (3)	21:23		49	20:28 (4)	21:45	30	20:16 (2)
28	08:05	07:05		05:58		05:46		19:34 (3)	04:55			19:36 (2)	04:45		19:46 (2)
	16:46	17:47		18:39		20:35	24	19:58 (3)	21:25		47	20:27 (4)	21:45	30	20:16 (2)
29	08:04			06:55		05:44		19:34 (3)	04:54			19:36 (2)	04:46		19:46 (2)
	16:48			19:41		20:37	24	19:58 (3)	21:26		44	20:25 (4)	21:45	30	20:16 (2)
30	08:02			06:53		05:42		19:34 (3)	04:53			19:36 (2)	04:47		19:45 (2)
	16:50			19:43		20:39	23	19:57 (3)	21:27		37	20:13 (2)	21:45	31	20:16 (2)
31	08:01			06:51					04:52			19:37 (2)			
	16:52			19:44					21:29		36	20:13 (2)			
Sonnenscheinstunden		252		274		367		419			492			508	
astr.max.mögl.Beschattung								597			1342			936	
Red.Sonnenscheinwahrsch.								0.41			0.51			0.45	
Reduktion Betriebsdauer								0.91			0.91			0.91	
Reduktion Windrichtung								0.68			0.66			0.66	
Gesamte Reduktion								0.26			0.31			0.27	
Met.wahrsch.Beschattung								152			414			257	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CA - IO79

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober	November	Dezember
1	04:47		19:46 (2) | 05:26		19:48 (2) | 06:20		18:54 (1) | 07:12	07:10	08:04
	21:45	31	20:17 (2) | 21:10	48	20:39 (4) | 20:04	28	19:22 (1) | 18:51	16:42	15:58
2	04:48		19:46 (2) | 05:28		19:49 (2) | 06:22		18:55 (1) | 07:14	07:12	08:05
	21:44	32	20:18 (2) | 21:08	44	20:37 (4) | 20:02	27	19:22 (1) | 18:49	16:40	15:57
3	04:49		19:45 (2) | 05:30		19:50 (2) | 06:23		18:54 (1) | 07:16	07:14	08:07
	21:44	32	20:17 (2) | 21:06	39	20:36 (4) | 20:00	26	19:20 (1) | 18:47	16:38	15:57
4	04:50		19:45 (2) | 05:31		19:50 (2) | 06:25		18:54 (1) | 07:18	07:15	08:08
	21:43	33	20:18 (2) | 21:05	34	20:33 (4) | 19:57	26	19:20 (1) | 18:44	16:36	15:56
5	04:50		19:46 (2) | 05:33		19:49 (3) | 06:27		18:55 (1) | 07:19	07:17	08:10
	21:43	33	20:19 (2) | 21:03	29	20:32 (4) | 19:55	24	19:19 (1) | 18:42	16:34	15:55
6	04:51		19:46 (2) | 05:35		19:47 (3) | 06:29		18:55 (1) | 07:21	07:19	08:11
	21:42	33	20:19 (2) | 21:01	26	20:13 (2) | 19:52	22	19:17 (1) | 18:39	16:32	15:55
7	04:52		19:46 (2) | 05:36		19:46 (3) | 06:30		18:56 (1) | 07:23	07:21	08:12
	21:42	34	20:20 (2) | 20:59	25	20:11 (2) | 19:50	20	19:16 (1) | 18:37	16:30	15:54
8	04:53		19:46 (2) | 05:38		19:45 (3) | 06:32		18:58 (1) | 07:25	07:23	08:14
	21:41	34	20:20 (2) | 20:57	23	20:08 (2) | 19:48	16	19:14 (1) | 18:35	16:28	15:54
9	04:54		19:46 (2) | 05:40		19:44 (3) | 06:34		19:00 (1) | 07:27	07:25	08:15
	21:40	35	20:21 (2) | 20:55	21	20:05 (3) | 19:45	10	19:10 (1) | 18:32	16:27	15:54
10	04:55		19:45 (2) | 05:42		19:43 (3) | 06:36		| 07:29	07:27	08:16
	21:39	36	20:21 (2) | 20:53	22	20:05 (3) | 19:43		| 18:30	16:25	15:53
11	04:56		19:45 (2) | 05:43		19:42 (3) | 06:37		| 07:30	07:29	08:17
	21:38	36	20:21 (2) | 20:51	23	20:05 (3) | 19:40		| 18:27	16:23	15:53
12	04:58		19:45 (2) | 05:45		19:42 (3) | 06:39		| 07:32	07:31	08:18
	21:38	36	20:21 (2) | 20:49	24	20:06 (3) | 19:38		| 18:25	16:22	15:53
13	04:59		19:45 (2) | 05:47		19:42 (3) | 06:41		| 07:34	07:33	08:19
	21:37	37	20:22 (2) | 20:47	24	20:06 (3) | 19:35		| 18:23	16:20	15:53
14	05:00		19:45 (2) | 05:48		19:42 (3) | 06:42		| 07:36	07:34	08:20
	21:36	42	20:33 (4) | 20:45	23	20:05 (3) | 19:33		| 18:21	16:18	15:53
15	05:01		19:45 (2) | 05:50		19:42 (3) | 06:44		| 07:38	07:36	08:21
	21:34	45	20:34 (4) | 20:43	23	20:05 (3) | 19:30		| 18:18	16:17	15:53
16	05:03		19:44 (2) | 05:52		19:42 (3) | 06:46		| 07:40	07:38	08:22
	21:33	49	20:36 (4) | 20:41	23	20:05 (3) | 19:28		| 18:16	16:15	15:53
17	05:04		19:45 (2) | 05:54		19:42 (3) | 06:48		| 07:41	07:40	08:23
	21:32	51	20:37 (4) | 20:38	22	20:04 (3) | 19:26		| 18:14	16:14	15:53
18	05:05		19:45 (2) | 05:55		19:43 (3) | 06:49		| 07:43	07:42	08:24
	21:31	52	20:38 (4) | 20:36	20	20:03 (3) | 19:23		| 18:11	16:12	15:53
19	05:07		19:45 (2) | 05:57		19:44 (3) | 06:51		| 07:45	07:44	08:25
	21:30	54	20:39 (4) | 20:34	18	20:02 (3) | 19:21		| 18:09	16:11	15:54
20	05:08		19:44 (2) | 05:59		19:44 (3) | 06:53		| 07:47	07:45	08:25
	21:28	55	20:39 (4) | 20:32	16	20:00 (3) | 19:18		| 18:07	16:10	15:54
21	05:09		19:45 (2) | 06:01		19:46 (3) | 06:55		| 07:49	07:47	08:26
	21:27	55	20:40 (4) | 20:30	13	19:59 (3) | 19:16		| 18:05	16:08	15:54
22	05:11		19:45 (2) | 06:02		19:07 (1) | 06:56		| 07:51	07:49	08:26
	21:26	55	20:40 (4) | 20:27	14	19:55 (3) | 19:13		| 18:02	16:07	15:55
23	05:12		19:45 (2) | 06:04		19:04 (1) | 06:58		| 07:53	07:51	08:27
	21:24	56	20:41 (4) | 20:25	14	19:18 (1) | 19:11		| 18:00	16:06	15:55
24	05:14		19:45 (2) | 06:06		19:02 (1) | 07:00		| 07:54	07:53	08:27
	21:23	56	20:41 (4) | 20:23	18	19:20 (1) | 19:08		| 17:58	16:05	15:56
25	05:15		19:45 (2) | 06:08		19:00 (1) | 07:02		| 06:56	07:54	08:28
	21:21	56	20:41 (4) | 20:21	20	19:20 (1) | 19:06		| 16:56	16:04	15:57
26	05:17		19:46 (2) | 06:09		18:59 (1) | 07:03		| 06:58	07:56	08:28
	21:20	55	20:41 (4) | 20:18	22	19:21 (1) | 19:04		| 16:54	16:03	15:57
27	05:18		19:46 (2) | 06:11		18:58 (1) | 07:05		| 07:00	07:58	08:28
	21:18	55	20:41 (4) | 20:16	24	19:22 (1) | 19:01		| 16:52	16:02	15:58
28	05:20		19:46 (2) | 06:13		18:56 (1) | 07:07		| 07:02	07:59	08:28
	21:17	55	20:41 (4) | 20:14	26	19:22 (1) | 18:59		| 16:50	16:01	15:59
29	05:22		19:46 (2) | 06:15		18:56 (1) | 07:09		| 07:04	08:01	08:29
	21:15	55	20:41 (4) | 20:11	26	19:22 (1) | 18:56		| 16:48	16:00	16:00
30	05:23		19:47 (2) | 06:16		18:56 (1) | 07:11		| 07:06	08:02	08:29
	21:13	54	20:41 (4) | 20:09	27	19:23 (1) | 18:54		| 16:46	15:59	16:01
31	05:25		19:47 (2) | 06:18		18:54 (1) |		| 07:08		08:29
	21:12	51	20:40 (4) | 20:07	28	19:22 (1) |		| 16:44		16:02
Sonnenscheinstunden	510		459		382		329	260	235
astr.max.mögl.Beschattung		1393		759		199			
Red.Sonnenscheinwahrsch.		0.45		0.49		0.40			
Reduktion Betriebsdauer		0.91		0.91		0.91			
Reduktion Windrichtung		0.66		0.67		0.69			
Gesamte Reduktion		0.27		0.30		0.25			
Met.wahrsch.Beschattung		374		226		50			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CB - IO80

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40			19:38 (3)	04:51		19:42 (2)
	16:03		16:54		17:49		19:46			20:41		23	20:01 (3)	21:30	48	20:30 (4)
2	08:28		07:57		07:00		06:46			05:38			19:37 (3)	04:50		19:43 (2)
	16:04		16:56		17:50		19:48			20:42		24	20:01 (3)	21:31	46	20:30 (4)
3	08:28		07:56		06:58		06:43			05:36			19:37 (3)	04:49		19:43 (2)
	16:05		16:58		17:52		19:50			20:44		24	20:01 (3)	21:32	43	20:28 (4)
4	08:28		07:54		06:55		06:41			05:34			19:38 (3)	04:48		19:43 (2)
	16:06		16:59		17:54		19:52			20:46		23	20:01 (3)	21:33	38	20:21 (2)
5	08:28		07:52		06:53		06:39		19:13 (1)	05:32			19:38 (3)	04:48		19:44 (2)
	16:08		17:01		17:56		19:53	4	19:17 (1)	20:48		23	20:01 (3)	21:34	38	20:22 (2)
6	08:27		07:50		06:51		06:36		19:09 (1)	05:30			19:39 (3)	04:47		19:44 (2)
	16:09		17:03		17:58		19:55	13	19:22 (1)	20:50		21	20:00 (3)	21:35	38	20:22 (2)
7	08:27		07:49		06:48		06:34		19:06 (1)	05:28			19:39 (3)	04:46		19:44 (2)
	16:10		17:05		18:00		19:57	17	19:23 (1)	20:51		20	19:59 (3)	21:36	37	20:21 (2)
8	08:26		07:47		06:46		06:31		19:04 (1)	05:26			19:39 (3)	04:46		19:45 (2)
	16:12		17:07		18:02		19:59	21	19:25 (1)	20:53		19	19:58 (3)	21:37	37	20:22 (2)
9	08:26		07:45		06:44		06:29		19:03 (1)	05:24			19:41 (3)	04:45		19:45 (2)
	16:13		17:09		18:04		20:01	23	19:26 (1)	20:55		24	20:05 (2)	21:38	38	20:23 (2)
10	08:25		07:43		06:41		06:27		19:01 (1)	05:22			19:42 (3)	04:45		19:45 (2)
	16:15		17:11		18:06		20:03	25	19:26 (1)	20:57		29	20:26 (4)	21:39	37	20:22 (2)
11	08:25		07:41		06:39		06:24		19:01 (1)	05:21			19:44 (3)	04:44		19:46 (2)
	16:16		17:13		18:08		20:04	26	19:27 (1)	20:58		34	20:27 (4)	21:40	36	20:22 (2)
12	08:24		07:39		06:37		06:22		19:00 (1)	05:19			19:48 (3)	04:44		19:46 (2)
	16:18		17:15		18:09		20:06	27	19:27 (1)	21:00		35	20:29 (4)	21:41	37	20:23 (2)
13	08:23		07:37		06:34		06:20		18:59 (1)	05:17			19:48 (2)	04:44		19:46 (2)
	16:19		17:17		18:11		20:08	27	19:26 (1)	21:02		38	20:30 (4)	21:41	36	20:22 (2)
14	08:22		07:35		06:32		06:17		18:59 (1)	05:15			19:47 (2)	04:43		19:46 (2)
	16:21		17:19		18:13		20:10	28	19:27 (1)	21:03		44	20:32 (4)	21:42	37	20:23 (2)
15	08:21		07:33		06:29		06:15		18:59 (1)	05:14			19:46 (2)	04:43		19:46 (2)
	16:22		17:21		18:15		20:12	28	19:27 (1)	21:05		47	20:33 (4)	21:43	37	20:23 (2)
16	08:20		07:31		06:27		06:13		18:59 (1)	05:12			19:45 (2)	04:43		19:47 (2)
	16:24		17:23		18:17		20:13	27	19:26 (1)	21:07		49	20:34 (4)	21:43	36	20:23 (2)
17	08:19		07:29		06:25		06:10		18:58 (1)	05:10			19:44 (2)	04:43		19:47 (2)
	16:26		17:25		18:19		20:15	27	19:25 (1)	21:08		50	20:34 (4)	21:44	36	20:23 (2)
18	08:18		07:27		06:22		06:08		18:59 (1)	05:09			19:44 (2)	04:43		19:47 (2)
	16:28		17:27		18:21		20:17	25	19:24 (1)	21:10		51	20:35 (4)	21:44	36	20:23 (2)
19	08:17		07:25		06:20		06:06		19:00 (1)	05:07			19:43 (2)	04:43		19:48 (2)
	16:29		17:29		18:22		20:19	24	19:24 (1)	21:11		51	20:34 (4)	21:44	35	20:23 (2)
20	08:16		07:22		06:17		06:03		19:01 (1)	05:06			19:43 (2)	04:43		19:48 (2)
	16:31		17:31		18:24		20:21	22	19:23 (1)	21:13		52	20:35 (4)	21:45	35	20:23 (2)
21	08:15		07:20		06:15		06:01		19:02 (1)	05:04			19:43 (2)	04:43		19:48 (2)
	16:33		17:33		18:26		20:23	19	19:21 (1)	21:15		52	20:35 (4)	21:45	36	20:24 (2)
22	08:14		07:18		06:12		05:59		19:02 (1)	05:03			19:42 (2)	04:43		19:49 (2)
	16:35		17:35		18:28		20:24	17	19:19 (1)	21:16		52	20:34 (4)	21:45	35	20:24 (2)
23	08:12		07:16		06:10		05:57		19:04 (1)	05:01			19:42 (2)	04:43		19:49 (2)
	16:36		17:37		18:30		20:26	19	19:54 (3)	21:18		52	20:34 (4)	21:45	35	20:24 (2)
24	08:11		07:14		06:08		05:55		19:09 (1)	05:00			19:42 (2)	04:44		19:48 (2)
	16:38		17:39		18:32		20:28	15	19:57 (3)	21:19		52	20:34 (4)	21:45	36	20:24 (2)
25	08:10		07:11		06:05		05:52		19:43 (3)	04:59			19:42 (2)	04:44		19:49 (2)
	16:40		17:41		18:33		20:30	16	19:59 (3)	21:21		52	20:34 (4)	21:46	36	20:25 (2)
26	08:08		07:09		06:03		05:50		19:41 (3)	04:58			19:42 (2)	04:44		19:49 (2)
	16:42		17:43		18:35		20:32	19	20:00 (3)	21:22		52	20:34 (4)	21:45	36	20:25 (2)
27	08:07		07:07		06:00		05:48		19:40 (3)	04:56			19:42 (2)	04:45		19:50 (2)
	16:44		17:45		18:37		20:33	20	20:00 (3)	21:23		52	20:34 (4)	21:45	36	20:26 (2)
28	08:05		07:05		05:58		05:46		19:39 (3)	04:55			19:42 (2)	04:45		19:49 (2)
	16:46		17:47		18:39		20:35	22	20:01 (3)	21:25		51	20:33 (4)	21:45	37	20:26 (2)
29	08:04				06:55		05:44		19:39 (3)	04:54			19:42 (2)	04:46		19:50 (2)
	16:48				19:41		20:37	22	20:01 (3)	21:26		51	20:33 (4)	21:45	36	20:26 (2)
30	08:02				06:53		05:42		19:38 (3)	04:53			19:42 (2)	04:47		19:49 (2)
	16:50				19:43		20:39	23	20:01 (3)	21:27		50	20:32 (4)	21:45	37	20:26 (2)
31	08:01				06:51					04:52			19:42 (2)			
	16:52				19:44					21:29		49	20:31 (4)			
Sonnenscheinstunden	252		274		367		419			492			508			
astr.max.mögl.Beschattung								556			1246			1121		
Red.Sonnenscheinwahrsch.								0.41			0.51			0.45		
Reduktion Betriebsdauer								0.91			0.91			0.91		
Reduktion Windrichtung								0.68			0.66			0.66		
Gesamte Reduktion								0.26			0.31			0.27		
Met.wahrsch.Beschattung								142			383			307		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CB - IO80

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober	November	Dezember
1	04:47		19:50 (2) | 05:26		19:56 (3) | 06:20		19:00 (1) | 07:12	07:10	08:04
	21:45	37	20:27 (2) | 21:10	36	20:39 (4) | 20:04	26	19:26 (1) | 18:51	16:42	15:58
2	04:48		19:50 (2) | 05:28		19:53 (3) | 06:22		19:00 (1) | 07:14	07:12	08:05
	21:44	37	20:27 (2) | 21:08	33	20:37 (4) | 20:02	25	19:25 (1) | 18:49	16:40	15:57
3	04:49		19:50 (2) | 05:30		19:52 (3) | 06:23		19:00 (1) | 07:16	07:14	08:07
	21:44	37	20:27 (2) | 21:06	26	20:18 (2) | 20:00	23	19:23 (1) | 18:47	16:38	15:57
4	04:50		19:50 (2) | 05:31		19:50 (3) | 06:25		19:01 (1) | 07:18	07:15	08:08
	21:43	37	20:27 (2) | 21:05	20	20:12 (2) | 19:57	21	19:22 (1) | 18:44	16:36	15:56
5	04:50		19:50 (2) | 05:33		19:50 (3) | 06:27		19:03 (1) | 07:19	07:17	08:10
	21:43	38	20:28 (2) | 21:03	19	20:09 (3) | 19:55	17	19:20 (1) | 18:42	16:34	15:55
6	04:51		19:50 (2) | 05:35		19:48 (3) | 06:29		19:04 (1) | 07:21	07:19	08:11
	21:42	38	20:28 (2) | 21:01	21	20:09 (3) | 19:52	13	19:17 (1) | 18:39	16:32	15:55
7	04:52		19:50 (2) | 05:36		19:48 (3) | 06:30		19:08 (1) | 07:23	07:21	08:12
	21:42	39	20:29 (2) | 20:59	22	20:10 (3) | 19:50	5	19:13 (1) | 18:37	16:30	15:54
8	04:53		19:51 (2) | 05:38		19:48 (3) | 06:32		| 07:25	07:23	08:14
	21:41	38	20:29 (2) | 20:57	22	20:10 (3) | 19:48		| 18:35	16:28	15:54
9	04:54		19:51 (2) | 05:40		19:47 (3) | 06:34		| 07:27	07:25	08:15
	21:40	38	20:29 (2) | 20:55	23	20:10 (3) | 19:45		| 18:32	16:27	15:54
10	04:55		19:51 (2) | 05:42		19:47 (3) | 06:36		| 07:29	07:27	08:16
	21:39	44	20:37 (4) | 20:53	23	20:10 (3) | 19:43		| 18:30	16:25	15:53
11	04:56		19:51 (2) | 05:43		19:46 (3) | 06:37		| 07:30	07:29	08:17
	21:38	47	20:38 (4) | 20:51	24	20:10 (3) | 19:40		| 18:27	16:23	15:53
12	04:58		19:51 (2) | 05:45		19:46 (3) | 06:39		| 07:32	07:31	08:18
	21:38	49	20:40 (4) | 20:49	24	20:10 (3) | 19:38		| 18:25	16:22	15:53
13	04:59		19:51 (2) | 05:47		19:47 (3) | 06:41		| 07:34	07:33	08:19
	21:37	49	20:40 (4) | 20:47	23	20:10 (3) | 19:35		| 18:23	16:20	15:53
14	05:00		19:51 (2) | 05:48		19:46 (3) | 06:42		| 07:36	07:34	08:20
	21:36	50	20:41 (4) | 20:45	23	20:09 (3) | 19:33		| 18:21	16:18	15:53
15	05:01		19:51 (2) | 05:50		19:47 (3) | 06:44		| 07:38	07:36	08:21
	21:34	51	20:42 (4) | 20:43	21	20:08 (3) | 19:30		| 18:18	16:17	15:53
16	05:03		19:51 (2) | 05:52		19:48 (3) | 06:46		| 07:40	07:38	08:22
	21:33	51	20:42 (4) | 20:41	20	20:08 (3) | 19:28		| 18:16	16:15	15:53
17	05:04		19:52 (2) | 05:54		19:48 (3) | 06:48		| 07:41	07:40	08:23
	21:32	51	20:43 (4) | 20:38	18	20:06 (3) | 19:26		| 18:14	16:14	15:53
18	05:05		19:52 (2) | 05:55		19:49 (3) | 06:49		| 07:43	07:42	08:24
	21:31	52	20:44 (4) | 20:36	16	20:05 (3) | 19:23		| 18:11	16:12	15:53
19	05:07		19:52 (2) | 05:57		19:14 (1) | 06:51		| 07:45	07:44	08:25
	21:30	52	20:44 (4) | 20:34	17	20:03 (3) | 19:21		| 18:09	16:11	15:54
20	05:08		19:52 (2) | 05:59		19:10 (1) | 06:53		| 07:47	07:45	08:25
	21:28	52	20:44 (4) | 20:32	16	19:58 (3) | 19:18		| 18:07	16:10	15:54
21	05:09		19:52 (2) | 06:01		19:08 (1) | 06:55		| 07:49	07:47	08:26
	21:27	53	20:45 (4) | 20:30	17	19:25 (1) | 19:16		| 18:05	16:08	15:54
22	05:11		19:52 (2) | 06:02		19:05 (1) | 06:56		| 07:51	07:49	08:26
	21:26	53	20:45 (4) | 20:27	20	19:25 (1) | 19:13		| 18:03	16:07	15:55
23	05:12		19:53 (2) | 06:04		19:04 (1) | 06:58		| 07:53	07:51	08:27
	21:24	52	20:45 (4) | 20:25	23	19:27 (1) | 19:11		| 18:00	16:06	15:55
24	05:14		19:53 (2) | 06:06		19:03 (1) | 07:00		| 07:54	07:53	08:27
	21:23	52	20:45 (4) | 20:23	25	19:28 (1) | 19:08		| 17:58	16:05	15:56
25	05:15		19:54 (2) | 06:08		19:02 (1) | 07:02		| 06:56	07:54	08:28
	21:21	51	20:45 (4) | 20:21	25	19:27 (1) | 19:06		| 16:56	16:04	15:57
26	05:17		19:55 (2) | 06:09		19:01 (1) | 07:03		| 06:58	07:56	08:28
	21:20	50	20:45 (4) | 20:18	27	19:28 (1) | 19:04		| 16:54	16:03	15:57
27	05:18		19:55 (2) | 06:11		19:01 (1) | 07:05		| 07:00	07:58	08:28
	21:18	49	20:44 (4) | 20:16	27	19:28 (1) | 19:01		| 16:52	16:02	15:58
28	05:20		19:56 (2) | 06:13		19:00 (1) | 07:07		| 07:02	07:59	08:28
	21:17	48	20:44 (4) | 20:14	27	19:27 (1) | 18:59		| 16:50	16:01	15:59
29	05:22		19:56 (2) | 06:15		19:00 (1) | 07:09		| 07:04	08:01	08:29
	21:15	46	20:43 (4) | 20:11	27	19:27 (1) | 18:56		| 16:48	16:00	16:00
30	05:23		19:58 (2) | 06:16		19:00 (1) | 07:11		| 07:06	08:02	08:29
	21:13	42	20:42 (4) | 20:09	27	19:27 (1) | 18:54		| 16:46	15:59	16:01
31	05:25		19:59 (2) | 06:18		18:59 (1) |		| 07:08		08:29
	21:12	36	20:40 (4) | 20:07	27	19:26 (1) |		| 16:44		16:02
Sonnenscheinstunden	510		459		382		329	260	235
astr.max.mögl.Beschattung		1419		719		130			
Red.Sonnenscheinwahrsch.		0.45		0.49		0.40			
Reduktion Betriebsdauer		0.91		0.91		0.91			
Reduktion Windrichtung		0.66		0.67		0.68			
Gesamte Reduktion		0.27		0.30		0.25			
Met.wahrsch.Beschattung		380		215		33			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CC - IO81

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40			04:51		
	16:03		16:54		17:49		19:46			20:41	23	20:03 (3)	21:30	51	20:37 (4)
2	08:28		07:57		07:00		06:46			05:38		19:39 (3)	04:50		19:47 (2)
	16:04		16:56		17:50		19:48			20:42	25	20:04 (3)	21:31	51	20:38 (4)
3	08:28		07:56		06:58		06:43			05:36		19:39 (3)	04:49		19:46 (2)
	16:05		16:58		17:52		19:50			20:44	25	20:04 (3)	21:32	51	20:37 (4)
4	08:28		07:54		06:55		06:41			05:34		19:39 (3)	04:48		19:46 (2)
	16:06		16:59		17:54		19:52			20:46	25	20:04 (3)	21:33	51	20:37 (4)
5	08:28		07:52		06:53		06:39			05:32		19:39 (3)	04:48		19:47 (2)
	16:08		17:01		17:56		19:53			20:48	25	20:04 (3)	21:34	50	20:37 (4)
6	08:27		07:50		06:51		06:36		19:13 (1)	05:30		19:39 (3)	04:47		19:47 (2)
	16:09		17:03		17:58		19:55	5	19:18 (1)	20:50	25	20:04 (3)	21:35	49	20:36 (4)
7	08:27		07:49		06:48		06:34		19:08 (1)	05:28		19:39 (3)	04:46		19:46 (2)
	16:10		17:05		18:00		19:57	14	19:22 (1)	20:51	24	20:03 (3)	21:36	49	20:35 (4)
8	08:26		07:47		06:46		06:31		19:05 (1)	05:26		19:39 (3)	04:46		19:47 (2)
	16:12		17:07		18:02		19:59	19	19:24 (1)	20:53	23	20:02 (3)	21:37	48	20:35 (4)
9	08:26		07:45		06:44		06:29		19:04 (1)	05:24		19:40 (3)	04:45		19:47 (2)
	16:13		17:09		18:04		20:01	22	19:26 (1)	20:55	23	20:03 (3)	21:38	48	20:35 (4)
10	08:25		07:43		06:41		06:27		19:02 (1)	05:22		19:41 (3)	04:45		19:47 (2)
	16:15		17:11		18:06		20:03	24	19:26 (1)	20:57	21	20:02 (3)	21:39	47	20:34 (4)
11	08:25		07:41		06:39		06:24		19:01 (1)	05:21		19:41 (3)	04:44		19:47 (2)
	16:16		17:13		18:08		20:04	26	19:27 (1)	20:58	19	20:00 (3)	21:40	46	20:33 (4)
12	08:24		07:39		06:37		06:22		19:00 (1)	05:19		19:43 (3)	04:44		19:48 (2)
	16:18		17:15		18:09		20:06	27	19:27 (1)	21:00	17	20:00 (3)	21:41	44	20:32 (4)
13	08:23		07:37		06:34		06:20		18:59 (1)	05:17		19:43 (3)	04:44		19:47 (2)
	16:19		17:17		18:11		20:08	28	19:27 (1)	21:02	21	20:30 (4)	21:41	42	20:29 (2)
14	08:22		07:35		06:32		06:17		18:58 (1)	05:15		19:46 (3)	04:43		19:48 (2)
	16:21		17:19		18:13		20:10	29	19:27 (1)	21:03	30	20:32 (4)	21:42	41	20:29 (2)
15	08:21		07:33		06:29		06:15		18:58 (1)	05:14		19:48 (3)	04:43		19:48 (2)
	16:22		17:21		18:15		20:12	29	19:27 (1)	21:05	35	20:33 (4)	21:43	42	20:30 (2)
16	08:20		07:31		06:27		06:13		18:58 (1)	05:12		19:55 (2)	04:43		19:48 (2)
	16:24		17:23		18:17		20:13	30	19:28 (1)	21:07	35	20:35 (4)	21:43	42	20:30 (2)
17	08:19		07:29		06:25		06:10		18:57 (1)	05:10		19:53 (2)	04:43		19:49 (2)
	16:26		17:25		18:19		20:15	29	19:26 (1)	21:08	40	20:36 (4)	21:44	41	20:30 (2)
18	08:18		07:27		06:22		06:08		18:58 (1)	05:09		19:52 (2)	04:43		19:49 (2)
	16:28		17:27		18:21		20:17	28	19:26 (1)	21:10	44	20:37 (4)	21:44	41	20:30 (2)
19	08:17		07:25		06:20		06:06		18:58 (1)	05:07		19:51 (2)	04:43		19:49 (2)
	16:29		17:29		18:22		20:19	28	19:26 (1)	21:11	46	20:37 (4)	21:44	42	20:31 (2)
20	08:16		07:22		06:17		06:04		18:58 (1)	05:06		19:50 (2)	04:43		19:49 (2)
	16:31		17:31		18:24		20:21	27	19:25 (1)	21:13	48	20:38 (4)	21:45	42	20:31 (2)
21	08:15		07:20		06:15		06:01		18:59 (1)	05:04		19:50 (2)	04:43		19:49 (2)
	16:33		17:33		18:26		20:23	25	19:24 (1)	21:15	48	20:38 (4)	21:45	42	20:31 (2)
22	08:14		07:18		06:12		05:59		18:59 (1)	05:03		19:48 (2)	04:43		19:50 (2)
	16:35		17:35		18:28		20:24	23	19:22 (1)	21:16	50	20:38 (4)	21:45	42	20:32 (2)
23	08:12		07:16		06:10		05:57		19:00 (1)	05:01		19:48 (2)	04:43		19:50 (2)
	16:36		17:37		18:30		20:26	21	19:21 (1)	21:18	50	20:38 (4)	21:45	42	20:32 (2)
24	08:11		07:14		06:08		05:55		19:02 (1)	05:00		19:48 (2)	04:44		19:50 (2)
	16:38		17:39		18:32		20:28	17	19:19 (1)	21:19	50	20:38 (4)	21:45	42	20:32 (2)
25	08:10		07:11		06:05		05:52		19:04 (1)	04:59		19:47 (2)	04:44		19:51 (2)
	16:40		17:41		18:33		20:30	22	19:57 (3)	21:21	52	20:39 (4)	21:46	41	20:32 (2)
26	08:08		07:09		06:03		05:50		19:07 (1)	04:58		19:47 (2)	04:44		19:50 (2)
	16:42		17:43		18:35		20:32	20	19:59 (3)	21:22	52	20:39 (4)	21:45	42	20:32 (2)
27	08:07		07:07		06:00		05:48		19:44 (3)	04:56		19:47 (2)	04:45		19:51 (2)
	16:44		17:45		18:37		20:33	17	20:01 (3)	21:23	52	20:39 (4)	21:45	42	20:33 (2)
28	08:05		07:05		05:58		05:46		19:42 (3)	04:55		19:47 (2)	04:45		19:51 (2)
	16:46		17:47		18:39		20:35	20	20:02 (3)	21:25	52	20:39 (4)	21:45	42	20:33 (2)
29	08:04				06:55		05:44		19:41 (3)	04:54		19:47 (2)	04:46		19:51 (2)
	16:48				19:41		20:37	22	20:03 (3)	21:26	51	20:38 (4)	21:45	42	20:33 (2)
30	08:02				06:53		05:42		19:41 (3)	04:53		19:46 (2)	04:47		19:51 (2)
	16:50				19:43		20:39	22	20:03 (3)	21:27	52	20:38 (4)	21:45	42	20:33 (2)
31	08:01				06:51					04:52		19:46 (2)			
	16:52				19:44					21:29	52	20:38 (4)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung								574			1135			1337	
Red.Sonnenscheinwahrsch.								0.41			0.51			0.45	
Reduktion Betriebsdauer								0.91			0.91			0.91	
Reduktion Windrichtung								0.68			0.66			0.66	
Gesamte Reduktion								0.26			0.31			0.27	
Met.wahrsch.Beschattung								147			348			364	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CC - IO81

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober	November	Dezember
1	04:47		19:52 (2)	05:26		19:53 (3)	06:20		19:00 (1)	07:12	07:10	08:04
	21:45	45	20:37 (4)	21:10	18	20:11 (3)	20:04	26	19:26 (1)	18:51	16:42	15:58
2	04:48		19:52 (2)	05:28		19:51 (3)	06:22		19:01 (1)	07:14	07:12	08:05
	21:44	47	20:39 (4)	21:08	20	20:11 (3)	20:02	24	19:25 (1)	18:49	16:40	15:57
3	04:49		19:52 (2)	05:30		19:51 (3)	06:23		19:01 (1)	07:16	07:14	08:07
	21:44	47	20:39 (4)	21:06	21	20:12 (3)	20:00	22	19:23 (1)	18:47	16:38	15:57
4	04:50		19:52 (2)	05:31		19:50 (3)	06:25		19:02 (1)	07:18	07:15	08:08
	21:43	48	20:40 (4)	21:05	22	20:12 (3)	19:57	19	19:21 (1)	18:44	16:36	15:56
5	04:50		19:52 (2)	05:33		19:49 (3)	06:27		19:05 (1)	07:19	07:17	08:10
	21:43	49	20:41 (4)	21:03	24	20:13 (3)	19:55	14	19:19 (1)	18:42	16:34	15:55
6	04:51		19:53 (2)	05:35		19:48 (3)	06:29		19:08 (1)	07:21	07:19	08:11
	21:42	49	20:42 (4)	21:01	25	20:13 (3)	19:52	5	19:13 (1)	18:39	16:32	15:55
7	04:52		19:53 (2)	05:36		19:49 (3)	06:30			07:23	07:21	08:12
	21:42	50	20:43 (4)	20:59	24	20:13 (3)	19:50			18:37	16:30	15:54
8	04:53		19:53 (2)	05:38		19:49 (3)	06:32			07:25	07:23	08:14
	21:41	51	20:44 (4)	20:57	25	20:14 (3)	19:48			18:35	16:28	15:54
9	04:54		19:54 (2)	05:40		19:48 (3)	06:34			07:27	07:25	08:15
	21:40	51	20:45 (4)	20:55	25	20:13 (3)	19:45			18:32	16:27	15:54
10	04:55		19:54 (2)	05:42		19:48 (3)	06:36			07:29	07:27	08:16
	21:39	51	20:45 (4)	20:53	25	20:13 (3)	19:43			18:30	16:25	15:53
11	04:56		19:54 (2)	05:43		19:48 (3)	06:37			07:30	07:29	08:17
	21:38	52	20:46 (4)	20:51	24	20:12 (3)	19:40			18:27	16:23	15:53
12	04:58		19:54 (2)	05:45		19:48 (3)	06:39			07:32	07:31	08:18
	21:38	52	20:46 (4)	20:49	24	20:12 (3)	19:38			18:25	16:22	15:53
13	04:59		19:55 (2)	05:47		19:49 (3)	06:41			07:34	07:33	08:19
	21:37	51	20:46 (4)	20:47	22	20:11 (3)	19:35			18:23	16:20	15:53
14	05:00		19:55 (2)	05:49		19:49 (3)	06:42			07:36	07:34	08:20
	21:36	52	20:47 (4)	20:45	21	20:10 (3)	19:33			18:21	16:18	15:53
15	05:01		19:55 (2)	05:50		19:50 (3)	06:44			07:38	07:36	08:21
	21:34	52	20:47 (4)	20:43	19	20:09 (3)	19:30			18:18	16:17	15:53
16	05:03		19:55 (2)	05:52		19:52 (3)	06:46			07:40	07:38	08:22
	21:33	52	20:47 (4)	20:41	16	20:08 (3)	19:28			18:16	16:15	15:53
17	05:04		19:57 (2)	05:54		19:13 (1)	06:48			07:41	07:40	08:23
	21:32	51	20:48 (4)	20:38	20	20:05 (3)	19:26			18:14	16:14	15:53
18	05:05		19:57 (2)	05:55		19:10 (1)	06:49			07:43	07:42	08:24
	21:31	51	20:48 (4)	20:36	20	20:02 (3)	19:23			18:11	16:12	15:53
19	05:07		19:57 (2)	05:57		19:08 (1)	06:51			07:45	07:44	08:25
	21:30	51	20:48 (4)	20:34	18	19:26 (1)	19:21			18:09	16:11	15:54
20	05:08		19:57 (2)	05:59		19:06 (1)	06:53			07:47	07:45	08:25
	21:28	51	20:48 (4)	20:32	21	19:27 (1)	19:18			18:07	16:10	15:54
21	05:09		19:59 (2)	06:01		19:04 (1)	06:55			07:49	07:47	08:26
	21:27	49	20:48 (4)	20:30	24	19:28 (1)	19:16			18:05	16:08	15:54
22	05:11		19:59 (2)	06:02		19:03 (1)	06:56			07:51	07:49	08:26
	21:26	49	20:48 (4)	20:27	25	19:28 (1)	19:13			18:03	16:07	15:55
23	05:12		20:00 (2)	06:04		19:02 (1)	06:58			07:53	07:51	08:27
	21:24	49	20:49 (4)	20:25	27	19:29 (1)	19:11			18:00	16:06	15:55
24	05:14		20:01 (2)	06:06		19:02 (1)	07:00			07:54	07:53	08:27
	21:23	47	20:48 (4)	20:23	27	19:29 (1)	19:08			17:58	16:05	15:56
25	05:15		20:02 (2)	06:08		19:00 (1)	07:02			06:56	07:54	08:28
	21:21	45	20:47 (4)	20:21	29	19:29 (1)	19:06			16:56	16:04	15:57
26	05:17		20:03 (2)	06:09		19:00 (1)	07:03			06:58	07:56	08:28
	21:20	43	20:47 (4)	20:18	29	19:29 (1)	19:04			16:54	16:03	15:57
27	05:18		20:04 (2)	06:11		19:00 (1)	07:05			07:00	07:58	08:28
	21:18	39	20:46 (4)	20:16	29	19:29 (1)	19:01			16:52	16:02	15:58
28	05:20		20:07 (2)	06:13		18:59 (1)	07:07			07:02	07:59	08:28
	21:17	32	20:45 (4)	20:14	29	19:28 (1)	18:59			16:50	16:01	15:59
29	05:22		19:57 (3)	06:15		18:59 (1)	07:09			07:04	08:01	08:29
	21:15	34	20:43 (4)	20:11	29	19:28 (1)	18:56			16:48	16:00	16:00
30	05:23		19:55 (3)	06:16		19:00 (1)	07:11			07:06	08:02	08:29
	21:13	25	20:42 (4)	20:09	28	19:28 (1)	18:54			16:46	15:59	16:01
31	05:25		19:53 (3)	06:18		18:59 (1)				07:08		08:29
	21:12	20	20:40 (4)	20:07	27	19:26 (1)				16:44		16:02
Sonnenscheinstunden	510			459			382			329	260	235
astr.max.mögl.Beschattung		1435			737			110				
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40				
Reduktion Betriebsdauer		0.91			0.91			0.91				
Reduktion Windrichtung		0.66			0.67			0.68				
Gesamte Reduktion		0.27			0.30			0.25				
Met.wahrsch.Beschattung		382			220			28				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CD - IO82

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40		19:14 (1)	04:51		20:07 (2)
	16:03		16:54		17:49		19:46			20:41	29	20:08 (3)	21:30	39	20:46 (4)
2	08:28		07:57		07:00		06:46			05:38		19:16 (1)	04:50		20:07 (2)
	16:04		16:56		17:50		19:48			20:42	26	20:09 (3)	21:31	40	20:47 (4)
3	08:28		07:56		06:58		06:43			05:36		19:51 (3)	04:49		20:07 (2)
	16:05		16:58		17:52		19:50			20:44	19	20:10 (3)	21:32	40	20:47 (4)
4	08:28		07:54		06:55		06:41			05:34		19:51 (3)	04:48		20:06 (2)
	16:06		16:59		17:54		19:52			20:46	21	20:12 (3)	21:33	41	20:47 (4)
5	08:28		07:52		06:53		06:39			05:32		19:50 (3)	04:48		20:07 (2)
	16:08		17:01		17:56		19:53			20:48	22	20:12 (3)	21:34	40	20:47 (4)
6	08:27		07:50		06:51		06:36			05:30		19:49 (3)	04:47		20:06 (2)
	16:09		17:03		17:58		19:55			20:50	24	20:13 (3)	21:35	41	20:47 (4)
7	08:27		07:49		06:48		06:34			05:28		19:49 (3)	04:46		20:05 (2)
	16:10		17:05		18:00		19:57			20:51	24	20:13 (3)	21:36	41	20:46 (4)
8	08:26		07:47		06:46		06:31			05:26		19:48 (3)	04:46		20:06 (2)
	16:12		17:07		18:02		19:59			20:53	25	20:13 (3)	21:37	41	20:47 (4)
9	08:26		07:45		06:44		06:29			05:24		19:49 (3)	04:45		20:06 (2)
	16:13		17:09		18:04		20:01			20:55	24	20:13 (3)	21:38	41	20:47 (4)
10	08:25		07:43		06:41		06:27			05:22		19:49 (3)	04:45		20:06 (2)
	16:15		17:11		18:06		20:03			20:57	24	20:13 (3)	21:39	41	20:47 (4)
11	08:25		07:41		06:39		06:24			05:21		19:48 (3)	04:44		20:06 (2)
	16:16		17:13		18:08		20:04			20:58	24	20:12 (3)	21:40	41	20:47 (4)
12	08:24		07:39		06:37		06:22		19:22 (1)	05:19		19:49 (3)	04:44		20:06 (2)
	16:18		17:15		18:09		20:06	8	19:30 (1)	21:00	24	20:13 (3)	21:41	41	20:47 (4)
13	08:23		07:37		06:34		06:20		19:17 (1)	05:17		19:49 (3)	04:44		20:06 (2)
	16:19		17:17		18:11		20:08	16	19:33 (1)	21:02	23	20:12 (3)	21:41	40	20:46 (4)
14	08:22		07:35		06:32		06:17		19:15 (1)	05:15		19:50 (3)	04:43		20:06 (2)
	16:21		17:19		18:13		20:10	20	19:35 (1)	21:03	22	20:12 (3)	21:42	41	20:47 (4)
15	08:21		07:33		06:29		06:15		19:14 (1)	05:14		19:50 (3)	04:43		20:06 (2)
	16:22		17:21		18:15		20:12	22	19:36 (1)	21:05	21	20:11 (3)	21:43	41	20:47 (4)
16	08:20		07:31		06:27		06:13		19:13 (1)	05:12		19:51 (3)	04:43		20:06 (2)
	16:24		17:23		18:17		20:13	24	19:37 (1)	21:07	20	20:11 (3)	21:43	41	20:47 (4)
17	08:19		07:29		06:25		06:10		19:11 (1)	05:10		19:51 (3)	04:43		20:06 (2)
	16:26		17:25		18:19		20:15	26	19:37 (1)	21:08	21	20:36 (4)	21:44	41	20:47 (4)
18	08:18		07:27		06:22		06:08		19:10 (1)	05:09		19:52 (3)	04:43		20:07 (2)
	16:28		17:27		18:21		20:17	27	19:37 (1)	21:10	25	20:38 (4)	21:44	40	20:47 (4)
19	08:17		07:25		06:20		06:06		19:10 (1)	05:07		19:53 (3)	04:43		20:07 (2)
	16:29		17:29		18:22		20:19	28	19:38 (1)	21:11	25	20:39 (4)	21:44	40	20:47 (4)
20	08:16		07:22		06:17		06:04		19:09 (1)	05:06		19:55 (3)	04:43		20:07 (2)
	16:31		17:31		18:24		20:21	29	19:38 (1)	21:13	25	20:41 (4)	21:45	40	20:47 (4)
21	08:15		07:20		06:15		06:01		19:09 (1)	05:04		19:57 (3)	04:43		20:07 (2)
	16:33		17:33		18:26		20:23	29	19:38 (1)	21:15	22	20:42 (4)	21:45	40	20:47 (4)
22	08:14		07:18		06:12		05:59		19:08 (1)	05:03		20:26 (4)	04:43		20:08 (2)
	16:35		17:35		18:28		20:24	29	19:37 (1)	21:16	17	20:43 (4)	21:45	40	20:48 (4)
23	08:12		07:16		06:10		05:57		19:08 (1)	05:02		20:26 (4)	04:43		20:08 (2)
	16:36		17:37		18:30		20:26	29	19:37 (1)	21:18	18	20:44 (4)	21:45	40	20:48 (4)
24	08:11		07:14		06:08		05:55		19:08 (1)	05:00		20:16 (2)	04:44		20:08 (2)
	16:38		17:39		18:32		20:28	29	19:37 (1)	21:19	29	20:45 (4)	21:45	40	20:48 (4)
25	08:10		07:11		06:05		05:52		19:09 (1)	04:59		20:14 (2)	04:44		20:09 (2)
	16:40		17:41		18:33		20:30	27	19:36 (1)	21:21	31	20:45 (4)	21:46	40	20:49 (4)
26	08:08		07:09		06:03		05:50		19:09 (1)	04:58		20:12 (2)	04:44		20:08 (2)
	16:42		17:43		18:35		20:32	27	19:36 (1)	21:22	34	20:46 (4)	21:45	41	20:49 (4)
27	08:07		07:07		06:00		05:48		19:10 (1)	04:56		20:11 (2)	04:45		20:09 (2)
	16:44		17:45		18:37		20:33	25	19:35 (1)	21:23	35	20:46 (4)	21:45	41	20:50 (4)
28	08:05		07:05		05:58		05:46		19:10 (1)	04:55		20:10 (2)	04:45		20:09 (2)
	16:46		17:47		18:39		20:35	24	19:34 (1)	21:25	36	20:46 (4)	21:45	41	20:50 (4)
29	08:04				06:55		05:44		19:11 (1)	04:54		20:09 (2)	04:46		20:10 (2)
	16:48				19:41		20:37	22	19:33 (1)	21:26	37	20:46 (4)	21:45	40	20:50 (4)
30	08:02				06:53		05:42		19:12 (1)	04:53		20:08 (2)	04:47		20:09 (2)
	16:50				19:43		20:39	28	20:06 (3)	21:27	38	20:46 (4)	21:45	41	20:50 (4)
31	08:01				06:51					04:52		20:08 (2)			
	16:52				19:44					21:29	38	20:46 (4)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung								469				803			1215
Red.Sonnenscheinwahrsch.								0.41				0.51			0.45
Reduktion Betriebsdauer								0.91				0.91			0.91
Reduktion Windrichtung								0.67				0.66			0.65
Gesamte Reduktion								0.25				0.31			0.27
Met.wahrsch.Beschattung								118				246			327

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CD - IO82

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September	Oktober	November	Dezember
1	04:47		20:10 (2) | 05:26		19:59 (3) | 06:20	07:12	07:10	08:04
	21:45	41	20:51 (4) | 21:10	24	20:23 (3) | 20:04	18:51	16:42	15:58
2	04:48		20:11 (2) | 05:28		19:59 (3) | 06:22	07:14	07:12	08:05
	21:44	41	20:52 (4) | 21:08	24	20:23 (3) | 20:02	18:49	16:40	15:57
3	04:49		20:10 (2) | 05:30		19:59 (3) | 06:23	07:16	07:14	08:07
	21:44	41	20:51 (4) | 21:06	24	20:23 (3) | 20:00	18:47	16:38	15:57
4	04:50		20:11 (2) | 05:31		19:58 (3) | 06:25	07:18	07:15	08:08
	21:43	41	20:52 (4) | 21:05	25	20:23 (3) | 19:57	18:44	16:36	15:56
5	04:50		20:12 (2) | 05:33		19:59 (3) | 06:27	07:19	07:17	08:10
	21:43	41	20:53 (4) | 21:03	24	20:23 (3) | 19:55	18:42	16:34	15:55
6	04:51		20:12 (2) | 05:35		19:58 (3) | 06:29	07:21	07:19	08:11
	21:42	41	20:53 (4) | 21:01	24	20:22 (3) | 19:52	18:39	16:32	15:55
7	04:52		20:13 (2) | 05:36		19:59 (3) | 06:30	07:23	07:21	08:12
	21:42	41	20:54 (4) | 20:59	23	20:22 (3) | 19:50	18:37	16:30	15:54
8	04:53		20:13 (2) | 05:38		20:00 (3) | 06:32	07:25	07:23	08:14
	21:41	41	20:54 (4) | 20:57	22	20:22 (3) | 19:48	18:35	16:28	15:54
9	04:54		20:14 (2) | 05:40		20:00 (3) | 06:34	07:27	07:25	08:15
	21:40	40	20:54 (4) | 20:55	20	20:20 (3) | 19:45	18:32	16:27	15:54
10	04:55		20:15 (2) | 05:42		19:30 (1) | 06:36	07:29	07:27	08:16
	21:39	40	20:55 (4) | 20:53	20	20:20 (3) | 19:43	18:30	16:25	15:53
11	04:56		20:15 (2) | 05:43		19:24 (1) | 06:37	07:30	07:29	08:17
	21:38	40	20:55 (4) | 20:51	19	20:18 (3) | 19:40	18:27	16:23	15:53
12	04:58		20:16 (2) | 05:45		19:22 (1) | 06:39	07:32	07:31	08:18
	21:38	39	20:55 (4) | 20:49	29	20:16 (3) | 19:38	18:25	16:22	15:53
13	04:59		20:17 (2) | 05:47		19:21 (1) | 06:41	07:34	07:33	08:19
	21:37	38	20:55 (4) | 20:47	27	20:14 (3) | 19:35	18:23	16:20	15:53
14	05:00		20:17 (2) | 05:49		19:19 (1) | 06:42	07:36	07:34	08:20
	21:36	38	20:55 (4) | 20:45	21	19:40 (1) | 19:33	18:21	16:18	15:53
15	05:01		20:18 (2) | 05:50		19:18 (1) | 06:44	07:38	07:36	08:21
	21:34	37	20:55 (4) | 20:43	24	19:42 (1) | 19:30	18:18	16:17	15:53
16	05:03		20:19 (2) | 05:52		19:17 (1) | 06:46	07:40	07:38	08:22
	21:33	36	20:55 (4) | 20:41	25	19:42 (1) | 19:28	18:16	16:15	15:53
17	05:04		20:21 (2) | 05:54		19:16 (1) | 06:48	07:41	07:40	08:23
	21:32	34	20:55 (4) | 20:38	26	19:42 (1) | 19:26	18:14	16:14	15:53
18	05:05		20:22 (2) | 05:55		19:15 (1) | 06:49	07:43	07:42	08:24
	21:31	33	20:55 (4) | 20:36	28	19:43 (1) | 19:23	18:11	16:12	15:53
19	05:07		20:24 (2) | 05:57		19:15 (1) | 06:51	07:45	07:44	08:25
	21:30	31	20:55 (4) | 20:34	28	19:43 (1) | 19:21	18:09	16:11	15:54
20	05:08		20:28 (2) | 05:59		19:14 (1) | 06:53	07:47	07:45	08:25
	21:28	24	20:54 (4) | 20:32	29	19:43 (1) | 19:18	18:07	16:10	15:54
21	05:09		20:37 (4) | 06:01		19:14 (1) | 06:55	07:49	07:47	08:26
	21:27	17	20:54 (4) | 20:30	29	19:43 (1) | 19:16	18:05	16:08	15:54
22	05:11		20:08 (3) | 06:02		19:13 (1) | 06:56	07:51	07:49	08:26
	21:26	22	20:53 (4) | 20:27	29	19:42 (1) | 19:13	18:03	16:07	15:55
23	05:12		20:06 (3) | 06:04		19:13 (1) | 06:58	07:53	07:51	08:27
	21:24	25	20:52 (4) | 20:25	29	19:42 (1) | 19:11	18:00	16:06	15:55
24	05:14		20:04 (3) | 06:06		19:14 (1) | 07:00	07:54	07:53	08:27
	21:23	25	20:50 (4) | 20:23	28	19:42 (1) | 19:08	17:58	16:05	15:56
25	05:15		20:03 (3) | 06:08		19:13 (1) | 07:02	06:56	07:54	08:28
	21:21	25	20:49 (4) | 20:21	27	19:40 (1) | 19:06	16:56	16:04	15:57
26	05:17		20:02 (3) | 06:09		19:14 (1) | 07:03	06:58	07:56	08:28
	21:20	24	20:48 (4) | 20:18	26	19:40 (1) | 19:04	16:54	16:03	15:57
27	05:18		20:01 (3) | 06:11		19:15 (1) | 07:05	07:00	07:58	08:28
	21:18	20	20:21 (3) | 20:16	24	19:39 (1) | 19:01	16:52	16:02	15:58
28	05:20		20:01 (3) | 06:13		19:15 (1) | 07:07	07:02	07:59	08:28
	21:17	21	20:22 (3) | 20:14	22	19:37 (1) | 18:59	16:50	16:01	15:59
29	05:22		20:00 (3) | 06:15		19:16 (1) | 07:09	07:04	08:01	08:29
	21:15	22	20:22 (3) | 20:11	19	19:35 (1) | 18:56	16:48	16:00	16:00
30	05:23		20:00 (3) | 06:16		19:18 (1) | 07:11	07:06	08:02	08:29
	21:13	23	20:23 (3) | 20:09	15	19:33 (1) | 18:54	16:46	15:59	16:01
31	05:25		19:59 (3) | 06:18		19:21 (1) |	07:08		08:29
	21:12	24	20:23 (3) | 20:07	8	19:29 (1) |	16:44		16:02
Sonnenscheinstunden	510		459		382	329	260	235
astr.max.mögl.Beschattung		1008		752				
Red.Sonnenscheinwahrsch.		0.45		0.49				
Reduktion Betriebsdauer		0.91		0.91				
Reduktion Windrichtung		0.65		0.67				
Gesamte Reduktion		0.26		0.30				
Met.wahrsch.Beschattung		266		223				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CE - IO83

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40		19:16 (1)	04:51		20:13 (2)
	16:03		16:54		17:49		19:46			20:41	27	20:08 (3)	21:30	26	20:39 (2)
2	08:28		07:57		07:00		06:46			05:38		19:18 (1)	04:50		20:13 (2)
	16:04		16:56		17:50		19:48			20:42	29	20:10 (3)	21:31	27	20:40 (2)
3	08:28		07:56		06:58		06:43			05:36		19:19 (1)	04:49		20:12 (2)
	16:05		16:58		17:52		19:50			20:44	30	20:12 (3)	21:32	28	20:40 (2)
4	08:28		07:54		06:55		06:41			05:34		19:23 (1)	04:48		20:12 (2)
	16:06		16:59		17:54		19:52			20:46	25	20:14 (3)	21:33	29	20:41 (2)
5	08:28		07:52		06:53		06:39			05:32		19:54 (3)	04:48		20:12 (2)
	16:08		17:01		17:56		19:53			20:48	20	20:14 (3)	21:34	30	20:42 (2)
6	08:27		07:50		06:51		06:36			05:30		19:53 (3)	04:47		20:12 (2)
	16:09		17:03		17:58		19:55			20:50	22	20:15 (3)	21:35	30	20:42 (2)
7	08:27		07:49		06:48		06:34			05:28		19:53 (3)	04:46		20:11 (2)
	16:10		17:05		18:00		19:57			20:51	22	20:15 (3)	21:36	31	20:42 (2)
8	08:26		07:47		06:46		06:31			05:26		19:52 (3)	04:46		20:11 (2)
	16:12		17:07		18:02		19:59			20:53	23	20:15 (3)	21:37	32	20:43 (2)
9	08:26		07:45		06:44		06:29			05:24		19:52 (3)	04:45		20:12 (2)
	16:13		17:09		18:04		20:01			20:55	24	20:16 (3)	21:38	32	20:44 (2)
10	08:25		07:43		06:41		06:27			05:22		19:52 (3)	04:45		20:11 (2)
	16:15		17:11		18:06		20:03			20:57	24	20:16 (3)	21:39	33	20:44 (2)
11	08:25		07:41		06:39		06:24			05:21		19:52 (3)	04:44		20:11 (2)
	16:16		17:13		18:08		20:04			20:58	23	20:15 (3)	21:40	33	20:44 (2)
12	08:24		07:39		06:37		06:22			05:19		19:52 (3)	04:44		20:12 (2)
	16:18		17:15		18:09		20:06			21:00	24	20:16 (3)	21:41	33	20:45 (2)
13	08:23		07:37		06:34		06:20			05:17		19:52 (3)	04:44		20:11 (2)
	16:19		17:17		18:11		20:08			21:02	23	20:15 (3)	21:41	34	20:45 (2)
14	08:22		07:35		06:32		06:17		19:25 (1)	05:15		19:53 (3)	04:43		20:11 (2)
	16:21		17:19		18:13		20:10	9	19:34 (1)	21:03	22	20:15 (3)	21:42	34	20:45 (2)
15	08:21		07:33		06:29		06:15		19:22 (1)	05:14		19:53 (3)	04:43		20:11 (2)
	16:22		17:21		18:15		20:12	15	19:37 (1)	21:05	22	20:15 (3)	21:43	35	20:46 (2)
16	08:20		07:31		06:27		06:13		19:20 (1)	05:12		19:54 (3)	04:43		20:12 (2)
	16:24		17:23		18:17		20:13	19	19:39 (1)	21:07	21	20:15 (3)	21:43	34	20:46 (2)
17	08:19		07:29		06:25		06:10		19:18 (1)	05:10		19:54 (3)	04:43		20:12 (2)
	16:26		17:25		18:19		20:15	22	19:40 (1)	21:08	20	20:14 (3)	21:44	34	20:46 (2)
18	08:18		07:27		06:22		06:08		19:17 (1)	05:09		19:55 (3)	04:43		20:12 (2)
	16:28		17:27		18:21		20:17	24	19:41 (1)	21:10	18	20:13 (3)	21:44	35	20:47 (2)
19	08:17		07:25		06:20		06:06		19:16 (1)	05:07		19:55 (3)	04:43		20:12 (2)
	16:29		17:29		18:22		20:19	25	19:41 (1)	21:11	17	20:12 (3)	21:44	35	20:47 (2)
20	08:16		07:22		06:17		06:04		19:15 (1)	05:06		19:56 (3)	04:43		20:12 (2)
	16:31		17:31		18:24		20:21	27	19:42 (1)	21:13	15	20:11 (3)	21:45	35	20:47 (2)
21	08:15		07:20		06:15		06:01		19:15 (1)	05:04		19:58 (3)	04:43		20:12 (2)
	16:33		17:33		18:26		20:23	27	19:42 (1)	21:15	12	20:10 (3)	21:45	35	20:47 (2)
22	08:14		07:18		06:12		05:59		19:14 (1)	05:03		19:59 (3)	04:43		20:13 (2)
	16:35		17:35		18:28		20:24	28	19:42 (1)	21:16	9	20:08 (3)	21:45	35	20:48 (2)
23	08:12		07:16		06:10		05:57		19:13 (1)	05:02		20:03 (3)	04:43		20:13 (2)
	16:36		17:37		18:30		20:26	29	19:42 (1)	21:18	2	20:05 (3)	21:45	35	20:48 (2)
24	08:11		07:14		06:08		05:55		19:13 (1)	05:00			04:44		20:13 (2)
	16:38		17:39		18:32		20:28	28	19:41 (1)	21:19			21:45	35	20:48 (2)
25	08:10		07:11		06:05		05:52		19:13 (1)	04:59		20:23 (2)	04:44		20:14 (2)
	16:40		17:41		18:33		20:30	28	19:41 (1)	21:21	4	20:27 (2)	21:46	34	20:48 (2)
26	08:08		07:09		06:03		05:50		19:14 (1)	04:58		20:20 (2)	04:44		20:14 (2)
	16:42		17:43		18:35		20:32	27	19:41 (1)	21:22	11	20:31 (2)	21:45	34	20:48 (2)
27	08:07		07:07		06:00		05:48		19:14 (1)	04:56		20:18 (2)	04:45		20:15 (2)
	16:44		17:45		18:37		20:33	26	19:40 (1)	21:23	15	20:33 (2)	21:45	34	20:49 (2)
28	08:05		07:05		05:58		05:46		19:14 (1)	04:55		20:16 (2)	04:45		20:14 (2)
	16:46		17:47		18:39		20:35	26	19:40 (1)	21:25	19	20:35 (2)	21:45	34	20:48 (2)
29	08:04				06:55		05:44		19:15 (1)	04:54		20:15 (2)	04:46		20:15 (2)
	16:48				19:41		20:37	24	19:39 (1)	21:26	21	20:36 (2)	21:45	34	20:49 (2)
30	08:02				06:53		05:42		19:16 (1)	04:53		20:14 (2)	04:47		20:15 (2)
	16:50				19:43		20:39	22	19:38 (1)	21:27	23	20:37 (2)	21:45	33	20:48 (2)
31	08:01				06:51					04:52		20:14 (2)			
	16:52				19:44					21:29	24	20:38 (2)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung							406				591			983	
Red.Sonnenscheinwahrsch.							0.41				0.51			0.45	
Reduktion Betriebsdauer							0.91				0.91			0.91	
Reduktion Windrichtung							0.67				0.66			0.65	
Gesamte Reduktion							0.25				0.31			0.27	
Met.wahrsch.Beschattung							102				182			264	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CE - IO83

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		Septembe	Oktober	November	Dezember
1	04:47		20:15 (2)	05:26	20:03 (3)	06:20	07:12	07:10	08:04
	21:45	34	20:49 (2)	21:10	23	20:26 (3)	20:04	18:51	16:42	15:58
2	04:48		20:16 (2)	05:28	20:02 (3)	06:22	07:14	07:12	08:05
	21:44	33	20:49 (2)	21:08	24	20:26 (3)	20:02	18:49	16:40	15:57
3	04:49		20:16 (2)	05:30	20:02 (3)	06:23	07:16	07:14	08:07
	21:44	32	20:48 (2)	21:06	24	20:26 (3)	20:00	18:47	16:38	15:57
4	04:50		20:16 (2)	05:31	20:02 (3)	06:25	07:18	07:15	08:08
	21:43	32	20:48 (2)	21:05	23	20:25 (3)	19:57	18:44	16:36	15:56
5	04:50		20:17 (2)	05:33	20:03 (3)	06:27	07:19	07:17	08:10
	21:43	32	20:49 (2)	21:03	22	20:25 (3)	19:55	18:42	16:34	15:55
6	04:51		20:18 (2)	05:35	20:02 (3)	06:29	07:21	07:19	08:11
	21:42	31	20:49 (2)	21:01	22	20:24 (3)	19:52	18:39	16:32	15:55
7	04:52		20:18 (2)	05:36	20:03 (3)	06:30	07:23	07:21	08:12
	21:42	30	20:48 (2)	20:59	21	20:24 (3)	19:50	18:37	16:30	15:54
8	04:53		20:19 (2)	05:38	20:04 (3)	06:32	07:25	07:23	08:14
	21:41	29	20:48 (2)	20:57	20	20:24 (3)	19:48	18:35	16:28	15:54
9	04:54		20:20 (2)	05:40	19:31 (1)	06:34	07:27	07:25	08:15
	21:40	28	20:48 (2)	20:55	27	20:22 (3)	19:45	18:32	16:27	15:54
10	04:55		20:20 (2)	05:42	19:28 (1)	06:36	07:29	07:27	08:16
	21:39	28	20:48 (2)	20:53	30	20:21 (3)	19:43	18:30	16:25	15:53
11	04:56		20:21 (2)	05:43	19:26 (1)	06:37	07:30	07:29	08:17
	21:38	26	20:47 (2)	20:51	29	20:18 (3)	19:40	18:27	16:23	15:53
12	04:58		20:22 (2)	05:45	19:25 (1)	06:39	07:32	07:31	08:18
	21:37	25	20:47 (2)	20:49	24	20:15 (3)	19:38	18:25	16:22	15:53
13	04:59		20:23 (2)	05:47	19:24 (1)	06:41	07:34	07:33	08:19
	21:37	23	20:46 (2)	20:47	22	19:46 (1)	19:35	18:23	16:20	15:53
14	05:00		20:23 (2)	05:49	19:22 (1)	06:42	07:36	07:34	08:20
	21:36	22	20:45 (2)	20:45	24	19:46 (1)	19:33	18:21	16:18	15:53
15	05:01		20:24 (2)	05:50	19:22 (1)	06:44	07:38	07:36	08:21
	21:34	20	20:44 (2)	20:43	25	19:47 (1)	19:30	18:18	16:17	15:53
16	05:03		20:26 (2)	05:52	19:21 (1)	06:46	07:40	07:38	08:22
	21:33	17	20:43 (2)	20:41	27	19:48 (1)	19:28	18:16	16:15	15:53
17	05:04		20:28 (2)	05:54	19:20 (1)	06:48	07:41	07:40	08:23
	21:32	14	20:42 (2)	20:38	27	19:47 (1)	19:26	18:14	16:14	15:53
18	05:05		20:30 (2)	05:55	19:20 (1)	06:49	07:43	07:42	08:24
	21:31	9	20:39 (2)	20:36	28	19:48 (1)	19:23	18:11	16:12	15:53
19	05:07			05:57	19:20 (1)	06:51	07:45	07:44	08:25
	21:30			20:34	28	19:48 (1)	19:21	18:09	16:11	15:54
20	05:08			05:59	19:19 (1)	06:53	07:47	07:45	08:25
	21:28			20:32	28	19:47 (1)	19:18	18:07	16:10	15:54
21	05:09		20:11 (3)	06:01	19:19 (1)	06:55	07:49	07:47	08:26
	21:27	6	20:17 (3)	20:30	28	19:47 (1)	19:16	18:05	16:08	15:54
22	05:11		20:09 (3)	06:02	19:19 (1)	06:56	07:51	07:49	08:26
	21:26	10	20:19 (3)	20:27	27	19:46 (1)	19:13	18:03	16:07	15:55
23	05:12		20:08 (3)	06:04	19:19 (1)	06:58	07:53	07:51	08:27
	21:24	13	20:21 (3)	20:25	27	19:46 (1)	19:11	18:00	16:06	15:55
24	05:14		20:06 (3)	06:06	19:20 (1)	07:00	07:54	07:53	08:27
	21:23	16	20:22 (3)	20:23	25	19:45 (1)	19:08	17:58	16:05	15:56
25	05:15		20:05 (3)	06:08	19:20 (1)	07:02	06:56	07:54	08:28
	21:21	18	20:23 (3)	20:21	23	19:43 (1)	19:06	16:56	16:04	15:57
26	05:17		20:05 (3)	06:09	19:21 (1)	07:03	06:58	07:56	08:28
	21:20	19	20:24 (3)	20:18	21	19:42 (1)	19:04	16:54	16:03	15:57
27	05:18		20:04 (3)	06:11	19:22 (1)	07:05	07:00	07:58	08:28
	21:18	20	20:24 (3)	20:16	19	19:41 (1)	19:01	16:52	16:02	15:58
28	05:20		20:04 (3)	06:13	19:23 (1)	07:07	07:02	07:59	08:28
	21:17	21	20:25 (3)	20:14	15	19:38 (1)	18:59	16:50	16:01	15:59
29	05:22		20:03 (3)	06:15	19:26 (1)	07:09	07:04	08:01	08:29
	21:15	22	20:25 (3)	20:11	9	19:35 (1)	18:56	16:48	16:00	16:00
30	05:23		20:03 (3)	06:16			07:11	07:06	08:02	08:29
	21:13	23	20:26 (3)	20:09			18:54	16:46	15:59	16:01
31	05:25		20:02 (3)	06:18				07:08		08:29
	21:12	24	20:26 (3)	20:07				16:44		16:02
Sonnenscheinstunden	510			459		382	329	260	235
astr.max.mögl.Beschattung		657			692					
Red.Sonnenscheinwahrsch.		0.45			0.49					
Reduktion Betriebsdauer		0.91			0.91					
Reduktion Windrichtung		0.65			0.67					
Gesamte Reduktion		0.26			0.30					
Met.wahrsch.Beschattung		174			205					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CF - IO84

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März			April			Mai			Juni		
1	08:29		07:59		07:02			06:48			18:38 (1)	05:40			04:51		20:04 (6)
	16:03		16:54		17:49			19:46	16		18:54 (1)	20:41			21:30	35	20:39 (5)
2	08:28		07:57		07:00			06:46			18:40 (1)	05:38			04:50		20:05 (6)
	16:04		16:56		17:50			19:48	12		18:52 (1)	20:42			21:31	35	20:40 (5)
3	08:28		07:56		06:58			06:43			18:46 (1)	05:36			04:49		20:05 (6)
	16:05		16:57		17:52			19:50	1		18:47 (1)	20:44			21:32	35	20:40 (5)
4	08:28		07:54		06:55			06:41				05:34			04:48		20:05 (6)
	16:06		16:59		17:54			19:52				20:46			21:33	34	20:39 (5)
5	08:28		07:52		06:53			06:38				05:32			04:48		20:06 (6)
	16:08		17:01		17:56			19:53				20:48			21:34	34	20:40 (5)
6	08:27		07:50		06:51			06:36			19:20 (3)	05:30			04:47		20:05 (6)
	16:09		17:03		17:58			19:55	9		19:29 (3)	20:50			21:35	34	20:39 (5)
7	08:27		07:49		06:48			06:34			19:17 (3)	05:28			04:46		20:05 (6)
	16:10		17:05		18:00			19:57	13		19:30 (3)	20:51			21:36	34	20:39 (5)
8	08:26		07:47		06:46			06:31			19:13 (2)	05:26			04:46		20:06 (6)
	16:12		17:07		18:02			19:59	19		19:32 (3)	20:53			21:37	33	20:39 (5)
9	08:26		07:45		06:44			06:29			19:09 (2)	05:24			04:45		20:06 (6)
	16:13		17:09		18:04			20:01	24		19:33 (3)	20:55			21:38	33	20:39 (5)
10	08:25		07:43		06:41			06:27			19:06 (2)	05:22			04:45		20:06 (6)
	16:15		17:11		18:06			20:03	27		19:33 (3)	20:57			21:39	32	20:38 (5)
11	08:25		07:41		06:39			06:24			19:04 (2)	05:20			04:44		20:07 (6)
	16:16		17:13		18:07			20:04	29		19:33 (3)	20:58			21:40	32	20:39 (5)
12	08:24		07:39		06:37			06:22			19:03 (2)	05:19			04:44		20:07 (6)
	16:18		17:15		18:09			20:06	31		19:34 (3)	21:00			21:41	32	20:39 (5)
13	08:23		07:37		06:34			06:20			19:01 (2)	05:17		20:25 (5)	04:44		20:07 (6)
	16:19		17:17		18:11			20:08	32		19:33 (3)	21:02	4	20:29 (5)	21:41	31	20:38 (5)
14	08:22		07:35		06:32			06:17			19:01 (2)	05:15		20:17 (6)	04:43		20:07 (6)
	16:21		17:19		18:13			20:10	31		19:32 (3)	21:03	15	20:32 (5)	21:42	31	20:38 (5)
15	08:21		07:33		06:29			06:15			19:00 (2)	05:14		20:13 (6)	04:43		20:08 (6)
	16:22		17:21		18:15			20:12	32		19:32 (3)	21:05	20	20:33 (5)	21:43	31	20:39 (6)
16	08:20		07:31		06:27			06:13			18:59 (2)	05:12		20:12 (6)	04:43		20:08 (6)
	16:24		17:23		18:17			20:13	32		19:31 (2)	21:07	23	20:35 (5)	21:43	31	20:39 (6)
17	08:19		07:29		06:25			06:10			18:58 (2)	05:10		20:10 (6)	04:43		20:08 (6)
	16:26		17:25		18:19			20:15	32		19:30 (2)	21:08	26	20:36 (5)	21:44	31	20:39 (6)
18	08:18		07:27		06:22			06:08			18:58 (2)	05:09		20:09 (6)	04:43		20:08 (6)
	16:27		17:27		18:21			20:17	32		19:30 (2)	21:10	28	20:37 (5)	21:44	31	20:39 (6)
19	08:17		07:25		06:20		17:48 (1)	06:06			18:58 (2)	05:07		20:07 (6)	04:43		20:09 (6)
	16:29		17:29		18:22	5	17:53 (1)	20:19	32		19:30 (2)	21:11	30	20:37 (5)	21:44	30	20:39 (6)
20	08:16		07:22		06:17		17:44 (1)	06:03			18:58 (2)	05:06		20:07 (6)	04:43		20:09 (6)
	16:31		17:31		18:24	13	17:57 (1)	20:21	32		19:30 (2)	21:13	31	20:38 (5)	21:45	30	20:39 (6)
21	08:15		07:20		06:15		17:41 (1)	06:01			18:58 (2)	05:04		20:06 (6)	04:43		20:09 (6)
	16:33		17:33		18:26	17	17:58 (1)	20:23	32		19:30 (2)	21:15	33	20:39 (5)	21:45	30	20:39 (6)
22	08:14		07:18		06:12		17:40 (1)	05:59			18:58 (2)	05:03		20:05 (6)	04:43		20:10 (6)
	16:35		17:35		18:28	20	18:00 (1)	20:24	31		19:29 (2)	21:16	33	20:38 (5)	21:45	30	20:40 (6)
23	08:12		07:16		06:10		17:38 (1)	05:57			18:58 (2)	05:01		20:05 (6)	04:43		20:10 (6)
	16:36		17:37		18:30	22	18:00 (1)	20:26	30		19:28 (2)	21:18	34	20:39 (5)	21:45	30	20:40 (6)
24	08:11		07:14		06:08		17:38 (1)	05:55			18:59 (2)	05:00		20:05 (6)	04:44		20:09 (6)
	16:38		17:39		18:32	23	18:01 (1)	20:28	28		19:27 (2)	21:19	34	20:39 (5)	21:45	31	20:40 (6)
25	08:10		07:11		06:05		17:37 (1)	05:52			18:59 (2)	04:59		20:05 (6)	04:44		20:10 (6)
	16:40		17:41		18:33	23	18:00 (1)	20:30	27		19:26 (2)	21:21	34	20:39 (5)	21:46	31	20:41 (6)
26	08:08		07:09		06:03		17:37 (1)	05:50			19:00 (2)	04:58		20:05 (6)	04:44		20:10 (6)
	16:42		17:43		18:35	23	18:00 (1)	20:32	25		19:25 (2)	21:22	35	20:40 (5)	21:45	31	20:41 (6)
27	08:07		07:07		06:00		17:37 (1)	05:48			19:01 (2)	04:56		20:05 (6)	04:45		20:11 (6)
	16:44		17:45		18:37	24	18:01 (1)	20:33	23		19:24 (2)	21:23	35	20:40 (5)	21:45	31	20:42 (6)
28	08:05		07:05		05:58		17:36 (1)	05:46			19:02 (2)	04:55		20:05 (6)	04:45		20:10 (6)
	16:46		17:47		18:39	23	17:59 (1)	20:35	21		19:23 (2)	21:25	35	20:40 (5)	21:45	32	20:42 (6)
29	08:04				06:55		18:37 (1)	05:44			19:04 (2)	04:54		20:04 (6)	04:46		20:11 (6)
	16:48				19:41	22	18:59 (1)	20:37	17		19:21 (2)	21:26	36	20:40 (5)	21:45	31	20:42 (5)
30	08:02				06:53		18:37 (1)	05:42			19:07 (2)	04:53		20:04 (6)	04:47		20:10 (6)
	16:50				19:42	20	18:57 (1)	20:39	11		19:18 (2)	21:27	36	20:40 (5)	21:45	32	20:42 (5)
31	08:01				06:51		18:38 (1)					04:52		20:04 (6)			
	16:52				19:44	19	18:57 (1)					21:29	36	20:40 (5)			
Sonnenscheinstunden		252		274		367			419			492				508	
astr.max.mögl.Beschattung						254			681			558				958	
Red.Sonnenscheinwahrsch.						0.31			0.41			0.51				0.45	
Reduktion Betriebsdauer						0.91			0.91			0.91				0.91	
Reduktion Windrichtung						0.70			0.68			0.65				0.65	
Gesamte Reduktion						0.20			0.26			0.30				0.27	
Met.wahrsch.Beschattung						51			174			170				260	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CF - IO84

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober	November	Dezember
1 | 04:47		20:11 (6) | 05:26		| 06:20		19:03 (2) | 07:12	| 07:10	| 08:04
| 21:45	32	20:43 (5) | 21:10		| 20:04	29	19:32 (3) | 18:51	16:42	| 15:58
2 | 04:48		20:11 (6) | 05:28		| 06:22		19:05 (2) | 07:14	07:12	| 08:05
| 21:44	32	20:43 (5) | 21:08		| 20:02	27	19:32 (3) | 18:49	16:40	| 15:57
3 | 04:49		20:11 (6) | 05:30		| 06:23		19:06 (2) | 07:16	07:14	| 08:07
| 21:44	32	20:43 (5) | 21:06		| 20:00	24	19:30 (3) | 18:47	16:38	| 15:57
4 | 04:50		20:11 (6) | 05:31		| 06:25		19:10 (2) | 07:18	07:15	| 08:08
| 21:43	33	20:44 (5) | 21:05		| 19:57	19	19:29 (3) | 18:44	16:36	| 15:56
5 | 04:50		20:11 (6) | 05:33		| 06:27		19:14 (3) | 07:19	07:17	| 08:10
| 21:43	34	20:45 (5) | 21:03		| 19:55	13	19:27 (3) | 18:42	16:34	| 15:55
6 | 04:51		20:12 (6) | 05:35		| 06:29		19:15 (3) | 07:21	07:19	| 08:11
| 21:42	33	20:45 (5) | 21:01		| 19:52	9	19:24 (3) | 18:39	16:32	| 15:55
7 | 04:52		20:12 (6) | 05:36		| 06:30		| 07:23	07:21	| 08:12
| 21:42	34	20:46 (5) | 20:59		| 19:50		| 18:37	16:30	| 15:54
8 | 04:53		20:12 (6) | 05:38		| 06:32		| 07:25	07:23	| 08:14
| 21:41	34	20:46 (5) | 20:57		| 19:48		| 18:35	16:28	| 15:54
9 | 04:54		20:12 (6) | 05:40		| 06:34		| 07:27	07:25	| 08:15
| 21:40	35	20:47 (5) | 20:55		| 19:45		| 18:32	16:27	| 15:54
10 | 04:55		20:12 (6) | 05:42		| 06:36		18:34 (1) | 07:28	07:27	| 08:16
| 21:39	35	20:47 (5) | 20:53		| 19:43	11	18:45 (1) | 18:30	16:25	| 15:53
11 | 04:56		20:13 (6) | 05:43		| 06:37		18:32 (1) | 07:30	07:29	| 08:17
| 21:38	35	20:48 (5) | 20:51		| 19:40	15	18:47 (1) | 18:27	16:23	| 15:53
12 | 04:58		20:13 (6) | 05:45	19:20 (2)	| 06:39		18:29 (1) | 07:32	07:31	| 08:18
| 21:38	35	20:48 (5) | 20:49	1 19:21 (2)	| 19:38	19	18:48 (1) | 18:25	16:22	| 15:53
13 | 04:59		20:13 (6) | 05:47	19:14 (2)	| 06:41		18:28 (1) | 07:34	07:33	| 08:19
| 21:37	35	20:48 (5) | 20:47	13 19:27 (2)	| 19:35	21	18:49 (1) | 18:23	16:20	| 15:53
14 | 05:00		20:13 (6) | 05:48	19:11 (2)	| 06:42		18:27 (1) | 07:36	07:34	| 08:20
| 21:36	35	20:48 (5) | 20:45	18 19:29 (2)	| 19:33	22	18:49 (1) | 18:20	16:18	| 15:53
15 | 05:01		20:13 (6) | 05:50	19:10 (2)	| 06:44		18:27 (1) | 07:38	07:36	| 08:21
| 21:34	35	20:48 (5) | 20:43	20 19:30 (2)	| 19:30	23	18:50 (1) | 18:18	16:17	| 15:53
16 | 05:03		20:13 (6) | 05:52	19:08 (2)	| 06:46		18:25 (1) | 07:39	07:38	| 08:22
| 21:33	35	20:48 (5) | 20:41	24 19:32 (2)	| 19:28	24	18:49 (1) | 18:16	16:15	| 15:53
17 | 05:04		20:14 (6) | 05:54	19:06 (2)	| 06:48		18:25 (1) | 07:41	07:40	| 08:23
| 21:32	35	20:49 (5) | 20:38	26 19:32 (2)	| 19:26	24	18:49 (1) | 18:14	16:14	| 15:53
18 | 05:05		20:14 (6) | 05:55	19:06 (2)	| 06:49		18:25 (1) | 07:43	07:42	| 08:24
| 21:31	35	20:49 (5) | 20:36	27 19:33 (2)	| 19:23	24	18:49 (1) | 18:11	16:12	| 15:53
19 | 05:07		20:14 (6) | 05:57	19:04 (2)	| 06:51		18:24 (1) | 07:45	07:44	| 08:25
| 21:30	35	20:49 (5) | 20:34	29 19:33 (2)	| 19:21	23	18:47 (1) | 18:09	16:11	| 15:54
20 | 05:08		20:14 (6) | 05:59	19:04 (2)	| 06:53		18:25 (1) | 07:47	07:45	| 08:25
| 21:28	35	20:49 (5) | 20:32	30 19:34 (2)	| 19:18	22	18:47 (1) | 18:07	16:10	| 15:54
21 | 05:09		20:16 (6) | 06:01	19:03 (2)	| 06:55		18:26 (1) | 07:49	07:47	| 08:26
| 21:27	33	20:49 (5) | 20:30	31 19:34 (2)	| 19:16	20	18:46 (1) | 18:05	16:08	| 15:54
22 | 05:11		20:16 (6) | 06:02	19:02 (2)	| 06:56		18:27 (1) | 07:51	07:49	| 08:26
| 21:26	33	20:49 (5) | 20:27	32 19:34 (2)	| 19:13	17	18:44 (1) | 18:02	16:07	| 15:55
23 | 05:12		20:17 (6) | 06:04	19:02 (2)	| 06:58		18:27 (1) | 07:53	07:51	| 08:27
| 21:24	32	20:49 (5) | 20:25	32 19:34 (2)	| 19:11	14	18:41 (1) | 18:00	16:06	| 15:55
24 | 05:14		20:18 (6) | 06:06	19:02 (2)	| 07:00		18:30 (1) | 07:54	07:53	| 08:27
| 21:23	30	20:48 (5) | 20:23	32 19:34 (2)	| 19:08	8	18:38 (1) | 17:58	16:05	| 15:56
25 | 05:15		20:18 (6) | 06:08	19:01 (2)	| 07:02		| 06:56	07:54	| 08:28
| 21:21	29	20:47 (5) | 20:21	32 19:33 (2)	| 19:06		| 16:56	16:04	| 15:57
26 | 05:17		20:20 (6) | 06:09	19:01 (2)	| 07:03		| 06:58	07:56	| 08:28
| 21:20	27	20:47 (5) | 20:18	32 19:33 (2)	| 19:04		| 16:54	16:03	| 15:57
27 | 05:18		20:21 (6) | 06:11	19:01 (2)	| 07:05		| 07:00	07:58	| 08:28
| 21:18	25	20:46 (5) | 20:16	32 19:33 (2)	| 19:01		| 16:52	16:02	| 15:58
28 | 05:20		20:23 (6) | 06:13	19:01 (2)	| 07:07		| 07:02	07:59	| 08:28
| 21:17	22	20:45 (5) | 20:14	32 19:33 (3)	| 18:59		| 16:50	16:01	| 15:59
29 | 05:22		20:25 (6) | 06:15	19:01 (2)	| 07:09		| 07:04	08:01	| 08:29
| 21:15	18	20:43 (5) | 20:11	32 19:33 (3)	| 18:56		| 16:48	16:00	| 16:00
30 | 05:23		20:33 (5) | 06:16	19:02 (2)	| 07:11		| 07:06	08:02	| 08:29
| 21:13	9	20:42 (5) | 20:09	32 19:34 (3)	| 18:54		| 16:46	15:59	| 16:01
31 | 05:25		| 06:18	19:02 (2)	|		| 07:08		| 08:29
| 21:12		| 20:07	31 19:33 (3)	|		| 16:44		| 16:02
Sonnenscheinstunden | 510		| 459		| 382		| 329	| 260	| 235
astr.max.mögl.Beschattung |	942	|	538	|	408	|	|	|
Red.Sonnenscheinwahrsch. |	0.45	|	0.49	|	0.40	|	|	|
Reduktion Betriebsdauer |	0.91	|	0.91	|	0.91	|	|	|
Reduktion Windrichtung |	0.65	|	0.68	|	0.69	|	|	|
Gesamte Reduktion |	0.27	|	0.30	|	0.25	|	|	|
Met.wahrsch.Beschattung |	250	|	163	|	104	|	|	|

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CG - IO85

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März			April			Mai			Juni			
1	08:29		07:59		07:02			06:48			18:45 (1)	05:40		19:12 (2)	04:51		20:25 (6)
	16:03		16:54		17:49			19:46	24		19:09 (1)	20:41	31	19:43 (2)	21:30	26	20:51 (5)
2	08:28		07:57		07:00			06:46			18:45 (1)	05:38		19:12 (2)	04:50		20:25 (6)
	16:04		16:56		17:50			19:48	24		19:09 (1)	20:42	31	19:43 (2)	21:31	27	20:52 (5)
3	08:28		07:56		06:58			06:43			18:46 (1)	05:36		19:12 (2)	04:49		20:24 (6)
	16:05		16:57		17:52			19:50	23		19:09 (1)	20:44	30	19:42 (2)	21:32	28	20:52 (5)
4	08:28		07:54		06:55			06:41			18:45 (1)	05:34		19:13 (2)	04:48		20:24 (6)
	16:06		16:59		17:54			19:52	23		19:08 (1)	20:46	28	19:41 (2)	21:33	28	20:52 (5)
5	08:28		07:52		06:53			06:38			18:46 (1)	05:32		19:14 (2)	04:48		20:24 (6)
	16:08		17:01		17:56			19:53	21		19:07 (1)	20:48	27	19:41 (2)	21:34	29	20:53 (5)
6	08:27		07:50		06:51			06:36			18:47 (1)	05:30		19:15 (2)	04:47		20:24 (6)
	16:09		17:03		17:58			19:55	19		19:06 (1)	20:50	25	19:40 (2)	21:35	29	20:53 (5)
7	08:27		07:49		06:48			06:34			18:48 (1)	05:28		19:16 (2)	04:46		20:23 (6)
	16:10		17:05		18:00			19:57	15		19:03 (1)	20:51	23	19:39 (2)	21:36	29	20:52 (5)
8	08:26		07:47		06:46			06:31			18:50 (1)	05:26		19:17 (2)	04:46		20:23 (6)
	16:12		17:07		18:02			19:59	11		19:01 (1)	20:53	20	19:37 (2)	21:37	30	20:53 (5)
9	08:26		07:45		06:44			06:29				05:24		19:19 (2)	04:45		20:24 (6)
	16:13		17:09		18:04			20:01				20:55	17	19:36 (2)	21:38	30	20:54 (5)
10	08:25		07:43		06:41			06:27				05:22		19:21 (2)	04:45		20:23 (6)
	16:15		17:11		18:06			20:03				20:57	13	19:34 (2)	21:39	30	20:53 (5)
11	08:25		07:41		06:39			06:24			19:28 (3)	05:20		19:24 (2)	04:44		20:24 (6)
	16:16		17:13		18:07			20:04	9		19:37 (3)	20:58	6	19:30 (2)	21:40	30	20:54 (5)
12	08:24		07:39		06:37			06:22			19:26 (3)	05:19			04:44		20:24 (6)
	16:18		17:15		18:09			20:06	13		19:39 (3)	21:00			21:41	30	20:54 (5)
13	08:23		07:37		06:34			06:20			19:24 (3)	05:17			04:44		20:23 (6)
	16:19		17:17		18:11			20:08	16		19:40 (3)	21:02			21:41	30	20:53 (5)
14	08:22		07:35		06:32			06:17			19:23 (3)	05:15			04:43		20:24 (6)
	16:21		17:19		18:13			20:10	19		19:42 (3)	21:03			21:42	30	20:54 (5)
15	08:21		07:33		06:29			06:15			19:22 (3)	05:14			04:43		20:24 (6)
	16:22		17:21		18:15			20:12	20		19:42 (3)	21:05			21:43	30	20:54 (5)
16	08:20		07:31		06:27			06:13			19:22 (3)	05:12			04:43		20:24 (6)
	16:24		17:23		18:17			20:13	21		19:43 (3)	21:07			21:43	30	20:54 (5)
17	08:19		07:29		06:25			06:10			19:21 (3)	05:10			04:43		20:24 (6)
	16:26		17:25		18:19			20:15	21		19:42 (3)	21:08			21:44	31	20:55 (5)
18	08:18		07:27		06:22			06:08			19:20 (2)	05:09			04:43		20:24 (6)
	16:28		17:27		18:21			20:17	22		19:42 (3)	21:10			21:44	31	20:55 (5)
19	08:17		07:25		06:20			06:06			19:18 (2)	05:07			04:43		20:24 (6)
	16:29		17:29		18:22			20:19	24		19:42 (2)	21:11			21:44	31	20:55 (5)
20	08:16		07:22		06:17			06:03			19:17 (2)	05:06			04:43		20:25 (6)
	16:31		17:31		18:24			20:21	26		19:43 (2)	21:13			21:45	30	20:55 (5)
21	08:15		07:20		06:15			06:01			19:16 (2)	05:04		20:36 (5)	04:43		20:25 (6)
	16:33		17:33		18:26			20:23	28		19:44 (2)	21:15	6	20:42 (5)	21:45	30	20:55 (5)
22	08:14		07:18		06:12			05:59			19:14 (2)	05:03		20:33 (5)	04:43		20:26 (6)
	16:35		17:35		18:28			20:24	29		19:43 (2)	21:16	10	20:43 (5)	21:45	30	20:56 (5)
23	08:12		07:16		06:10			05:57			19:13 (2)	05:01		20:32 (5)	04:43		20:26 (6)
	16:36		17:37		18:30			20:26	31		19:44 (2)	21:18	13	20:45 (5)	21:45	30	20:56 (5)
24	08:11		07:14		06:08			05:55			19:13 (2)	05:00		20:31 (5)	04:44		20:25 (6)
	16:38		17:39		18:32			20:28	31		19:44 (2)	21:19	15	20:46 (5)	21:45	31	20:56 (5)
25	08:10		07:11		06:05		17:54 (1)	05:52			19:12 (2)	04:59		20:30 (5)	04:44		20:26 (6)
	16:40		17:41		18:33	11	18:05 (1)	20:30	33		19:45 (2)	21:21	17	20:47 (5)	21:46	31	20:57 (5)
26	08:08		07:09		06:03		17:52 (1)	05:50			19:12 (2)	04:58		20:30 (5)	04:44		20:26 (6)
	16:42		17:43		18:35	15	18:07 (1)	20:32	33		19:45 (2)	21:22	19	20:49 (5)	21:45	30	20:56 (5)
27	08:07		07:07		06:00		17:50 (1)	05:48			19:12 (2)	04:56		20:29 (6)	04:45		20:27 (6)
	16:44		17:45		18:37	19	18:09 (1)	20:33	33		19:45 (2)	21:23	20	20:49 (5)	21:45	30	20:57 (5)
28	08:05		07:05		05:58		17:48 (1)	05:46			19:12 (2)	04:55		20:28 (6)	04:45		20:27 (6)
	16:46		17:47		18:39	21	18:09 (1)	20:35	32		19:44 (2)	21:25	22	20:50 (5)	21:45	30	20:57 (5)
29	08:04				06:55		18:48 (1)	05:44			19:11 (2)	04:54		20:27 (6)	04:46		20:27 (6)
	16:48				19:41	22	19:10 (1)	20:37	33		19:44 (2)	21:26	23	20:50 (5)	21:45	31	20:58 (5)
30	08:02				06:53		18:46 (1)	05:42			19:12 (2)	04:53		20:26 (6)	04:47		20:27 (6)
	16:50				19:42	24	19:10 (1)	20:39	32		19:44 (2)	21:27	25	20:51 (5)	21:45	30	20:57 (5)
31	08:01				06:51		18:46 (1)					04:52		20:25 (6)			
	16:52				19:44	24	19:10 (1)					21:29	26	20:51 (5)			
Sonnenscheinstunden	252		274		367			419				492			508		
astr.max.mögl.Beschattung						136			666			447				892	
Red.Sonnenscheinwahrsch.						0.31			0.41			0.51				0.45	
Reduktion Betriebsdauer						0.91			0.91			0.91				0.91	
Reduktion Windrichtung						0.70			0.67			0.66				0.64	
Gesamte Reduktion						0.20			0.25			0.31				0.27	
Met.wahrsch.Beschattung						27			169			137				238	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CG - IO85

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober	November	Dezember
1 | 04:47		20:28 (6) | 05:26		| 06:20	19:27 (3) | 07:12	| 07:10	| 08:04
| 21:45	30	20:58 (5) | 21:10		| 20:04	9 19:36 (3) | 18:51	16:42	| 15:58
2 | 04:48		20:28 (6) | 05:28		19:33 (2) | 06:22	| 07:14	07:12	| 08:05
| 21:44	30	20:58 (5) | 21:08	9	19:42 (2) | 20:02	| 18:49	16:40	| 15:57
3 | 04:49		20:28 (6) | 05:30		19:30 (2) | 06:23	| 07:16	07:14	| 08:07
| 21:44	30	20:58 (5) | 21:06	15	19:45 (2) | 20:00	| 18:47	16:38	| 15:57
4 | 04:50		20:29 (6) | 05:31		19:28 (2) | 06:25	18:47 (1) | 07:18	07:15	| 08:08
| 21:43	29	20:58 (5) | 21:05	18	19:46 (2) | 19:57	11 18:58 (1) | 18:44	16:36	| 15:56
5 | 04:50		20:29 (6) | 05:33		19:27 (2) | 06:27	18:45 (1) | 07:19	07:17	| 08:10
| 21:43	30	20:59 (5) | 21:03	21	19:48 (2) | 19:55	15 19:00 (1) | 18:42	16:34	| 15:55
6 | 04:51		20:30 (6) | 05:35		19:25 (2) | 06:29	18:42 (1) | 07:21	07:19	| 08:11
| 21:42	29	20:59 (5) | 21:01	23	19:48 (2) | 19:52	19 19:01 (1) | 18:39	16:32	| 15:55
7 | 04:52		20:30 (6) | 05:36		19:24 (2) | 06:30	18:41 (1) | 07:23	07:21	| 08:12
| 21:42	29	20:59 (5) | 20:59	26	19:50 (2) | 19:50	21 19:02 (1) | 18:37	16:30	| 15:54
8 | 04:53		20:31 (6) | 05:38		19:23 (2) | 06:32	18:40 (1) | 07:25	07:23	| 08:14
| 21:41	28	20:59 (5) | 20:57	28	19:51 (2) | 19:48	23 19:03 (1) | 18:35	16:28	| 15:54
9 | 04:54		20:31 (6) | 05:40		19:22 (2) | 06:34	18:39 (1) | 07:27	07:25	| 08:15
| 21:40	29	21:00 (5) | 20:55	29	19:51 (2) | 19:45	23 19:02 (1) | 18:32	16:27	| 15:54
10 | 04:55		20:32 (6) | 05:42		19:21 (2) | 06:36	18:38 (1) | 07:28	07:27	| 08:16
| 21:39	28	21:00 (5) | 20:53	31	19:52 (2) | 19:43	24 19:02 (1) | 18:30	16:25	| 15:53
11 | 04:56		20:33 (6) | 05:43		19:20 (2) | 06:37	18:38 (1) | 07:30	07:29	| 08:17
| 21:38	27	21:00 (5) | 20:51	31	19:51 (2) | 19:40	25 19:03 (1) | 18:27	16:23	| 15:53
12 | 04:58		20:33 (6) | 05:45		19:20 (2) | 06:39	18:37 (1) | 07:32	07:31	| 08:18
| 21:37	26	20:59 (5) | 20:49	32	19:52 (2) | 19:38	24 19:01 (1) | 18:25	16:22	| 15:53
13 | 04:59		20:34 (6) | 05:47		19:20 (2) | 06:41	18:37 (1) | 07:34	07:33	| 08:19
| 21:37	25	20:59 (5) | 20:47	32	19:52 (2) | 19:35	24 19:01 (1) | 18:23	16:20	| 15:53
14 | 05:00		20:35 (6) | 05:48		19:19 (2) | 06:42	18:36 (1) | 07:36	07:34	| 08:20
| 21:36	24	20:59 (5) | 20:45	33	19:52 (2) | 19:33	23 19:01 (1) | 18:21	16:18	| 15:53
15 | 05:01		20:36 (6) | 05:50		19:19 (2) | 06:44	18:39 (1) | 07:38	07:36	| 08:21
| 21:34	23	20:59 (5) | 20:43	33	19:52 (2) | 19:30	21 19:00 (1) | 18:18	16:17	| 15:53
16 | 05:03		20:37 (6) | 05:52		19:19 (2) | 06:46	18:38 (1) | 07:39	07:38	| 08:22
| 21:33	21	20:58 (5) | 20:41	33	19:52 (2) | 19:28	20 18:58 (1) | 18:16	16:15	| 15:53
17 | 05:04		20:39 (5) | 05:54		19:19 (2) | 06:48	18:40 (1) | 07:41	07:40	| 08:23
| 21:32	20	20:59 (5) | 20:38	32	19:51 (2) | 19:26	16 18:56 (1) | 18:14	16:14	| 15:53
18 | 05:05		20:40 (5) | 05:55		19:19 (2) | 06:49	18:42 (1) | 07:43	07:42	| 08:24
| 21:31	18	20:58 (5) | 20:36	32	19:51 (2) | 19:23	12 18:54 (1) | 18:11	16:12	| 15:53
19 | 05:07		20:40 (5) | 05:57		19:18 (2) | 06:51	18:46 (1) | 07:45	07:44	| 08:25
| 21:30	16	20:56 (5) | 20:34	32	19:50 (2) | 19:21	2 18:48 (1) | 18:09	16:11	| 15:54
20 | 05:08		20:41 (5) | 05:59		19:19 (2) | 06:53	| 07:47	07:45	| 08:25
| 21:28	14	20:55 (5) | 20:32	30	19:49 (2) | 19:18	| 18:07	16:10	| 15:54
21 | 05:09		20:43 (5) | 06:01		19:20 (2) | 06:55	| 07:49	07:47	| 08:26
| 21:27	11	20:54 (5) | 20:30	29	19:49 (2) | 19:16	| 18:05	16:08	| 15:54
22 | 05:11		20:44 (5) | 06:02		19:20 (2) | 06:56	| 07:51	07:49	| 08:26
| 21:26	9	20:53 (5) | 20:27	27	19:47 (2) | 19:13	| 18:02	16:07	| 15:55
23 | 05:12		20:48 (5) | 06:04		19:21 (2) | 06:58	| 07:53	07:51	| 08:27
| 21:24	3	20:51 (5) | 20:25	25	19:46 (2) | 19:11	| 18:00	16:06	| 15:55
24 | 05:14		06:06		19:22 (2) | 07:00	| 07:54	07:53	| 08:27
| 21:23		20:23	23	19:45 (2) | 19:08	| 17:58	16:05	| 15:56
25 | 05:15		06:08		19:23 (2) | 07:02	| 06:56	07:54	| 08:28
| 21:21		20:21	22	19:45 (3) | 19:06	| 16:56	16:04	| 15:57
26 | 05:17		06:09		19:23 (3) | 07:03	| 06:58	07:56	| 08:28
| 21:20		20:18	22	19:45 (3) | 19:04	| 16:54	16:03	| 15:57
27 | 05:18		06:11		19:24 (3) | 07:05	| 07:00	07:58	| 08:28
| 21:18		20:16	21	19:45 (3) | 19:01	| 16:52	16:02	| 15:58
28 | 05:20		06:13		19:23 (3) | 07:07	| 07:02	07:59	| 08:28
| 21:17		20:14	20	19:43 (3) | 18:59	| 16:50	16:01	| 15:59
29 | 05:22		06:15		19:24 (3) | 07:09	| 07:04	08:01	| 08:29
| 21:15		20:11	19	19:43 (3) | 18:56	| 16:48	16:00	| 16:00
30 | 05:23		06:16		19:25 (3) | 07:11	| 07:06	08:02	| 08:29
| 21:13		20:09	16	19:41 (3) | 18:54	| 16:46	15:59	| 16:01
31 | 05:25		06:18		19:25 (3) |	| 07:08		| 08:29
| 21:12		20:07	13	19:38 (3) |	| 16:44		| 16:02
Sonnenscheinstunden |	510	|	459	|	382 |	329	260	| 235
astr.max.mögl.Beschattung |	529	|	757	|	312 |	|	|
Red.Sonnenscheinwahrsch. |	0.45	|	0.49	|	0.40 |	|	|
Reduktion Betriebsdauer |	0.91	|	0.91	|	0.91 |	|	|
Reduktion Windrichtung |	0.64	|	0.67	|	0.69 |	|	|
Gesamte Reduktion |	0.26	|	0.30	|	0.26 |	|	|
Met.wahrsch.Beschattung |	138	|	224	|	80 |	|	|

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CH - IO86

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März			April			Mai			Juni			
1	08:29		07:59		07:02			06:48			18:51 (1)	05:40		19:17 (2)	04:51		20:18 (6)
	16:03		16:54		17:49			19:46	23		19:14 (1)	20:41	27	19:44 (2)	21:30	29	20:47 (5)
2	08:28		07:57		07:00			06:46			18:51 (1)	05:38		19:18 (2)	04:50		20:19 (6)
	16:04		16:56		17:50			19:48	23		19:14 (1)	20:42	25	19:43 (2)	21:31	29	20:48 (5)
3	08:28		07:56		06:58			06:43			18:52 (1)	05:36		19:19 (2)	04:49		20:19 (6)
	16:05		16:57		17:52			19:50	22		19:14 (1)	20:44	23	19:42 (2)	21:32	29	20:48 (5)
4	08:28		07:54		06:55			06:41			18:51 (1)	05:34		19:19 (2)	04:48		20:19 (6)
	16:06		16:59		17:54			19:52	22		19:13 (1)	20:46	22	19:41 (2)	21:33	28	20:47 (5)
5	08:28		07:52		06:53			06:38			18:52 (1)	05:32		19:21 (2)	04:48		20:19 (6)
	16:08		17:01		17:56			19:53	20		19:12 (1)	20:48	19	19:40 (2)	21:34	29	20:48 (5)
6	08:27		07:50		06:51			06:36			18:53 (1)	05:30		19:23 (2)	04:47		20:19 (6)
	16:09		17:03		17:58			19:55	18		19:11 (1)	20:50	15	19:38 (2)	21:35	29	20:48 (5)
7	08:27		07:49		06:48			06:34			18:53 (1)	05:28		19:25 (2)	04:46		20:19 (6)
	16:10		17:05		18:00			19:57	16		19:09 (1)	20:51	11	19:36 (2)	21:36	28	20:47 (5)
8	08:26		07:47		06:46			06:31			18:55 (1)	05:26			04:46		20:19 (6)
	16:12		17:07		18:02			19:59	12		19:07 (1)	20:53			21:37	29	20:48 (5)
9	08:26		07:45		06:44			06:29			18:58 (1)	05:24			04:45		20:20 (6)
	16:13		17:09		18:04			20:01	7		19:05 (1)	20:55			21:38	28	20:48 (5)
10	08:25		07:43		06:41			06:27				05:22			04:45		20:19 (6)
	16:15		17:11		18:06			20:03				20:57			21:39	29	20:48 (5)
11	08:25		07:41		06:39			06:24			19:31 (3)	05:20			04:44		20:20 (6)
	16:16		17:13		18:07			20:04	6		19:37 (3)	20:58			21:40	29	20:49 (6)
12	08:24		07:39		06:37			06:22			19:29 (3)	05:19			04:44		20:20 (6)
	16:18		17:15		18:09			20:06	10		19:39 (3)	21:00			21:41	29	20:49 (6)
13	08:23		07:37		06:34			06:20			19:27 (3)	05:17			04:44		20:20 (6)
	16:19		17:17		18:11			20:08	13		19:40 (3)	21:02			21:41	28	20:48 (5)
14	08:22		07:35		06:32			06:17			19:26 (3)	05:15			04:43		20:20 (6)
	16:21		17:19		18:13			20:10	16		19:42 (3)	21:03			21:42	29	20:49 (6)
15	08:21		07:33		06:29			06:15			19:25 (3)	05:14			04:43		20:20 (6)
	16:22		17:21		18:15			20:12	19		19:44 (3)	21:05			21:43	29	20:49 (6)
16	08:20		07:31		06:27			06:13			19:25 (3)	05:12			04:43		20:21 (6)
	16:24		17:23		18:17			20:13	19		19:44 (3)	21:07			21:43	28	20:49 (6)
17	08:19		07:29		06:25			06:10			19:23 (3)	05:10		20:33 (5)	04:43		20:21 (6)
	16:26		17:25		18:19			20:15	20		19:43 (3)	21:08	3	20:36 (5)	21:44	29	20:50 (6)
18	08:18		07:27		06:22			06:08			19:23 (2)	05:09		20:31 (5)	04:43		20:21 (6)
	16:27		17:27		18:20			20:17	20		19:43 (2)	21:10	7	20:38 (5)	21:44	29	20:50 (6)
19	08:17		07:25		06:20			06:06			19:22 (2)	05:07		20:29 (5)	04:43		20:21 (6)
	16:29		17:29		18:22			20:19	22		19:44 (2)	21:11	10	20:39 (5)	21:44	29	20:50 (6)
20	08:16		07:22		06:17			06:03			19:21 (2)	05:06		20:27 (6)	04:43		20:21 (6)
	16:31		17:31		18:24			20:21	24		19:45 (2)	21:13	14	20:41 (5)	21:45	29	20:50 (6)
21	08:15		07:20		06:15			06:01			19:20 (2)	05:04		20:25 (6)	04:43		20:21 (6)
	16:33		17:33		18:26			20:23	26		19:46 (2)	21:15	17	20:42 (5)	21:45	29	20:50 (6)
22	08:14		07:18		06:12			05:59			19:18 (2)	05:03		20:23 (6)	04:43		20:22 (6)
	16:35		17:35		18:28			20:24	27		19:45 (2)	21:16	20	20:43 (5)	21:45	29	20:51 (6)
23	08:12		07:16		06:10			05:57			19:18 (2)	05:01		20:22 (6)	04:43		20:22 (6)
	16:36		17:37		18:30			20:26	28		19:46 (2)	21:18	23	20:45 (5)	21:45	29	20:51 (6)
24	08:11		07:14		06:08			05:55			19:17 (2)	05:00		20:21 (6)	04:44		20:22 (6)
	16:38		17:39		18:32			20:28	29		19:46 (2)	21:19	24	20:45 (5)	21:45	29	20:51 (6)
25	08:10		07:11		06:05			05:52			19:17 (2)	04:59		20:21 (6)	04:44		20:23 (6)
	16:40		17:41		18:33			20:30	29		19:46 (2)	21:21	25	20:46 (5)	21:45	29	20:52 (6)
26	08:08		07:09		06:03		18:03 (1)	05:50			19:17 (2)	04:58		20:20 (6)	04:44		20:23 (6)
	16:42		17:43		18:35	4	18:07 (1)	20:32	29		19:46 (2)	21:22	26	20:46 (5)	21:45	28	20:51 (6)
27	08:07		07:07		06:00		17:59 (1)	05:48			19:17 (2)	04:56		20:20 (6)	04:45		20:24 (6)
	16:44		17:45		18:37	12	18:11 (1)	20:33	29		19:46 (2)	21:23	27	20:47 (5)	21:45	28	20:52 (6)
28	08:05		07:05		05:58		17:56 (1)	05:46			19:17 (2)	04:55		20:20 (6)	04:45		20:23 (6)
	16:46		17:47		18:39	16	18:12 (1)	20:35	29		19:46 (2)	21:25	27	20:47 (5)	21:45	29	20:52 (6)
29	08:04				06:55		18:55 (1)	05:44			19:17 (2)	04:54		20:19 (6)	04:46		20:24 (6)
	16:48				19:41	18	19:13 (1)	20:37	28		19:45 (2)	21:26	28	20:47 (5)	21:45	29	20:53 (6)
30	08:02				06:53		18:53 (1)	05:42			19:17 (2)	04:53		20:19 (6)	04:47		20:23 (6)
	16:50				19:42	20	19:13 (1)	20:39	28		19:45 (2)	21:27	28	20:47 (5)	21:45	29	20:52 (6)
31	08:01				06:51		18:53 (1)					04:52		20:19 (6)			
	16:52				19:44	21	19:14 (1)					21:29	28	20:47 (5)			
Sonnenscheinstunden	252		274		367			419				492			508		
astr.max.mögl.Beschattung						91			614				449			863	
Red.Sonnenscheinwahrsch.						0.31			0.41				0.51			0.45	
Reduktion Betriebsdauer						0.91			0.91				0.91			0.91	
Reduktion Windrichtung						0.69			0.67				0.65			0.65	
Gesamte Reduktion						0.20			0.25				0.30			0.27	
Met.wahrsch.Beschattung						18			155				137			232	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CH - IO86

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober	November	Dezember
1	04:47		20:24 (6)	05:26		06:20	19:30 (3)	07:12	07:10	08:04
	21:45	29	20:53 (6)	21:10		20:04	6 19:36 (3)	18:51	16:42	15:58
2	04:48		20:24 (6)	05:28		06:22		07:14	07:12	08:05
	21:44	29	20:53 (5)	21:08		20:02		18:49	16:40	15:57
3	04:49		20:24 (6)	05:30		06:23	18:55 (1)	07:16	07:14	08:07
	21:44	29	20:53 (6)	21:06		20:00	7 19:02 (1)	18:47	16:38	15:57
4	04:50		20:24 (6)	05:31		06:25	18:52 (1)	07:18	07:15	08:08
	21:43	29	20:53 (5)	21:05		19:57	12 19:04 (1)	18:44	16:36	15:56
5	04:50		20:25 (6)	05:33	19:38 (2)	06:27	18:50 (1)	07:19	07:17	08:10
	21:43	29	20:54 (5)	21:03	5 19:43 (2)	19:55	16 19:06 (1)	18:42	16:34	15:55
6	04:51		20:25 (6)	05:35	19:33 (2)	06:29	18:48 (1)	07:21	07:19	08:11
	21:42	29	20:54 (5)	21:01	13 19:46 (2)	19:52	18 19:06 (1)	18:39	16:32	15:55
7	04:52		20:25 (6)	05:36	19:32 (2)	06:30	18:47 (1)	07:23	07:21	08:12
	21:42	29	20:54 (5)	20:59	16 19:48 (2)	19:50	20 19:07 (1)	18:37	16:30	15:54
8	04:53		20:26 (6)	05:38	19:30 (2)	06:32	18:46 (1)	07:25	07:23	08:14
	21:41	29	20:55 (5)	20:57	20 19:50 (2)	19:48	22 19:08 (1)	18:35	16:28	15:54
9	04:54		20:26 (6)	05:40	19:28 (2)	06:34	18:45 (1)	07:27	07:25	08:15
	21:40	29	20:55 (5)	20:55	22 19:50 (2)	19:45	22 19:07 (1)	18:32	16:27	15:54
10	04:55		20:26 (6)	05:42	19:28 (2)	06:36	18:45 (1)	07:28	07:27	08:16
	21:39	29	20:55 (5)	20:53	24 19:52 (2)	19:43	22 19:07 (1)	18:30	16:25	15:53
11	04:56		20:27 (6)	05:43	19:26 (2)	06:37	18:45 (1)	07:30	07:29	08:17
	21:38	29	20:56 (5)	20:51	26 19:52 (2)	19:40	22 19:07 (1)	18:27	16:23	15:53
12	04:58		20:27 (6)	05:45	19:26 (2)	06:39	18:44 (1)	07:32	07:31	08:18
	21:37	29	20:56 (5)	20:49	26 19:52 (2)	19:38	21 19:05 (1)	18:25	16:22	15:53
13	04:59		20:27 (6)	05:47	19:25 (2)	06:41	18:44 (1)	07:34	07:33	08:19
	21:37	29	20:56 (5)	20:47	28 19:53 (2)	19:35	21 19:05 (1)	18:23	16:20	15:53
14	05:00		20:28 (6)	05:48	19:24 (2)	06:42	18:45 (1)	07:36	07:34	08:20
	21:36	28	20:56 (5)	20:45	29 19:53 (2)	19:33	19 19:04 (1)	18:20	16:18	15:53
15	05:01		20:28 (6)	05:50	19:24 (2)	06:44	18:46 (1)	07:38	07:36	08:21
	21:34	28	20:56 (5)	20:43	29 19:53 (2)	19:30	17 19:03 (1)	18:18	16:17	15:53
16	05:03		20:28 (6)	05:52	19:24 (2)	06:46	18:47 (1)	07:39	07:38	08:22
	21:33	27	20:55 (5)	20:41	30 19:54 (2)	19:28	13 19:00 (1)	18:16	16:15	15:53
17	05:04		20:30 (6)	05:54	19:23 (2)	06:48	18:50 (1)	07:41	07:40	08:23
	21:32	26	20:56 (5)	20:38	30 19:53 (2)	19:26	7 18:57 (1)	18:14	16:14	15:53
18	05:05		20:30 (6)	05:55	19:23 (2)	06:49		07:43	07:42	08:24
	21:31	26	20:56 (5)	20:36	30 19:53 (2)	19:23		18:11	16:12	15:53
19	05:07		20:30 (6)	05:57	19:23 (2)	06:51		07:45	07:44	08:25
	21:30	25	20:55 (5)	20:34	29 19:52 (2)	19:21		18:09	16:11	15:54
20	05:08		20:31 (6)	05:59	19:23 (2)	06:53		07:47	07:45	08:25
	21:28	24	20:55 (5)	20:32	28 19:51 (2)	19:18		18:07	16:10	15:54
21	05:09		20:33 (6)	06:01	19:24 (2)	06:55		07:49	07:47	08:26
	21:27	21	20:54 (5)	20:30	27 19:51 (2)	19:16		18:05	16:08	15:54
22	05:11		20:34 (6)	06:02	19:24 (2)	06:56		07:51	07:49	08:26
	21:26	19	20:53 (5)	20:27	26 19:50 (2)	19:13		18:02	16:07	15:55
23	05:12		20:36 (6)	06:04	19:25 (2)	06:58		07:53	07:51	08:27
	21:24	16	20:52 (5)	20:25	24 19:49 (2)	19:11		18:00	16:06	15:55
24	05:14		20:39 (5)	06:06	19:26 (2)	07:00		07:54	07:52	08:27
	21:23	11	20:50 (5)	20:23	22 19:48 (2)	19:08		17:58	16:05	15:56
25	05:15		20:40 (5)	06:08	19:26 (2)	07:02		06:56	07:54	08:28
	21:21	9	20:49 (5)	20:21	20 19:46 (3)	19:06		16:56	16:04	15:57
26	05:17		20:42 (5)	06:09	19:26 (3)	07:03		06:58	07:56	08:28
	21:20	6	20:48 (5)	20:18	20 19:46 (3)	19:04		16:54	16:03	15:57
27	05:18			06:11	19:26 (3)	07:05		07:00	07:58	08:28
	21:18			20:16	20 19:46 (3)	19:01		16:52	16:02	15:58
28	05:20			06:13	19:26 (3)	07:07		07:02	07:59	08:28
	21:17			20:14	19 19:45 (3)	18:59		16:50	16:01	15:59
29	05:22			06:15	19:26 (3)	07:09		07:04	08:01	08:29
	21:15			20:11	17 19:43 (3)	18:56		16:48	16:00	16:00
30	05:23			06:16	19:27 (3)	07:11		07:06	08:02	08:29
	21:13			20:09	14 19:41 (3)	18:54		16:46	15:59	16:01
31	05:25			06:18	19:28 (3)			07:08		08:29
	21:12			20:07	10 19:38 (3)			16:44		16:02
Sonnenscheinstunden	510		459		382		329	260	235
astr.max.mögl.Beschattung		643		604		265			
Red.Sonnenscheinwahrsch.		0.45		0.49		0.40			
Reduktion Betriebsdauer		0.91		0.91		0.91			
Reduktion Windrichtung		0.65		0.67		0.69			
Gesamte Reduktion		0.26		0.30		0.25			
Met.wahrsch.Beschattung		169		179		67			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CI - IO87

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:29	07:59	07:02	06:48	18:53 (1) 05:40	19:19 (2) 04:51 20:21 (6)
	16:03	16:54	17:49	19:46 22	19:15 (1) 20:41 27	19:46 (2) 21:30 28 20:49 (5)
2	08:28	07:57	07:00	06:46	18:53 (1) 05:38	19:19 (2) 04:50 20:21 (6)
	16:04	16:56	17:50	19:48 22	19:15 (1) 20:42 27	19:46 (2) 21:31 29 20:50 (5)
3	08:28	07:56	06:58	06:43	18:53 (1) 05:36	19:20 (2) 04:49 20:21 (6)
	16:05	16:57	17:52	19:50 22	19:15 (1) 20:44 25	19:45 (2) 21:32 28 20:49 (5)
4	08:28	07:54	06:55	06:41	18:52 (1) 05:34	19:20 (2) 04:48 20:21 (6)
	16:06	16:59	17:54	19:52 22	19:14 (1) 20:46 24	19:44 (2) 21:33 28 20:49 (5)
5	08:28	07:52	06:53	06:38	18:53 (1) 05:32	19:22 (2) 04:48 20:21 (6)
	16:08	17:01	17:56	19:53 21	19:14 (1) 20:48 22	19:44 (2) 21:34 29 20:50 (5)
6	08:27	07:50	06:51	06:36	18:53 (1) 05:30	19:23 (2) 04:47 20:21 (6)
	16:09	17:03	17:58	19:55 21	19:14 (1) 20:50 19	19:42 (2) 21:35 28 20:49 (5)
7	08:27	07:49	06:48	06:34	18:53 (1) 05:28	19:24 (2) 04:46 20:21 (6)
	16:10	17:05	18:00	19:57 19	19:12 (1) 20:51 16	19:40 (2) 21:36 28 20:49 (5)
8	08:26	07:47	06:46	06:31	18:55 (1) 05:26	19:26 (2) 04:46 20:21 (6)
	16:12	17:07	18:02	19:59 15	19:10 (1) 20:53 12	19:38 (2) 21:37 29 20:50 (5)
9	08:26	07:45	06:44	06:29	18:57 (1) 05:24	19:30 (2) 04:45 20:22 (6)
	16:13	17:09	18:04	20:01 12	19:09 (1) 20:55 5	19:35 (2) 21:38 28 20:50 (5)
10	08:25	07:43	06:41	06:27	19:00 (1) 05:22	04:45 20:21 (6)
	16:15	17:11	18:06	20:03 4	19:04 (1) 20:57	21:39 29 20:50 (6)
11	08:25	07:41	06:39	06:24	05:20	04:44 20:22 (6)
	16:16	17:13	18:07	20:04	20:58	21:40 28 20:50 (5)
12	08:24	07:39	06:37	06:22	19:32 (3) 05:19	04:44 20:22 (6)
	16:18	17:15	18:09	20:06 7	19:39 (3) 21:00	21:41 29 20:51 (6)
13	08:23	07:37	06:34	06:20	19:29 (3) 05:17	04:44 20:22 (6)
	16:19	17:17	18:11	20:08 11	19:40 (3) 21:02	21:41 28 20:50 (6)
14	08:22	07:35	06:32	06:17	19:28 (3) 05:15	04:43 20:22 (6)
	16:21	17:19	18:13	20:10 14	19:42 (3) 21:03	21:42 29 20:51 (6)
15	08:21	07:33	06:29	06:15	19:27 (3) 05:14	04:43 20:22 (6)
	16:22	17:21	18:15	20:12 17	19:44 (3) 21:05	21:43 29 20:51 (6)
16	08:20	07:31	06:27	06:13	19:26 (3) 05:12	04:43 20:23 (6)
	16:24	17:23	18:17	20:13 19	19:45 (3) 21:07	21:43 28 20:51 (6)
17	08:19	07:29	06:25	06:10	19:25 (3) 05:10	04:43 20:23 (6)
	16:26	17:25	18:19	20:15 20	19:45 (3) 21:08	21:44 29 20:52 (6)
18	08:18	07:27	06:22	06:08	19:25 (3) 05:09	20:35 (5) 04:43 20:23 (6)
	16:27	17:27	18:20	20:17 20	19:45 (3) 21:10 3	20:38 (5) 21:44 29 20:52 (6)
19	08:17	07:25	06:20	06:06	19:25 (2) 05:07	20:32 (5) 04:43 20:23 (6)
	16:29	17:29	18:22	20:19 20	19:45 (2) 21:11 7	20:39 (5) 21:44 29 20:52 (6)
20	08:16	07:22	06:17	06:03	19:24 (2) 05:06	20:30 (5) 04:43 20:23 (6)
	16:31	17:31	18:24	20:21 22	19:46 (2) 21:13 11	20:41 (5) 21:45 29 20:52 (6)
21	08:15	07:20	06:15	06:01	19:23 (2) 05:04	20:30 (5) 04:43 20:23 (6)
	16:33	17:33	18:26	20:23 24	19:47 (2) 21:15 12	20:42 (5) 21:45 29 20:52 (6)
22	08:14	07:18	06:12	05:59	19:21 (2) 05:03	20:27 (6) 04:43 20:24 (6)
	16:35	17:35	18:28	20:24 26	19:47 (2) 21:16 16	20:43 (5) 21:45 29 20:53 (6)
23	08:12	07:16	06:10	05:57	19:20 (2) 05:01	20:26 (6) 04:43 20:24 (6)
	16:36	17:37	18:30	20:26 27	19:47 (2) 21:18 19	20:45 (5) 21:45 29 20:53 (6)
24	08:11	07:14	06:08	05:55	19:20 (2) 05:00	20:25 (6) 04:44 20:24 (6)
	16:38	17:39	18:32	20:28 28	19:48 (2) 21:19 21	20:46 (5) 21:45 29 20:53 (6)
25	08:10	07:11	06:05	05:52	19:19 (2) 04:59	20:24 (6) 04:44 20:25 (6)
	16:40	17:41	18:33	20:30 29	19:48 (2) 21:21 23	20:47 (5) 21:45 29 20:54 (6)
26	08:08	07:09	06:03	05:50	19:19 (2) 04:58	20:23 (6) 04:44 20:25 (6)
	16:42	17:43	18:35	20:32 29	19:48 (2) 21:22 25	20:48 (5) 21:45 28 20:53 (6)
27	08:07	07:07	06:00 18:03 (1)	05:48	19:19 (2) 04:56	20:23 (6) 04:45 20:25 (6)
	16:44	17:45	18:37 7 18:10 (1)	20:33 29	19:48 (2) 21:23 25	20:48 (5) 21:45 29 20:54 (6)
28	08:05	07:05	05:58 17:59 (1)	05:46	19:19 (2) 04:55	20:22 (6) 04:45 20:25 (6)
	16:46	17:47	18:39 13 18:12 (1)	20:35 29	19:48 (2) 21:25 26	20:48 (5) 21:45 29 20:54 (6)
29	08:04		06:55 18:57 (1)	05:44	19:19 (2) 04:54	20:22 (6) 04:46 20:26 (6)
	16:48		19:41 17 19:14 (1)	20:37 29	19:48 (2) 21:26 26	20:48 (5) 21:45 28 20:54 (5)
30	08:02		06:53 18:55 (1)	05:42	19:19 (2) 04:53	20:21 (6) 04:47 20:25 (6)
	16:50		19:42 19 19:14 (1)	20:39 28	19:47 (2) 21:27 28	20:49 (5) 21:45 29 20:54 (6)
31	08:01		06:51 18:55 (1)		04:52	20:21 (6)
	16:52		19:44 20 19:15 (1)		21:29 28	20:49 (5)
Sonnenscheinstunden	252	274	367	419	492	508
astr.max.mögl.Beschattung			76	608	447	859
Red.Sonnenscheinwahrsch.			0.31	0.41	0.51	0.45
Reduktion Betriebsdauer			0.91	0.91	0.91	0.91
Reduktion Windrichtung			0.69	0.67	0.65	0.65
Gesamte Reduktion			0.20	0.25	0.30	0.27
Met.wahrsch.Beschattung			15	154	136	230

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CI - IO87

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober	November	Dezember
1	04:47	20:26 (6)	05:26		06:20		07:12	07:10	08:04
	21:45	29 20:55 (6)	21:10		20:04		18:51	16:42	15:58
2	04:48	20:27 (6)	05:28		06:22	18:58 (1)	07:14	07:12	08:05
	21:44	28 20:55 (5)	21:08		20:02	5 19:03 (1)	18:49	16:40	15:57
3	04:49	20:26 (6)	05:30		06:23	18:54 (1)	07:16	07:14	08:07
	21:44	28 20:54 (5)	21:06		20:00	12 19:06 (1)	18:47	16:38	15:57
4	04:50	20:26 (6)	05:31	19:38 (2)	06:25	18:52 (1)	07:18	07:15	08:08
	21:43	29 20:55 (5)	21:05	8 19:46 (2)	19:57	15 19:07 (1)	18:44	16:36	15:56
5	04:50	20:27 (6)	05:33	19:36 (2)	06:27	18:51 (1)	07:19	07:17	08:10
	21:43	28 20:55 (5)	21:03	13 19:49 (2)	19:55	18 19:09 (1)	18:42	16:34	15:55
6	04:51	20:27 (6)	05:35	19:33 (2)	06:29	18:49 (1)	07:21	07:19	08:11
	21:42	29 20:56 (5)	21:01	17 19:50 (2)	19:52	20 19:09 (1)	18:39	16:32	15:55
7	04:52	20:28 (6)	05:36	19:32 (2)	06:30	18:48 (1)	07:23	07:21	08:12
	21:42	28 20:56 (5)	20:59	20 19:52 (2)	19:50	21 19:09 (1)	18:37	16:30	15:54
8	04:53	20:28 (6)	05:38	19:31 (2)	06:32	18:47 (1)	07:25	07:23	08:14
	21:41	28 20:56 (5)	20:57	22 19:53 (2)	19:48	22 19:09 (1)	18:35	16:28	15:54
9	04:54	20:28 (6)	05:40	19:29 (2)	06:34	18:46 (1)	07:27	07:25	08:15
	21:40	29 20:57 (5)	20:55	25 19:54 (2)	19:45	23 19:09 (1)	18:32	16:27	15:54
10	04:55	20:29 (6)	05:42	19:29 (2)	06:36	18:46 (1)	07:28	07:27	08:16
	21:39	28 20:57 (5)	20:53	26 19:55 (2)	19:43	23 19:09 (1)	18:30	16:25	15:53
11	04:56	20:29 (6)	05:43	19:27 (2)	06:37	18:46 (1)	07:30	07:29	08:17
	21:38	28 20:57 (5)	20:51	27 19:54 (2)	19:40	22 19:08 (1)	18:27	16:23	15:53
12	04:58	20:29 (6)	05:45	19:27 (2)	06:39	18:46 (1)	07:32	07:31	08:18
	21:37	28 20:57 (5)	20:49	28 19:55 (2)	19:38	21 19:07 (1)	18:25	16:22	15:53
13	04:59	20:30 (6)	05:47	19:27 (2)	06:41	18:46 (1)	07:34	07:33	08:19
	21:37	27 20:57 (5)	20:47	29 19:56 (2)	19:35	20 19:06 (1)	18:23	16:20	15:53
14	05:00	20:30 (6)	05:48	19:26 (2)	06:42	18:48 (1)	07:36	07:34	08:20
	21:36	27 20:57 (5)	20:45	29 19:55 (2)	19:33	17 19:05 (1)	18:20	16:18	15:53
15	05:01	20:31 (6)	05:50	19:26 (2)	06:44	18:49 (1)	07:38	07:36	08:21
	21:34	26 20:57 (5)	20:43	29 19:55 (2)	19:30	14 19:03 (1)	18:18	16:17	15:53
16	05:03	20:31 (6)	05:52	19:26 (2)	06:46	18:50 (1)	07:39	07:38	08:22
	21:33	26 20:57 (5)	20:41	30 19:56 (2)	19:28	9 18:59 (1)	18:16	16:15	15:53
17	05:04	20:32 (6)	05:54	19:25 (2)	06:48		07:41	07:40	08:23
	21:32	25 20:57 (5)	20:38	30 19:55 (2)	19:26		18:14	16:14	15:53
18	05:05	20:33 (6)	05:55	19:26 (2)	06:49		07:43	07:42	08:24
	21:31	24 20:57 (5)	20:36	29 19:55 (2)	19:23		18:11	16:12	15:53
19	05:07	20:34 (6)	05:57	19:25 (2)	06:51		07:45	07:44	08:25
	21:30	22 20:56 (5)	20:34	28 19:53 (2)	19:21		18:09	16:11	15:54
20	05:08	20:35 (6)	05:59	19:26 (2)	06:53		07:47	07:45	08:25
	21:28	20 20:55 (5)	20:32	27 19:53 (2)	19:18		18:07	16:10	15:54
21	05:09	20:37 (6)	06:01	19:27 (2)	06:55		07:49	07:47	08:26
	21:27	17 20:54 (5)	20:30	25 19:52 (2)	19:16		18:05	16:08	15:54
22	05:11	20:38 (6)	06:02	19:27 (2)	06:56		07:51	07:49	08:26
	21:26	15 20:53 (5)	20:27	24 19:51 (2)	19:13		18:02	16:07	15:55
23	05:12	20:41 (5)	06:04	19:28 (2)	06:58		07:53	07:51	08:27
	21:24	11 20:52 (5)	20:25	22 19:50 (2)	19:11		18:00	16:06	15:55
24	05:14	20:41 (5)	06:06	19:29 (2)	07:00		07:54	07:52	08:27
	21:23	9 20:50 (5)	20:23	19 19:48 (2)	19:08		17:58	16:05	15:56
25	05:15	20:43 (5)	06:08	19:27 (3)	07:02		06:56	07:54	08:28
	21:21	6 20:49 (5)	20:21	20 19:47 (3)	19:06		16:56	16:04	15:57
26	05:17		06:09	19:28 (3)	07:03		06:58	07:56	08:28
	21:20		20:18	19 19:47 (3)	19:04		16:54	16:03	15:57
27	05:18		06:11	19:28 (3)	07:05		07:00	07:58	08:28
	21:18		20:16	19 19:47 (3)	19:01		16:52	16:02	15:58
28	05:20		06:13	19:28 (3)	07:07		07:02	07:59	08:28
	21:17		20:14	17 19:45 (3)	18:59		16:50	16:01	15:59
29	05:22		06:15	19:29 (3)	07:09		07:04	08:01	08:29
	21:15		20:11	14 19:43 (3)	18:56		16:48	16:00	16:00
30	05:23		06:16	19:30 (3)	07:11		07:06	08:02	08:29
	21:13		20:09	11 19:41 (3)	18:54		16:46	15:59	16:01
31	05:25		06:18	19:31 (3)			07:08		08:29
	21:12		20:07	7 19:38 (3)			16:44		16:02
Sonnenscheinstunden	510		459		382		329	260	235
astr.max.mögl.Beschattung		595		614		282			
Red.Sonnenscheinwahrsch.		0.45		0.49		0.40			
Reduktion Betriebsdauer		0.91		0.91		0.91			
Reduktion Windrichtung		0.65		0.66		0.69			
Gesamte Reduktion		0.26		0.30		0.25			
Met.wahrsch.Beschattung		156		181		67			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CJ - IO88

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März			April			Mai			Juni			
1	08:29	07:59		07:02			06:48		18:55 (1)	05:40		19:20 (2)	04:51		20:23 (6)	
	16:03	16:54		17:49			19:46	21	19:16 (1)	20:41	29	19:49 (2)	21:30	27	20:50 (5)	
2	08:28	07:57		07:00			06:46		18:54 (1)	05:38		19:20 (2)	04:50		20:24 (6)	
	16:04	16:56		17:50			19:48	22	19:16 (1)	20:42	28	19:48 (2)	21:31	27	20:51 (5)	
3	08:28	07:56		06:58			06:43		18:54 (1)	05:36		19:21 (2)	04:49		20:23 (6)	
	16:05	16:57		17:52			19:50	23	19:17 (1)	20:44	26	19:47 (2)	21:32	28	20:51 (5)	
4	08:28	07:54		06:55			06:41		18:53 (1)	05:34		19:21 (2)	04:48		20:23 (6)	
	16:06	16:59		17:54			19:52	23	19:16 (1)	20:46	25	19:46 (2)	21:33	27	20:50 (5)	
5	08:28	07:52		06:53			06:38		18:54 (1)	05:32		19:23 (2)	04:48		20:23 (6)	
	16:08	17:01		17:56			19:53	22	19:16 (1)	20:48	23	19:46 (2)	21:34	28	20:51 (5)	
6	08:27	07:50		06:51			06:36		18:54 (1)	05:30		19:23 (2)	04:47		20:23 (6)	
	16:09	17:03		17:58			19:55	21	19:15 (1)	20:50	22	19:45 (2)	21:35	28	20:51 (5)	
7	08:27	07:49		06:48			06:34		18:54 (1)	05:28		19:24 (2)	04:46		20:23 (6)	
	16:10	17:05		18:00			19:57	20	19:14 (1)	20:51	20	19:44 (2)	21:36	27	20:50 (5)	
8	08:26	07:47		06:46			06:31		18:55 (1)	05:26		19:25 (2)	04:46		20:23 (6)	
	16:12	17:07		18:02			19:59	18	19:13 (1)	20:53	17	19:42 (2)	21:37	28	20:51 (5)	
9	08:26	07:45		06:44			06:29		18:57 (1)	05:24		19:28 (2)	04:45		20:24 (6)	
	16:13	17:09		18:04			20:01	14	19:11 (1)	20:55	13	19:41 (2)	21:38	28	20:52 (6)	
10	08:25	07:43		06:41			06:27		18:58 (1)	05:22		19:31 (2)	04:45		20:23 (6)	
	16:15	17:11		18:06			20:03	10	19:08 (1)	20:57	6	19:37 (2)	21:39	28	20:51 (5)	
11	08:25	07:41		06:39			06:24			05:20			04:44		20:24 (6)	
	16:16	17:13		18:07			20:04			20:58			21:40	28	20:52 (6)	
12	08:24	07:39		06:37			06:22		19:35 (3)	05:19			04:44		20:24 (6)	
	16:18	17:15		18:09			20:06	4	19:39 (3)	21:00			21:41	28	20:52 (5)	
13	08:23	07:37		06:34			06:20		19:31 (3)	05:17			04:44		20:23 (6)	
	16:19	17:17		18:11			20:08	9	19:40 (3)	21:02			21:41	29	20:52 (6)	
14	08:22	07:35		06:32			06:17		19:29 (3)	05:15			04:43		20:24 (6)	
	16:21	17:19		18:13			20:10	13	19:42 (3)	21:03			21:42	28	20:52 (6)	
15	08:21	07:33		06:29			06:15		19:28 (3)	05:14			04:43		20:24 (6)	
	16:22	17:21		18:15			20:12	16	19:44 (3)	21:05			21:43	29	20:53 (6)	
16	08:20	07:31		06:27			06:13		19:28 (3)	05:12			04:43		20:24 (6)	
	16:24	17:23		18:17			20:13	18	19:46 (3)	21:07			21:43	29	20:53 (6)	
17	08:19	07:29		06:25			06:10		19:26 (3)	05:10			04:43		20:25 (6)	
	16:26	17:25		18:19			20:15	20	19:46 (3)	21:08			21:44	28	20:53 (6)	
18	08:18	07:27		06:22			06:08		19:26 (3)	05:09			04:43		20:25 (6)	
	16:27	17:27		18:20			20:17	20	19:46 (3)	21:10			21:44	28	20:53 (6)	
19	08:17	07:25		06:20			06:06		19:26 (3)	05:07		20:35 (5)	04:43		20:25 (6)	
	16:29	17:29		18:22			20:19	20	19:46 (3)	21:11	4	20:39 (5)	21:44	28	20:53 (6)	
20	08:16	07:22		06:17			06:03		19:26 (3)	05:06		20:33 (5)	04:43		20:25 (6)	
	16:31	17:31		18:24			20:21	21	19:47 (2)	21:13	8	20:41 (5)	21:45	28	20:53 (6)	
21	08:15	07:20		06:15			06:01		19:25 (2)	05:04		20:32 (5)	04:43		20:25 (6)	
	16:33	17:33		18:26			20:23	23	19:48 (2)	21:15	10	20:42 (5)	21:45	29	20:54 (6)	
22	08:14	07:18		06:12			05:59		19:23 (2)	05:03		20:30 (5)	04:43		20:26 (6)	
	16:35	17:35		18:28			20:24	25	19:48 (2)	21:16	13	20:43 (5)	21:45	29	20:55 (6)	
23	08:12	07:16		06:10			05:57		19:22 (2)	05:01		20:29 (6)	04:43		20:26 (6)	
	16:36	17:37		18:30			20:26	27	19:49 (2)	21:18	16	20:45 (5)	21:45	28	20:54 (6)	
24	08:11	07:14		06:08			05:55		19:22 (2)	05:00		20:28 (6)	04:44		20:26 (6)	
	16:38	17:39		18:32			20:28	27	19:49 (2)	21:19	18	20:46 (5)	21:45	28	20:54 (6)	
25	08:10	07:11		06:05			05:52		19:21 (2)	04:59		20:27 (6)	04:44		20:27 (6)	
	16:40	17:41		18:33			20:30	28	19:49 (2)	21:21	20	20:47 (5)	21:45	28	20:55 (6)	
26	08:08	07:09		06:03			05:50		19:21 (2)	04:58		20:26 (6)	04:44		20:26 (6)	
	16:42	17:43		18:35			20:32	29	19:50 (2)	21:22	22	20:48 (5)	21:45	29	20:55 (6)	
27	08:07	07:07		06:00			05:48		19:20 (2)	04:56		20:25 (6)	04:45		20:27 (6)	
	16:44	17:45		18:37			20:33	30	19:50 (2)	21:23	24	20:49 (5)	21:45	29	20:56 (6)	
28	08:05	07:05		05:58		18:02 (1)	05:46		19:20 (2)	04:55		20:25 (6)	04:45		20:27 (6)	
	16:46	17:47		18:39	10	18:12 (1)	20:35	30	19:50 (2)	21:25	24	20:49 (5)	21:45	28	20:55 (6)	
29	08:04			06:55		19:00 (1)	05:44		19:20 (2)	04:54		20:24 (6)	04:46		20:28 (6)	
	16:48			19:41	14	19:14 (1)	20:37	29	19:49 (2)	21:26	26	20:50 (5)	21:45	28	20:56 (6)	
30	08:02			06:53		18:57 (1)	05:42		19:20 (2)	04:53		20:24 (6)	04:47		20:27 (6)	
	16:50			19:42	18	19:15 (1)	20:39	29	19:49 (2)	21:27	26	20:50 (5)	21:45	29	20:56 (6)	
31	08:01			06:51		18:56 (1)				04:52		20:23 (6)				
	16:52			19:44	20	19:16 (1)				21:29	27	20:50 (5)				
Sonnenscheinstunden		252	274	367			419			492			508			
astr.max.mögl.Beschattung					62			612			447			844		
Red.Sonnenscheinwahrsch.					0.31			0.41			0.51			0.45		
Reduktion Betriebsdauer					0.91			0.91			0.91			0.91		
Reduktion Windrichtung					0.69			0.67			0.65			0.64		
Gesamte Reduktion					0.20			0.25			0.31			0.27		
Met.wahrsch.Beschattung					12			155			136			226		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CJ - IO88

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober	November	Dezember
1	04:47		20:28 (6)	05:26		06:20	07:12	07:10	08:04
	21:45	28	20:56 (6)	21:10		20:04	18:51	16:42	15:58
2	04:48		20:28 (6)	05:28		06:22	07:14	07:12	08:05
	21:44	28	20:56 (5)	21:08		20:02	10 19:07 (1)	18:49	16:40	15:57
3	04:49		20:28 (6)	05:30	19:40 (2)	06:23	18:54 (1)	07:16	07:14	08:07
	21:44	28	20:56 (5)	21:06	9 19:49 (2)	20:00	14 19:08 (1)	18:47	16:38	15:57
4	04:50		20:28 (6)	05:31	19:37 (2)	06:25	18:52 (1)	07:18	07:15	08:08
	21:43	28	20:56 (5)	21:05	14 19:51 (2)	19:57	18 19:10 (1)	18:44	16:36	15:56
5	04:50		20:29 (6)	05:33	19:35 (2)	06:27	18:51 (1)	07:19	07:17	08:10
	21:43	28	20:57 (5)	21:03	18 19:53 (2)	19:55	20 19:11 (1)	18:42	16:34	15:55
6	04:51		20:29 (6)	05:35	19:33 (2)	06:29	18:49 (1)	07:21	07:19	08:11
	21:42	28	20:57 (5)	21:01	21 19:54 (2)	19:52	21 19:10 (1)	18:39	16:32	15:55
7	04:52		20:30 (6)	05:36	19:32 (2)	06:30	18:49 (1)	07:23	07:21	08:12
	21:42	27	20:57 (5)	20:59	23 19:55 (2)	19:50	22 19:11 (1)	18:37	16:30	15:54
8	04:53		20:30 (6)	05:38	19:32 (2)	06:32	18:49 (1)	07:25	07:23	08:14
	21:41	28	20:58 (5)	20:57	24 19:56 (2)	19:48	22 19:11 (1)	18:35	16:28	15:54
9	04:54		20:30 (6)	05:40	19:30 (2)	06:34	18:48 (1)	07:27	07:25	08:15
	21:40	28	20:58 (5)	20:55	26 19:56 (2)	19:45	22 19:10 (1)	18:32	16:27	15:54
10	04:55		20:31 (6)	05:42	19:30 (2)	06:36	18:48 (1)	07:28	07:27	08:16
	21:39	27	20:58 (5)	20:53	27 19:57 (2)	19:43	22 19:10 (1)	18:30	16:25	15:53
11	04:56		20:31 (6)	05:43	19:29 (2)	06:37	18:48 (1)	07:30	07:29	08:17
	21:38	27	20:58 (5)	20:51	28 19:57 (2)	19:40	21 19:09 (1)	18:27	16:23	15:53
12	04:58		20:32 (6)	05:45	19:29 (2)	06:39	18:48 (1)	07:32	07:31	08:18
	21:37	26	20:58 (5)	20:49	28 19:57 (2)	19:38	20 19:08 (1)	18:25	16:22	15:53
13	04:59		20:32 (6)	05:47	19:29 (2)	06:41	18:48 (1)	07:34	07:33	08:19
	21:37	26	20:58 (5)	20:47	29 19:58 (2)	19:35	19 19:07 (1)	18:23	16:20	15:53
14	05:00		20:32 (6)	05:48	19:28 (2)	06:42	18:50 (1)	07:36	07:34	08:20
	21:36	26	20:58 (5)	20:45	29 19:57 (2)	19:33	15 19:05 (1)	18:20	16:18	15:53
15	05:01		20:33 (6)	05:50	19:28 (2)	06:44	18:52 (1)	07:38	07:36	08:21
	21:34	25	20:58 (5)	20:43	29 19:57 (2)	19:30	11 19:03 (1)	18:18	16:17	15:53
16	05:03		20:33 (6)	05:52	19:28 (2)	06:46		07:39	07:38	08:22
	21:33	25	20:58 (5)	20:41	29 19:57 (2)	19:28		18:16	16:15	15:53
17	05:04		20:35 (6)	05:54	19:27 (2)	06:48		07:41	07:40	08:23
	21:32	23	20:58 (5)	20:38	29 19:56 (2)	19:26		18:14	16:14	15:53
18	05:05		20:36 (6)	05:55	19:28 (2)	06:49		07:43	07:42	08:24
	21:31	22	20:58 (5)	20:36	28 19:56 (2)	19:23		18:11	16:12	15:53
19	05:07		20:37 (6)	05:57	19:27 (2)	06:51		07:45	07:44	08:25
	21:30	19	20:56 (5)	20:34	28 19:55 (2)	19:21		18:09	16:11	15:54
20	05:08		20:38 (6)	05:59	19:28 (2)	06:53		07:47	07:45	08:25
	21:28	17	20:55 (5)	20:32	26 19:54 (2)	19:18		18:07	16:10	15:54
21	05:09		20:40 (5)	06:01	19:29 (2)	06:55		07:49	07:47	08:26
	21:27	14	20:54 (5)	20:30	24 19:53 (2)	19:16		18:05	16:08	15:54
22	05:11		20:41 (5)	06:02	19:29 (2)	06:56		07:51	07:49	08:26
	21:26	12	20:53 (5)	20:27	22 19:51 (2)	19:13		18:02	16:07	15:55
23	05:12		20:43 (5)	06:04	19:30 (3)	06:58		07:53	07:51	08:27
	21:24	9	20:52 (5)	20:25	20 19:50 (2)	19:11		18:00	16:06	15:55
24	05:14		20:44 (5)	06:06	19:30 (3)	07:00		07:54	07:52	08:27
	21:23	6	20:50 (5)	20:23	19 19:49 (3)	19:08		17:58	16:05	15:56
25	05:15		20:47 (5)	06:08	19:29 (3)	07:02		06:56	07:54	08:28
	21:21	2	20:49 (5)	20:21	19 19:48 (3)	19:06		16:56	16:04	15:57
26	05:17			06:09	19:29 (3)	07:03		06:58	07:56	08:28
	21:20			20:18	19 19:48 (3)	19:04		16:54	16:03	15:57
27	05:18			06:11	19:30 (3)	07:05		07:00	07:58	08:28
	21:18			20:16	18 19:48 (3)	19:01		16:52	16:02	15:58
28	05:20			06:13	19:29 (3)	07:07		07:02	07:59	08:28
	21:17			20:14	16 19:45 (3)	18:59		16:50	16:01	15:59
29	05:22			06:15	19:30 (3)	07:09		07:04	08:01	08:29
	21:15			20:11	13 19:43 (3)	18:56		16:48	16:00	16:00
30	05:23			06:16	19:32 (3)	07:11		07:06	08:02	08:29
	21:13			20:09	9 19:41 (3)	18:54		16:46	15:59	16:01
31	05:25			06:18	19:34 (3)			07:08		08:29
	21:12			20:07	4 19:38 (3)			16:44		16:02
Sonnenscheinstunden	510			459		382		329	260	235
astr.max.mögl.Beschattung		557		628		257				
Red.Sonnenscheinwahrsch.		0.45		0.49		0.40				
Reduktion Betriebsdauer		0.91		0.91		0.91				
Reduktion Windrichtung		0.64		0.66		0.69				
Gesamte Reduktion		0.26		0.30		0.25				
Met.wahrsch.Beschattung		146		186		65				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CK - IO89

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März			April			Mai			Juni			
1	08:29		07:59		07:02			06:48			18:57 (1)	05:40		19:22 (2)	04:51		20:26 (6)
	16:03		16:54		17:49			19:46	20		19:17 (1)	20:41	29	19:51 (2)	21:30	25	20:51 (5)
2	08:28		07:57		07:00			06:46			18:56 (1)	05:38		19:22 (2)	04:50		20:26 (6)
	16:04		16:56		17:50			19:48	22		19:18 (1)	20:42	29	19:51 (2)	21:31	26	20:52 (5)
3	08:28		07:56		06:58			06:43			18:56 (1)	05:36		19:22 (2)	04:49		20:26 (6)
	16:05		16:57		17:52			19:50	22		19:18 (1)	20:44	28	19:50 (2)	21:32	26	20:52 (5)
4	08:28		07:54		06:55			06:41			18:55 (1)	05:34		19:23 (2)	04:48		20:25 (6)
	16:06		16:59		17:54			19:52	23		19:18 (1)	20:46	26	19:49 (2)	21:33	27	20:52 (5)
5	08:28		07:52		06:53			06:38			18:55 (1)	05:32		19:24 (2)	04:48		20:26 (6)
	16:08		17:01		17:56			19:53	23		19:18 (1)	20:48	26	19:50 (2)	21:34	27	20:53 (5)
6	08:27		07:50		06:51			06:36			18:56 (1)	05:30		19:24 (2)	04:47		20:26 (6)
	16:09		17:03		17:58			19:55	21		19:17 (1)	20:50	25	19:49 (2)	21:35	26	20:52 (5)
7	08:27		07:49		06:48			06:34			18:55 (1)	05:28		19:25 (2)	04:46		20:25 (6)
	16:10		17:05		18:00			19:57	21		19:16 (1)	20:51	22	19:47 (2)	21:36	27	20:52 (5)
8	08:26		07:47		06:46			06:31			18:56 (1)	05:26		19:26 (2)	04:46		20:26 (6)
	16:12		17:07		18:02			19:59	19		19:15 (1)	20:53	20	19:46 (2)	21:37	27	20:53 (5)
9	08:26		07:45		06:44			06:29			18:57 (1)	05:24		19:28 (2)	04:45		20:26 (6)
	16:13		17:09		18:04			20:01	17		19:14 (1)	20:55	17	19:45 (2)	21:38	27	20:53 (5)
10	08:25		07:43		06:41			06:27			18:58 (1)	05:22		19:29 (2)	04:45		20:26 (6)
	16:15		17:11		18:06			20:03	14		19:12 (1)	20:57	14	19:43 (2)	21:39	27	20:53 (5)
11	08:25		07:41		06:39			06:24			19:00 (1)	05:20		19:31 (2)	04:44		20:26 (6)
	16:16		17:13		18:07			20:04	9		19:09 (1)	20:58	10	19:41 (2)	21:40	28	20:54 (6)
12	08:24		07:39		06:37			06:22				05:19			04:44		20:26 (6)
	16:18		17:15		18:09			20:06				21:00			21:41	28	20:54 (5)
13	08:23		07:37		06:34			06:20			19:35 (3)	05:17			04:44		20:26 (6)
	16:19		17:17		18:11			20:08	5		19:40 (3)	21:02			21:41	28	20:54 (6)
14	08:22		07:35		06:32			06:17			19:32 (3)	05:15			04:43		20:26 (6)
	16:21		17:19		18:13			20:10	10		19:42 (3)	21:03			21:42	28	20:54 (6)
15	08:21		07:33		06:29			06:15			19:31 (3)	05:14			04:43		20:26 (6)
	16:22		17:21		18:15			20:12	13		19:44 (3)	21:05			21:43	28	20:54 (6)
16	08:20		07:31		06:27			06:13			19:30 (3)	05:12			04:43		20:27 (6)
	16:24		17:23		18:17			20:13	16		19:46 (3)	21:07			21:43	28	20:55 (6)
17	08:19		07:29		06:25			06:10			19:28 (3)	05:10			04:43		20:27 (6)
	16:26		17:25		18:19			20:15	19		19:47 (3)	21:08			21:44	28	20:55 (6)
18	08:18		07:27		06:22			06:08			19:28 (3)	05:09			04:43		20:27 (6)
	16:27		17:27		18:20			20:17	19		19:47 (3)	21:10			21:44	28	20:55 (6)
19	08:17		07:25		06:20			06:06			19:27 (3)	05:07			04:43		20:27 (6)
	16:29		17:29		18:22			20:19	20		19:47 (3)	21:11			21:44	28	20:55 (6)
20	08:16		07:22		06:17			06:03			19:27 (3)	05:06		20:37 (5)	04:43		20:27 (6)
	16:31		17:31		18:24			20:21	20		19:47 (2)	21:13	4	20:41 (5)	21:45	28	20:55 (6)
21	08:15		07:20		06:15			06:01			19:28 (3)	05:04		20:35 (5)	04:43		20:27 (6)
	16:33		17:33		18:26			20:23	21		19:49 (2)	21:15	7	20:42 (5)	21:45	28	20:55 (6)
22	08:14		07:18		06:12			05:59			19:27 (2)	05:03		20:33 (5)	04:43		20:28 (6)
	16:35		17:35		18:28			20:24	22		19:49 (2)	21:16	10	20:43 (5)	21:45	28	20:56 (6)
23	08:12		07:16		06:10			05:57			19:26 (2)	05:01		20:32 (5)	04:43		20:28 (6)
	16:36		17:37		18:30			20:26	24		19:50 (2)	21:18	13	20:45 (5)	21:45	28	20:56 (6)
24	08:11		07:14		06:08			05:55			19:25 (2)	05:00		20:32 (5)	04:44		20:28 (6)
	16:38		17:39		18:32			20:28	26		19:51 (2)	21:19	14	20:46 (5)	21:45	28	20:56 (6)
25	08:10		07:11		06:05			05:52			19:24 (2)	04:59		20:31 (5)	04:44		20:29 (6)
	16:40		17:41		18:33			20:30	27		19:51 (2)	21:21	16	20:47 (5)	21:45	28	20:57 (6)
26	08:08		07:09		06:03			05:50			19:23 (2)	04:58		20:30 (6)	04:44		20:29 (6)
	16:42		17:43		18:35			20:32	29		19:52 (2)	21:22	19	20:49 (5)	21:45	28	20:57 (6)
27	08:07		07:07		06:00			05:48			19:23 (2)	04:56		20:29 (6)	04:45		20:29 (6)
	16:44		17:45		18:37			20:33	29		19:52 (2)	21:23	21	20:50 (5)	21:45	29	20:58 (6)
28	08:05		07:05		05:58			05:46			19:23 (2)	04:55		20:28 (6)	04:45		20:29 (6)
	16:46		17:47		18:39			20:35	29		19:52 (2)	21:25	23	20:51 (5)	21:45	28	20:57 (6)
29	08:04				06:55		19:03 (1)	05:44			19:22 (2)	04:54		20:27 (6)	04:46		20:30 (6)
	16:48				19:41	11	19:14 (1)	20:37	30		19:52 (2)	21:26	24	20:51 (5)	21:45	28	20:58 (6)
30	08:02				06:53		19:00 (1)	05:42			19:22 (2)	04:53		20:27 (6)	04:47		20:30 (6)
	16:50				19:42	16	19:16 (1)	20:39	30		19:52 (2)	21:27	24	20:51 (5)	21:45	27	20:57 (5)
31	08:01				06:51		18:59 (1)					04:52		20:26 (6)			
	16:52				19:44	18	19:17 (1)					21:29	25	20:51 (5)			
Sonnenscheinstunden	252		274		367			419				492			508		
astr.max.mögl.Beschattung						45			600				446			825	
Red.Sonnenscheinwahrsch.						0.31			0.41				0.51			0.45	
Reduktion Betriebsdauer						0.91			0.91				0.91			0.91	
Reduktion Windrichtung						0.69			0.67				0.65			0.64	
Gesamte Reduktion						0.20			0.25				0.31			0.27	
Met.wahrsch.Beschattung						9			152				136			220	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CK - IO89

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober	November	Dezember
1 | 04:47		20:30 (6) | 05:26		19:45 (2) | 06:20		18:59 (1) | 07:12	| 07:10	| 08:04
| 21:45	28	20:58 (6) | 21:10	4	19:49 (2) | 20:04	9	19:08 (1) | 18:51	| 16:42	| 15:58
2 | 04:48		20:31 (6) | 05:28		19:40 (2) | 06:22		18:57 (1) | 07:14	| 07:12	| 08:05
| 21:44	27	20:58 (5) | 21:08	12	19:52 (2) | 20:02	14	19:11 (1) | 18:49	| 16:40	| 15:57
3 | 04:49		20:30 (6) | 05:30		19:39 (2) | 06:23		18:54 (1) | 07:16	| 07:14	| 08:07
| 21:44	28	20:58 (6) | 21:06	16	19:55 (2) | 20:00	17	19:11 (1) | 18:47	| 16:38	| 15:57
4 | 04:50		20:31 (6) | 05:31		19:37 (2) | 06:25		18:53 (1) | 07:18	| 07:15	| 08:08
| 21:43	27	20:58 (5) | 21:05	18	19:55 (2) | 19:57	19	19:12 (1) | 18:44	| 16:36	| 15:56
5 | 04:50		20:31 (6) | 05:33		19:36 (2) | 06:27		18:52 (1) | 07:19	| 07:17	| 08:10
| 21:43	27	20:58 (5) | 21:03	21	19:57 (2) | 19:55	21	19:13 (1) | 18:42	| 16:34	| 15:55
6 | 04:51		20:32 (6) | 05:35		19:34 (2) | 06:29		18:51 (1) | 07:21	| 07:19	| 08:11
| 21:42	27	20:59 (5) | 21:01	23	19:57 (2) | 19:52	21	19:12 (1) | 18:39	| 16:32	| 15:55
7 | 04:52		20:32 (6) | 05:36		19:33 (2) | 06:30		18:50 (1) | 07:23	| 07:21	| 08:12
| 21:42	27	20:59 (5) | 20:59	25	19:58 (2) | 19:50	23	19:13 (1) | 18:37	| 16:30	| 15:54
8 | 04:53		20:33 (6) | 05:38		19:33 (2) | 06:32		18:50 (1) | 07:25	| 07:23	| 08:14
| 21:41	26	20:59 (5) | 20:57	26	19:59 (2) | 19:48	23	19:13 (1) | 18:35	| 16:28	| 15:54
9 | 04:54		20:33 (6) | 05:40		19:32 (2) | 06:34		18:49 (1) | 07:27	| 07:25	| 08:15
| 21:40	27	21:00 (5) | 20:55	27	19:59 (2) | 19:45	22	19:11 (1) | 18:32	| 16:27	| 15:54
10 | 04:55		20:34 (6) | 05:42		19:32 (2) | 06:36		18:50 (1) | 07:28	| 07:27	| 08:16
| 21:39	26	21:00 (5) | 20:53	28	20:00 (2) | 19:43	21	19:11 (1) | 18:30	| 16:25	| 15:53
11 | 04:56		20:34 (6) | 05:43		19:31 (2) | 06:37		18:50 (1) | 07:30	| 07:29	| 08:17
| 21:38	26	21:00 (5) | 20:51	28	19:59 (2) | 19:40	20	19:10 (1) | 18:27	| 16:23	| 15:53
12 | 04:58		20:35 (6) | 05:45		19:31 (2) | 06:39		18:50 (1) | 07:32	| 07:31	| 08:18
| 21:37	25	21:00 (5) | 20:49	29	20:00 (2) | 19:38	18	19:08 (1) | 18:25	| 16:22	| 15:53
13 | 04:59		20:35 (6) | 05:47		19:31 (2) | 06:41		18:51 (1) | 07:34	| 07:33	| 08:19
| 21:37	25	21:00 (5) | 20:47	29	20:00 (2) | 19:35	16	19:07 (1) | 18:23	| 16:20	| 15:53
14 | 05:00		20:36 (6) | 05:48		19:30 (2) | 06:42		18:53 (1) | 07:36	| 07:34	| 08:20
| 21:36	23	20:59 (5) | 20:45	29	19:59 (2) | 19:33	12	19:05 (1) | 18:20	| 16:18	| 15:53
15 | 05:01		20:36 (6) | 05:50		19:30 (2) | 06:44		18:57 (1) | 07:38	| 07:36	| 08:21
| 21:34	23	20:59 (5) | 20:43	29	19:59 (2) | 19:30	4	19:01 (1) | 18:18	| 16:17	| 15:53
16 | 05:03		20:37 (6) | 05:52		19:31 (2) | 06:46			07:39	| 07:38	| 08:22
| 21:33	22	20:59 (5) | 20:41	28	19:59 (2) | 19:28			18:16	| 16:15	| 15:53
17 | 05:04		20:39 (6) | 05:54		19:30 (2) | 06:48			07:41	| 07:40	| 08:23
| 21:32	20	20:59 (5) | 20:38	28	19:58 (2) | 19:26			18:14	| 16:14	| 15:53
18 | 05:05		20:40 (6) | 05:55		19:31 (2) | 06:49			07:43	| 07:42	| 08:24
| 21:31	18	20:58 (5) | 20:36	27	19:58 (2) | 19:23			18:11	| 16:12	| 15:53
19 | 05:07		20:41 (5) | 05:57		19:30 (2) | 06:51			07:45	| 07:44	| 08:25
| 21:30	15	20:56 (5) | 20:34	26	19:56 (2) | 19:21			18:09	| 16:11	| 15:54
20 | 05:08		20:41 (5) | 05:59		19:31 (2) | 06:53			07:47	| 07:45	| 08:25
| 21:28	14	20:55 (5) | 20:32	24	19:55 (2) | 19:18			18:07	| 16:10	| 15:54
21 | 05:09		20:43 (5) | 06:01		19:32 (3) | 06:55			07:49	| 07:47	| 08:26
| 21:27	11	20:54 (5) | 20:30	22	19:54 (2) | 19:16			18:05	| 16:08	| 15:54
22 | 05:11		20:44 (5) | 06:02		19:31 (3) | 06:56			07:51	| 07:49	| 08:26
| 21:26	9	20:53 (5) | 20:27	21	19:52 (2) | 19:13			18:02	| 16:07	| 15:55
23 | 05:12		20:46 (5) | 06:04		19:31 (3) | 06:58			07:53	| 07:51	| 08:27
| 21:24	6	20:52 (5) | 20:25	20	19:51 (3) | 19:11			18:00	| 16:06	| 15:55
24 | 05:14		06:06		19:31 (3) | 07:00			07:54	| 07:52	| 08:27
| 21:23		20:23	20	19:51 (3) | 19:08			17:58	| 16:05	| 15:56
25 | 05:15		06:08		19:30 (3) | 07:02			06:56	| 07:54	| 08:28
| 21:21		20:21	20	19:50 (3) | 19:06			16:56	| 16:04	| 15:57
26 | 05:17		06:09		19:31 (3) | 07:03			06:58	| 07:56	| 08:28
| 21:20		20:18	18	19:49 (3) | 19:04			16:54	| 16:03	| 15:57
27 | 05:18		06:11		19:32 (3) | 07:05			07:00	| 07:58	| 08:28
| 21:18		20:16	16	19:48 (3) | 19:01			16:52	| 16:02	| 15:58
28 | 05:20		06:13		19:32 (3) | 07:07			07:02	| 07:59	| 08:28
| 21:17		20:14	13	19:45 (3) | 18:59			16:50	| 16:01	| 15:59
29 | 05:22		06:15		19:33 (3) | 07:09			07:04	| 08:01	| 08:29
| 21:15		20:11	10	19:43 (3) | 18:56			16:48	| 16:00	| 16:00
30 | 05:23		06:16		19:36 (3) | 07:11			07:06	| 08:02	| 08:29
| 21:13		20:09	5	19:41 (3) | 18:54			16:46	| 15:59	| 16:01
31 | 05:25		06:18					07:08		| 08:29
| 21:12		20:07					16:44		| 16:02
Sonnenscheinstunden | 510		459		382		329	260	| 235	
astr.max.mögl.Beschattung |	507		642		260				
Red.Sonnenscheinwahrsch. |	0.45		0.49		0.40				
Reduktion Betriebsdauer |	0.91		0.91		0.91				
Reduktion Windrichtung |	0.64		0.66		0.69				
Gesamte Reduktion |	0.26		0.30		0.25				
Met.wahrsch.Beschattung |	132		190		66				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CL - IO90

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40		19:37 (3)	04:51		19:51 (2)
	16:03		16:54		17:49		19:46			20:41	24	20:01 (2)	21:30	6	19:57 (2)
2	08:28		07:57		07:00		06:46			05:38		19:38 (3)	04:50		
	16:04		16:56		17:50		19:48			20:42	25	20:03 (2)	21:31		
3	08:28		07:56		06:58		06:43			05:36		19:39 (3)	04:49		
	16:05		16:57		17:52		19:50			20:44	25	20:04 (2)	21:32		
4	08:28		07:54		06:55		06:41		19:10 (1)	05:34		19:40 (2)	04:48		20:55 (5)
	16:06		16:59		17:54		19:52	12	19:22 (1)	20:46	25	20:05 (2)	21:33	3	20:58 (5)
5	08:28		07:52		06:53		06:38		19:08 (1)	05:32		19:40 (2)	04:48		20:54 (5)
	16:08		17:01		17:56		19:53	16	19:24 (1)	20:48	27	20:07 (2)	21:34	6	21:00 (5)
6	08:27		07:50		06:51		06:36		19:07 (1)	05:30		19:39 (2)	04:47		20:52 (5)
	16:09		17:03		17:58		19:55	19	19:26 (1)	20:50	28	20:07 (2)	21:35	9	21:01 (5)
7	08:27		07:49		06:48		06:34		19:05 (1)	05:28		19:38 (2)	04:46		20:51 (5)
	16:10		17:05		18:00		19:57	21	19:26 (1)	20:51	29	20:07 (2)	21:36	10	21:01 (5)
8	08:26		07:47		06:46		06:31		19:04 (1)	05:26		19:37 (2)	04:46		20:51 (5)
	16:12		17:07		18:02		19:59	23	19:27 (1)	20:53	30	20:07 (2)	21:37	12	21:03 (5)
9	08:26		07:45		06:44		06:29		19:04 (1)	05:24		19:38 (2)	04:45		20:51 (5)
	16:13		17:09		18:04		20:01	23	19:27 (1)	20:55	30	20:08 (2)	21:38	13	21:04 (5)
10	08:25		07:43		06:41		06:27		19:02 (1)	05:22		19:37 (2)	04:45		20:50 (5)
	16:15		17:11		18:06		20:03	24	19:26 (1)	20:57	31	20:08 (2)	21:39	14	21:04 (5)
11	08:25		07:41		06:39		06:24		19:02 (1)	05:21		19:36 (2)	04:44		20:51 (5)
	16:16		17:13		18:07		20:04	25	19:27 (1)	20:58	32	20:08 (2)	21:40	14	21:05 (5)
12	08:24		07:39		06:37		06:22		19:02 (1)	05:19		19:37 (2)	04:44		20:51 (5)
	16:18		17:15		18:09		20:06	24	19:26 (1)	21:00	32	20:09 (2)	21:41	15	21:06 (5)
13	08:23		07:37		06:34		06:20		19:02 (1)	05:17		19:36 (2)	04:44		20:50 (5)
	16:19		17:17		18:11		20:08	23	19:25 (1)	21:02	32	20:08 (2)	21:41	16	21:06 (5)
14	08:22		07:35		06:32		06:17		19:02 (1)	05:15		19:37 (2)	04:43		20:50 (5)
	16:21		17:19		18:13		20:10	23	19:25 (1)	21:03	32	20:09 (2)	21:42	16	21:06 (5)
15	08:21		07:33		06:29		06:15		19:03 (1)	05:14		19:37 (2)	04:43		20:50 (5)
	16:22		17:21		18:15		20:12	21	19:24 (1)	21:05	31	20:08 (2)	21:43	17	21:07 (5)
16	08:20		07:31		06:27		06:13		19:04 (1)	05:12		19:37 (2)	04:43		20:50 (5)
	16:24		17:23		18:17		20:13	19	19:23 (1)	21:07	32	20:09 (2)	21:43	18	21:08 (5)
17	08:19		07:29		06:25		06:10		19:04 (1)	05:10		19:37 (2)	04:43		20:50 (5)
	16:26		17:25		18:19		20:15	17	19:21 (1)	21:08	31	20:08 (2)	21:44	18	21:08 (5)
18	08:18		07:27		06:22		06:08		19:06 (1)	05:09		19:38 (2)	04:43		20:51 (5)
	16:28		17:27		18:21		20:17	13	19:19 (1)	21:10	30	20:08 (2)	21:44	17	21:08 (5)
19	08:17		07:25		06:20		06:06		19:09 (1)	05:07		19:37 (2)	04:43		20:51 (5)
	16:29		17:29		18:22		20:19	11	19:50 (3)	21:11	30	20:07 (2)	21:44	18	21:09 (5)
20	08:16		07:22		06:17		06:03		19:42 (3)	05:06		19:38 (2)	04:43		20:51 (5)
	16:31		17:31		18:24		20:21	11	19:53 (3)	21:13	29	20:07 (2)	21:45	18	21:09 (5)
21	08:15		07:20		06:15		06:01		19:41 (3)	05:04		19:39 (2)	04:43		20:51 (5)
	16:33		17:33		18:26		20:23	14	19:55 (3)	21:15	28	20:07 (2)	21:45	18	21:09 (5)
22	08:14		07:18		06:12		05:59		19:38 (3)	05:03		19:39 (2)	04:43		20:52 (5)
	16:35		17:35		18:28		20:24	17	19:55 (3)	21:16	27	20:06 (2)	21:45	18	21:10 (5)
23	08:12		07:16		06:10		05:57		19:37 (3)	05:01		19:40 (2)	04:43		20:52 (5)
	16:36		17:37		18:30		20:26	19	19:56 (3)	21:18	26	20:06 (2)	21:45	18	21:10 (5)
24	08:11		07:14		06:08		05:55		19:37 (3)	05:00		19:41 (2)	04:44		20:52 (5)
	16:38		17:39		18:32		20:28	20	19:57 (3)	21:19	24	20:05 (2)	21:45	17	21:09 (5)
25	08:10		07:11		06:05		05:52		19:36 (3)	04:59		19:42 (2)	04:44		20:52 (5)
	16:40		17:41		18:33		20:30	21	19:57 (3)	21:21	23	20:05 (2)	21:45	18	21:10 (5)
26	08:08		07:09		06:03		05:50		19:36 (3)	04:58		19:43 (2)	04:44		20:52 (5)
	16:42		17:43		18:35		20:32	21	19:57 (3)	21:22	21	20:04 (2)	21:45	18	21:10 (5)
27	08:07		07:07		06:00		05:48		19:36 (3)	04:56		19:44 (2)	04:45		20:53 (5)
	16:44		17:45		18:37		20:33	21	19:57 (3)	21:23	20	20:04 (2)	21:45	17	21:10 (5)
28	08:05		07:05		05:58		05:46		19:36 (3)	04:55		19:45 (2)	04:45		20:53 (5)
	16:46		17:47		18:39		20:35	21	19:57 (3)	21:25	18	20:03 (2)	21:45	17	21:10 (5)
29	08:04				06:55		05:44		19:36 (3)	04:54		19:46 (2)	04:46		20:54 (5)
	16:48				19:41		20:37	20	19:56 (3)	21:26	16	20:02 (2)	21:45	16	21:10 (5)
30	08:02				06:53		05:42		19:36 (3)	04:53		19:47 (2)	04:47		20:54 (5)
	16:50				19:42		20:39	23	19:59 (2)	21:27	14	20:01 (2)	21:45	15	21:09 (5)
31	08:01				06:51					04:52		19:49 (2)			
	16:52				19:44					21:29	10	19:59 (2)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung								522			812			412	
Red.Sonnenscheinwahrsch.								0.41			0.51			0.45	
Reduktion Betriebsdauer								0.91			0.91			0.91	
Reduktion Windrichtung								0.68			0.66			0.63	
Gesamte Reduktion								0.25			0.31			0.26	
Met.wahrsch.Beschattung								133			252			108	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CL - IO90

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober		November	Dezember
1 | 04:47		20:55 (5)	05:26		19:47 (2)	06:20		19:01 (1)	07:12		07:10	08:04
| 21:45	14	21:09 (5)	21:10	32	20:19 (2)	20:04	24	19:25 (1)	18:51		16:42	15:58
2 | 04:48		20:55 (5)	05:28		19:47 (2)	06:22		19:01 (1)	07:14		07:12	08:05
| 21:44	14	21:09 (5)	21:08	31	20:18 (2)	20:02	24	19:25 (1)	18:49		16:40	15:57
3 | 04:49		20:55 (5)	05:30		19:47 (2)	06:23		19:01 (1)	07:16		07:14	08:07
| 21:44	13	21:08 (5)	21:06	32	20:19 (2)	20:00	23	19:24 (1)	18:47		16:38	15:57
4 | 04:50		20:56 (5)	05:31		19:47 (2)	06:25		19:01 (1)	07:18		07:15	08:08
| 21:43	12	21:08 (5)	21:05	31	20:18 (2)	19:57	23	19:24 (1)	18:44		16:36	15:56
5 | 04:50		20:57 (5)	05:33		19:48 (2)	06:27		19:02 (1)	07:19		07:17	08:10
| 21:43	11	21:08 (5)	21:03	30	20:18 (2)	19:55	21	19:23 (1)	18:42		16:34	15:55
6 | 04:51		20:58 (5)	05:35		19:48 (2)	06:29		19:02 (1)	07:21		07:19	08:11
| 21:42	9	21:07 (5)	21:01	29	20:17 (2)	19:52	19	19:21 (1)	18:39		16:32	15:55
7 | 04:52		20:59 (5)	05:36		19:49 (2)	06:30		19:03 (1)	07:23		07:21	08:12
| 21:42	8	21:07 (5)	20:59	27	20:16 (2)	19:50	16	19:19 (1)	18:37		16:30	15:54
8 | 04:53		21:01 (5)	05:38		19:50 (2)	06:32		19:05 (1)	07:25		07:23	08:14
| 21:41	5	21:06 (5)	20:57	26	20:16 (2)	19:48	12	19:17 (1)	18:35		16:28	15:54
9 | 04:54			05:40		19:49 (3)	06:34		19:09 (1)	07:27		07:25	08:15
| 21:40			20:55	25	20:14 (2)	19:45	3	19:12 (1)	18:32		16:27	15:54
10 | 04:55			05:42		19:48 (3)	06:36			07:28		07:27	08:16
| 21:39			20:53	25	20:13 (2)	19:43			18:30		16:25	15:53
11 | 04:56		20:01 (2)	05:43		19:46 (3)	06:37			07:30		07:29	08:17
| 21:38	2	20:03 (2)	20:51	25	20:11 (2)	19:40			18:27		16:23	15:53
12 | 04:58		19:58 (2)	05:45		19:45 (3)	06:39			07:32		07:31	08:18
| 21:37	9	20:07 (2)	20:49	24	20:09 (2)	19:38			18:25		16:22	15:53
13 | 04:59		19:56 (2)	05:47		19:45 (3)	06:41			07:34		07:33	08:19
| 21:37	12	20:08 (2)	20:47	21	20:06 (2)	19:35			18:23		16:20	15:53
14 | 05:00		19:55 (2)	05:48		19:43 (3)	06:42			07:36		07:34	08:20
| 21:36	15	20:10 (2)	20:45	21	20:04 (3)	19:33			18:21		16:18	15:53
15 | 05:01		19:54 (2)	05:50		19:43 (3)	06:44			07:38		07:36	08:21
| 21:34	17	20:11 (2)	20:43	21	20:04 (3)	19:30			18:18		16:17	15:53
16 | 05:03		19:53 (2)	05:52		19:43 (3)	06:46			07:39		07:38	08:22
| 21:33	19	20:12 (2)	20:41	21	20:04 (3)	19:28			18:16		16:15	15:53
17 | 05:04		19:53 (2)	05:54		19:43 (3)	06:48			07:41		07:40	08:23
| 21:32	20	20:13 (2)	20:38	21	20:04 (3)	19:26			18:14		16:14	15:53
18 | 05:05		19:52 (2)	05:55		19:43 (3)	06:49			07:43		07:42	08:24
| 21:31	22	20:14 (2)	20:36	20	20:03 (3)	19:23			18:11		16:12	15:53
19 | 05:07		19:51 (2)	05:57		19:42 (3)	06:51			07:45		07:44	08:25
| 21:30	24	20:15 (2)	20:34	20	20:02 (3)	19:21			18:09		16:11	15:54
20 | 05:08		19:50 (2)	05:59		19:43 (3)	06:53			07:47		07:45	08:25
| 21:28	25	20:15 (2)	20:32	19	20:02 (3)	19:18			18:07		16:10	15:54
21 | 05:09		19:50 (2)	06:01		19:44 (3)	06:55			07:49		07:47	08:26
| 21:27	26	20:16 (2)	20:30	17	20:01 (3)	19:16			18:05		16:08	15:54
22 | 05:11		19:49 (2)	06:02		19:45 (3)	06:56			07:51		07:49	08:26
| 21:26	28	20:17 (2)	20:27	13	19:58 (3)	19:13			18:02		16:07	15:55
23 | 05:12		19:49 (2)	06:04		19:47 (3)	06:58			07:53		07:51	08:27
| 21:24	29	20:18 (2)	20:25	9	19:56 (3)	19:11			18:00		16:06	15:55
24 | 05:14		19:48 (2)	06:06		19:12 (1)	07:00			07:54		07:52	08:27
| 21:23	30	20:18 (2)	20:23	8	19:20 (1)	19:08			17:58		16:05	15:56
25 | 05:15		19:48 (2)	06:08		19:09 (1)	07:02			06:56		07:54	08:28
| 21:21	30	20:18 (2)	20:21	13	19:22 (1)	19:06			16:56		16:04	15:57
26 | 05:17		19:48 (2)	06:09		19:07 (1)	07:03			06:58		07:56	08:28
| 21:20	31	20:19 (2)	20:18	17	19:24 (1)	19:04			16:54		16:03	15:57
27 | 05:18		19:47 (2)	06:11		19:06 (1)	07:05			07:00		07:58	08:28
| 21:18	31	20:18 (2)	20:16	19	19:25 (1)	19:01			16:52		16:02	15:58
28 | 05:20		19:48 (2)	06:13		19:04 (1)	07:07			07:02		07:59	08:28
| 21:17	31	20:19 (2)	20:14	21	19:25 (1)	18:59			16:50		16:01	15:59
29 | 05:22		19:47 (2)	06:15		19:03 (1)	07:09			07:04		08:01	08:29
| 21:15	32	20:19 (2)	20:11	23	19:26 (1)	18:56			16:48		16:00	16:00
30 | 05:23		19:47 (2)	06:16		19:03 (1)	07:11			07:06		08:02	08:29
| 21:13	32	20:19 (2)	20:09	23	19:26 (1)	18:54			16:46		15:59	16:01
31 | 05:25		19:47 (2)	06:18		19:01 (1)				07:08			08:29
| 21:12	32	20:19 (2)	20:07	24	19:25 (1)				16:44			16:02
Sonnenscheinstunden	510		459			382			329		260	235
astr.max.mögl.Beschattung		583		688			165					
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40					
Reduktion Betriebsdauer		0.91		0.91			0.91					
Reduktion Windrichtung		0.66		0.67			0.69					
Gesamte Reduktion		0.27		0.30			0.25					
Met.wahrsch.Beschattung		156		204			41					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CM - IO91

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April			Mai			Juni		
1	08:29	07:59	07:02	06:48			05:40		19:41 (3)	04:51		19:49 (2)
	16:03	16:54	17:49	19:46			20:41	21	20:02 (3)	21:30	26	20:15 (2)
2	08:28	07:57	07:00	06:46			05:38		19:41 (3)	04:50		19:51 (2)
	16:04	16:56	17:50	19:48			20:42	20	20:01 (3)	21:31	25	20:16 (2)
3	08:28	07:56	06:58	06:43			05:36		19:41 (3)	04:49		19:51 (2)
	16:05	16:57	17:52	19:50			20:44	20	20:01 (3)	21:32	24	20:15 (2)
4	08:28	07:54	06:55	06:41			05:34		19:41 (3)	04:48		19:51 (2)
	16:06	16:59	17:54	19:52			20:46	19	20:00 (3)	21:33	24	20:15 (2)
5	08:28	07:52	06:53	06:38			05:32		19:43 (3)	04:48		19:53 (2)
	16:08	17:01	17:56	19:53			20:48	24	20:07 (2)	21:34	22	20:15 (2)
6	08:27	07:50	06:51	06:36			05:30		19:44 (3)	04:47		19:53 (2)
	16:09	17:03	17:58	19:55			20:50	25	20:09 (2)	21:35	21	20:14 (2)
7	08:27	07:49	06:48	06:34		19:17 (1)	05:28		19:45 (3)	04:46		19:53 (2)
	16:10	17:05	18:00	19:57	10	19:27 (1)	20:51	26	20:11 (2)	21:36	20	20:13 (2)
8	08:26	07:47	06:46	06:31		19:14 (1)	05:26		19:47 (3)	04:46		19:54 (2)
	16:12	17:07	18:02	19:59	15	19:29 (1)	20:53	25	20:12 (2)	21:37	20	20:14 (2)
9	08:26	07:45	06:44	06:29		19:13 (1)	05:24		19:50 (2)	04:45		19:56 (2)
	16:13	17:09	18:04	20:01	18	19:31 (1)	20:55	24	20:14 (2)	21:38	18	20:14 (2)
10	08:25	07:43	06:41	06:27		19:11 (1)	05:22		19:48 (2)	04:45		19:56 (2)
	16:15	17:11	18:06	20:03	20	19:31 (1)	20:57	26	20:14 (2)	21:39	17	20:13 (2)
11	08:25	07:41	06:39	06:24		19:10 (1)	05:21		19:47 (2)	04:44		19:57 (2)
	16:16	17:13	18:07	20:04	22	19:32 (1)	20:58	28	20:15 (2)	21:40	16	20:13 (2)
12	08:24	07:39	06:37	06:22		19:09 (1)	05:19		19:47 (2)	04:44		19:58 (2)
	16:18	17:15	18:09	20:06	23	19:32 (1)	21:00	29	20:16 (2)	21:41	15	20:13 (2)
13	08:23	07:37	06:34	06:20		19:08 (1)	05:17		19:46 (2)	04:44		19:58 (2)
	16:19	17:17	18:11	20:08	24	19:32 (1)	21:02	30	20:16 (2)	21:41	14	20:12 (2)
14	08:22	07:35	06:32	06:17		19:08 (1)	05:15		19:46 (2)	04:43		19:59 (2)
	16:21	17:19	18:13	20:10	24	19:32 (1)	21:03	31	20:17 (2)	21:42	15	21:06 (5)
15	08:21	07:33	06:29	06:15		19:08 (1)	05:14		19:46 (2)	04:43		19:59 (2)
	16:22	17:21	18:15	20:12	24	19:32 (1)	21:05	31	20:17 (2)	21:43	17	21:07 (5)
16	08:20	07:31	06:27	06:13		19:08 (1)	05:12		19:46 (2)	04:43		20:00 (2)
	16:24	17:23	18:17	20:13	24	19:32 (1)	21:07	31	20:17 (2)	21:43	17	21:08 (5)
17	08:19	07:29	06:25	06:10		19:07 (1)	05:10		19:45 (2)	04:43		20:01 (2)
	16:26	17:25	18:19	20:15	23	19:30 (1)	21:08	32	20:17 (2)	21:44	16	21:08 (5)
18	08:18	07:27	06:22	06:08		19:08 (1)	05:09		19:46 (2)	04:43		20:01 (2)
	16:28	17:27	18:21	20:17	22	19:30 (1)	21:10	32	20:18 (2)	21:44	17	21:08 (5)
19	08:17	07:25	06:20	06:06		19:09 (1)	05:07		19:45 (2)	04:43		20:02 (2)
	16:29	17:29	18:22	20:19	20	19:29 (1)	21:11	32	20:17 (2)	21:44	17	21:09 (5)
20	08:16	07:22	06:17	06:03		19:10 (1)	05:06		19:45 (2)	04:43		20:02 (2)
	16:31	17:31	18:24	20:21	18	19:28 (1)	21:13	32	20:17 (2)	21:45	17	21:09 (5)
21	08:15	07:20	06:15	06:01		19:11 (1)	05:04		19:46 (2)	04:43		20:02 (2)
	16:33	17:33	18:26	20:23	15	19:26 (1)	21:15	32	20:18 (2)	21:45	17	21:09 (5)
22	08:14	07:18	06:12	05:59		19:12 (1)	05:03		19:45 (2)	04:43		20:03 (2)
	16:35	17:35	18:28	20:24	14	19:54 (3)	21:16	32	20:17 (2)	21:45	17	21:10 (5)
23	08:12	07:16	06:10	05:57		19:16 (1)	05:01		19:46 (2)	04:43		20:03 (2)
	16:36	17:37	18:30	20:26	13	19:57 (3)	21:18	31	20:17 (2)	21:45	17	21:10 (5)
24	08:11	07:14	06:08	05:55		19:45 (3)	05:00		19:46 (2)	04:44		20:03 (2)
	16:38	17:39	18:32	20:28	14	19:59 (3)	21:19	31	20:17 (2)	21:45	17	21:10 (5)
25	08:10	07:11	06:05	05:52		19:44 (3)	04:59		19:46 (2)	04:44		20:03 (2)
	16:40	17:41	18:33	20:30	17	20:01 (3)	21:21	31	20:17 (2)	21:45	17	21:10 (5)
26	08:08	07:09	06:03	05:50		19:43 (3)	04:58		19:47 (2)	04:44		20:02 (2)
	16:42	17:43	18:35	20:32	18	20:01 (3)	21:22	30	20:17 (2)	21:45	17	21:10 (5)
27	08:07	07:07	06:00	05:48		19:42 (3)	04:56		19:47 (2)	04:45		20:03 (2)
	16:44	17:45	18:37	20:33	20	20:02 (3)	21:23	30	20:17 (2)	21:45	16	21:10 (5)
28	08:05	07:05	05:58	05:46		19:42 (3)	04:55		19:48 (2)	04:45		20:02 (2)
	16:46	17:47	18:39	20:35	20	20:02 (3)	21:25	29	20:17 (2)	21:45	17	21:10 (5)
29	08:04		06:55	05:44		19:41 (3)	04:54		19:48 (2)	04:46		20:02 (2)
	16:48		19:41	20:37	21	20:02 (3)	21:26	29	20:17 (2)	21:45	13	20:15 (2)
30	08:02		06:53	05:42		19:41 (3)	04:53		19:49 (2)	04:47		20:01 (2)
	16:50		19:42	20:39	21	20:02 (3)	21:27	27	20:16 (2)	21:45	15	20:16 (2)
31	08:01		06:51				04:52		19:49 (2)			
	16:52		19:44				21:29	27	20:16 (2)			
Sonnenscheinstunden	252	274	367	419			492			508		
astr.max.mögl.Beschattung					460			867			541	
Red.Sonnenscheinwahrsch.					0.41			0.51			0.45	
Reduktion Betriebsdauer					0.91			0.91			0.91	
Reduktion Windrichtung					0.68			0.66			0.65	
Gesamte Reduktion					0.25			0.31			0.27	
Met.wahrsch.Beschattung					117			268			147	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CM - IO91

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober	November	Dezember
1	04:47		20:01 (2) / 05:26		19:58 (2) / 06:20		19:09 (1) / 07:12	07:10	08:04
	21:45	16	20:17 (2) / 21:10	28	20:26 (2) / 20:04	22	19:31 (1) / 18:51	16:42	15:58
2	04:48		20:01 (2) / 05:28		19:58 (2) / 06:22		19:10 (1) / 07:14	07:12	08:05
	21:44	17	20:18 (2) / 21:08	27	20:25 (2) / 20:02	20	19:30 (1) / 18:49	16:40	15:57
3	04:49		20:00 (2) / 05:30		19:59 (2) / 06:23		19:10 (1) / 07:16	07:14	08:07
	21:44	18	20:18 (2) / 21:06	25	20:24 (2) / 20:00	18	19:28 (1) / 18:47	16:38	15:57
4	04:50		20:00 (2) / 05:31		19:59 (2) / 06:25		19:11 (1) / 07:18	07:15	08:08
	21:43	19	20:19 (2) / 21:05	24	20:23 (2) / 19:57	15	19:26 (1) / 18:44	16:36	15:56
5	04:50		20:00 (2) / 05:33		19:56 (3) / 06:27		19:14 (1) / 07:19	07:17	08:10
	21:43	19	20:19 (2) / 21:03	26	20:22 (2) / 19:55	10	19:24 (1) / 18:42	16:34	15:55
6	04:51		20:00 (2) / 05:35		19:54 (3) / 06:29			07:21 / 07:19	08:11
	21:42	20	20:20 (2) / 21:01	26	20:20 (2) / 19:52			18:39 / 16:32	15:55
7	04:52		19:59 (2) / 05:36		19:53 (3) / 06:30			07:23 / 07:21	08:12
	21:42	22	20:21 (2) / 20:59	25	20:18 (2) / 19:50			18:37 / 16:30	15:54
8	04:53		19:59 (2) / 05:38		19:52 (3) / 06:32			07:25 / 07:23	08:14
	21:41	23	20:22 (2) / 20:57	23	20:15 (2) / 19:48			18:35 / 16:28	15:54
9	04:54		19:59 (2) / 05:40		19:51 (3) / 06:34			07:27 / 07:25	08:15
	21:40	23	20:22 (2) / 20:55	18	20:09 (3) / 19:45			18:32 / 16:27	15:54
10	04:55		19:58 (2) / 05:42		19:50 (3) / 06:36			07:28 / 07:27	08:16
	21:39	25	20:23 (2) / 20:53	20	20:10 (3) / 19:43			18:30 / 16:25	15:53
11	04:56		19:58 (2) / 05:43		19:49 (3) / 06:37			07:30 / 07:29	08:17
	21:38	26	20:24 (2) / 20:51	21	20:10 (3) / 19:40			18:27 / 16:23	15:53
12	04:58		19:58 (2) / 05:45		19:49 (3) / 06:39			07:32 / 07:31	08:18
	21:37	26	20:24 (2) / 20:49	21	20:10 (3) / 19:38			18:25 / 16:22	15:53
13	04:59		19:57 (2) / 05:47		19:49 (3) / 06:41			07:34 / 07:33	08:19
	21:37	27	20:24 (2) / 20:47	22	20:11 (3) / 19:35			18:23 / 16:20	15:53
14	05:00		19:57 (2) / 05:48		19:49 (3) / 06:42			07:36 / 07:34	08:20
	21:36	28	20:25 (2) / 20:45	21	20:10 (3) / 19:33			18:21 / 16:18	15:53
15	05:01		19:56 (2) / 05:50		19:49 (3) / 06:44			07:38 / 07:36	08:21
	21:34	29	20:25 (2) / 20:43	21	20:10 (3) / 19:30			18:18 / 16:17	15:53
16	05:03		19:56 (2) / 05:52		19:50 (3) / 06:46			07:39 / 07:38	08:22
	21:33	29	20:25 (2) / 20:41	19	20:09 (3) / 19:28			18:16 / 16:15	15:53
17	05:04		19:57 (2) / 05:54		19:50 (3) / 06:48			07:41 / 07:40	08:23
	21:32	30	20:27 (2) / 20:38	18	20:08 (3) / 19:26			18:14 / 16:14	15:53
18	05:05		19:56 (2) / 05:55		19:51 (3) / 06:49			07:43 / 07:42	08:24
	21:31	31	20:27 (2) / 20:36	16	20:07 (3) / 19:23			18:11 / 16:12	15:53
19	05:07		19:56 (2) / 05:57		19:51 (3) / 06:51			07:45 / 07:44	08:25
	21:30	31	20:27 (2) / 20:34	13	20:04 (3) / 19:21			18:09 / 16:11	15:54
20	05:08		19:55 (2) / 05:59		19:21 (1) / 06:53			07:47 / 07:45	08:25
	21:28	32	20:27 (2) / 20:32	15	20:03 (3) / 19:18			18:07 / 16:10	15:54
21	05:09		19:56 (2) / 06:01		19:17 (1) / 06:55			07:49 / 07:47	08:26
	21:27	32	20:28 (2) / 20:30	12	19:29 (1) / 19:16			18:05 / 16:08	15:54
22	05:11		19:55 (2) / 06:02		19:14 (1) / 06:56			07:51 / 07:49	08:26
	21:26	32	20:27 (2) / 20:27	16	19:30 (1) / 19:13			18:02 / 16:07	15:55
23	05:12		19:56 (2) / 06:04		19:13 (1) / 06:58			07:53 / 07:51	08:27
	21:24	32	20:28 (2) / 20:25	19	19:32 (1) / 19:11			18:00 / 16:06	15:55
24	05:14		19:56 (2) / 06:06		19:12 (1) / 07:00			07:54 / 07:52	08:27
	21:23	32	20:28 (2) / 20:23	21	19:33 (1) / 19:08			17:58 / 16:05	15:56
25	05:15		19:55 (2) / 06:08		19:11 (1) / 07:02			06:56 / 07:54	08:28
	21:21	32	20:27 (2) / 20:21	22	19:33 (1) / 19:06			16:56 / 16:04	15:57
26	05:17		19:56 (2) / 06:09		19:10 (1) / 07:03			06:58 / 07:56	08:28
	21:20	32	20:28 (2) / 20:18	23	19:33 (1) / 19:04			16:54 / 16:03	15:57
27	05:18		19:56 (2) / 06:11		19:10 (1) / 07:05			07:00 / 07:58	08:28
	21:18	31	20:27 (2) / 20:16	24	19:34 (1) / 19:01			16:52 / 16:02	15:58
28	05:20		19:56 (2) / 06:13		19:09 (1) / 07:07			07:02 / 07:59	08:28
	21:17	32	20:28 (2) / 20:14	24	19:33 (1) / 18:59			16:50 / 16:01	15:59
29	05:22		19:56 (2) / 06:15		19:09 (1) / 07:09			07:04 / 08:01	08:29
	21:15	31	20:27 (2) / 20:11	24	19:33 (1) / 18:56			16:48 / 16:00	16:00
30	05:23		19:57 (2) / 06:16		19:09 (1) / 07:11			07:06 / 08:02	08:29
	21:13	30	20:27 (2) / 20:09	24	19:33 (1) / 18:54			16:46 / 15:59	16:01
31	05:25		19:57 (2) / 06:18		19:08 (1)			07:08	08:29
	21:12	29	20:26 (2) / 20:07	23	19:31 (1)			16:44	16:02
Sonnenscheinstunden	510		459		382		329	260	235
astr.max.mögl.Beschattung		836		661		85			
Red.Sonnenscheinwahrsch.		0.45		0.49		0.40			
Reduktion Betriebsdauer		0.91		0.91		0.91			
Reduktion Windrichtung		0.66		0.67		0.68			
Gesamte Reduktion		0.27		0.30		0.25			
Met.wahrsch.Beschattung		225		197		21			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CN - IO92

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40		19:41 (3)	04:51		19:56 (2)
	16:03		16:54		17:49		19:46			20:41	19	20:00 (3)	21:30	9	20:05 (2)
2	08:28		07:57		07:00		06:46			05:38		19:42 (3)	04:50		19:59 (2)
	16:04		16:56		17:50		19:48			20:42	22	20:04 (2)	21:31	5	20:04 (2)
3	08:28		07:56		06:58		06:43			05:36		19:42 (3)	04:49		
	16:05		16:57		17:52		19:50			20:44	24	20:06 (2)	21:32		
4	08:28		07:54		06:55		06:41			05:34		19:43 (3)	04:48		20:56 (5)
	16:06		16:59		17:54		19:52			20:46	25	20:08 (2)	21:33	3	20:59 (5)
5	08:28		07:52		06:53		06:38			05:32		19:45 (3)	04:48		20:55 (5)
	16:08		17:01		17:56		19:53			20:48	25	20:10 (2)	21:34	5	21:00 (5)
6	08:27		07:50		06:51		06:36			05:30		19:47 (3)	04:47		20:54 (5)
	16:09		17:03		17:58		19:55			20:50	24	20:11 (2)	21:35	7	21:01 (5)
7	08:27		07:49		06:48		06:34		19:18 (1)	05:28		19:47 (2)	04:46		20:53 (5)
	16:10		17:05		18:00		19:57	10	19:28 (1)	20:51	25	20:12 (2)	21:36	8	21:01 (5)
8	08:26		07:47		06:46		06:31		19:15 (1)	05:26		19:46 (2)	04:46		20:53 (5)
	16:12		17:07		18:02		19:59	16	19:31 (1)	20:53	26	20:12 (2)	21:37	10	21:03 (5)
9	08:26		07:45		06:44		06:29		19:14 (1)	05:24		19:46 (2)	04:45		20:53 (5)
	16:13		17:09		18:04		20:01	18	19:32 (1)	20:55	27	20:13 (2)	21:38	11	21:04 (5)
10	08:25		07:43		06:41		06:27		19:12 (1)	05:22		19:45 (2)	04:45		20:52 (5)
	16:15		17:11		18:06		20:03	20	19:32 (1)	20:57	28	20:13 (2)	21:39	12	21:04 (5)
11	08:25		07:41		06:39		06:24		19:11 (1)	05:21		19:45 (2)	04:44		20:52 (5)
	16:16		17:13		18:07		20:04	22	19:33 (1)	20:58	28	20:13 (2)	21:40	13	21:05 (5)
12	08:24		07:39		06:37		06:22		19:11 (1)	05:19		19:45 (2)	04:44		20:52 (5)
	16:18		17:15		18:09		20:06	22	19:33 (1)	21:00	29	20:14 (2)	21:41	14	21:06 (5)
13	08:23		07:37		06:34		06:20		19:10 (1)	05:17		19:44 (2)	04:44		20:51 (5)
	16:19		17:17		18:11		20:08	23	19:33 (1)	21:02	30	20:14 (2)	21:41	15	21:06 (5)
14	08:22		07:35		06:32		06:17		19:10 (1)	05:15		19:45 (2)	04:43		20:52 (5)
	16:21		17:19		18:13		20:10	23	19:33 (1)	21:03	30	20:15 (2)	21:42	14	21:06 (5)
15	08:21		07:33		06:29		06:15		19:10 (1)	05:14		19:44 (2)	04:43		20:52 (5)
	16:22		17:21		18:15		20:12	22	19:32 (1)	21:05	30	20:14 (2)	21:43	15	21:07 (5)
16	08:20		07:31		06:27		06:13		19:10 (1)	05:12		19:45 (2)	04:43		20:52 (5)
	16:24		17:23		18:17		20:13	22	19:32 (1)	21:07	30	20:15 (2)	21:43	16	21:08 (5)
17	08:19		07:29		06:25		06:10		19:10 (1)	05:10		19:45 (2)	04:43		20:52 (5)
	16:26		17:25		18:19		20:15	21	19:31 (1)	21:08	29	20:14 (2)	21:44	16	21:08 (5)
18	08:18		07:27		06:22		06:08		19:11 (1)	05:09		19:45 (2)	04:43		20:52 (5)
	16:28		17:27		18:21		20:17	19	19:30 (1)	21:10	29	20:14 (2)	21:44	16	21:08 (5)
19	08:17		07:25		06:20		06:06		19:12 (1)	05:07		19:45 (2)	04:43		20:52 (5)
	16:29		17:29		18:22		20:19	17	19:29 (1)	21:11	28	20:13 (2)	21:44	17	21:09 (5)
20	08:16		07:22		06:17		06:03		19:13 (1)	05:06		19:46 (2)	04:43		20:52 (5)
	16:31		17:31		18:24		20:21	14	19:27 (1)	21:13	27	20:13 (2)	21:45	17	21:09 (5)
21	08:15		07:20		06:15		06:01		19:15 (1)	05:04		19:46 (2)	04:43		20:52 (5)
	16:33		17:33		18:26		20:23	14	19:55 (3)	21:15	27	20:13 (2)	21:45	17	21:09 (5)
22	08:14		07:18		06:12		05:59		19:46 (3)	05:03		19:46 (2)	04:43		20:53 (5)
	16:35		17:35		18:28		20:24	10	19:56 (3)	21:16	26	20:12 (2)	21:45	17	21:10 (5)
23	08:12		07:16		06:10		05:57		19:45 (3)	05:01		19:47 (2)	04:43		20:53 (5)
	16:36		17:37		18:30		20:26	12	19:57 (3)	21:18	25	20:12 (2)	21:45	17	21:10 (5)
24	08:11		07:14		06:08		05:55		19:43 (3)	05:00		19:48 (2)	04:44		20:53 (5)
	16:38		17:39		18:32		20:28	16	19:59 (3)	21:19	24	20:12 (2)	21:45	17	21:10 (5)
25	08:10		07:11		06:05		05:52		19:43 (3)	04:59		19:48 (2)	04:44		20:54 (5)
	16:40		17:41		18:33		20:30	18	20:01 (3)	21:21	24	20:12 (2)	21:45	16	21:10 (5)
26	08:08		07:09		06:03		05:50		19:42 (3)	04:58		19:49 (2)	04:44		20:54 (5)
	16:42		17:43		18:35		20:32	19	20:01 (3)	21:22	22	20:11 (2)	21:45	16	21:10 (5)
27	08:07		07:07		06:00		05:48		19:41 (3)	04:56		19:50 (2)	04:45		20:55 (5)
	16:44		17:45		18:37		20:33	20	20:01 (3)	21:23	21	20:11 (2)	21:45	15	21:10 (5)
28	08:05		07:05		05:58		05:46		19:41 (3)	04:55		19:51 (2)	04:45		20:55 (5)
	16:46		17:47		18:39		20:35	20	20:01 (3)	21:25	19	20:10 (2)	21:45	15	21:10 (5)
29	08:04				06:55		05:44		19:41 (3)	04:54		19:52 (2)	04:46		20:56 (5)
	16:48				19:41		20:37	20	20:01 (3)	21:26	17	20:09 (2)	21:45	14	21:10 (5)
30	08:02				06:53		05:42		19:41 (3)	04:53		19:53 (2)	04:47		20:55 (5)
	16:50				19:42		20:39	20	20:01 (3)	21:27	15	20:08 (2)	21:45	14	21:09 (5)
31	08:01				06:51					04:52		19:54 (2)			
	16:52				19:44					21:29	13	20:07 (2)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung								438				768			381
Red.Sonnenscheinwahrsch.								0.41				0.51			0.45
Reduktion Betriebsdauer								0.91				0.91			0.91
Reduktion Windrichtung								0.67				0.66			0.63
Gesamte Reduktion								0.25				0.31			0.26
Met.wahrsch.Beschattung								111				237			99

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CN - IO92

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober	November	Dezember
1 | 04:47		20:56 (5)	05:26		19:56 (2)	06:20		19:10 (1)	07:12	07:10	08:04
| 21:45	13	21:09 (5)	21:10	28	20:24 (2)	20:04	22	19:32 (1)	18:51	16:42	15:58
2 | 04:48		20:57 (5)	05:28		19:55 (2)	06:22		19:11 (1)	07:14	07:12	08:05
| 21:44	12	21:09 (5)	21:08	29	20:24 (2)	20:02	20	19:31 (1)	18:49	16:40	15:57
3 | 04:49		20:57 (5)	05:30		19:56 (2)	06:23		19:11 (1)	07:16	07:14	08:07
| 21:44	11	21:08 (5)	21:06	28	20:24 (2)	20:00	18	19:29 (1)	18:47	16:38	15:57
4 | 04:50		20:58 (5)	05:31		19:56 (2)	06:25		19:12 (1)	07:18	07:15	08:08
| 21:43	10	21:08 (5)	21:05	27	20:23 (2)	19:57	16	19:28 (1)	18:44	16:36	15:56
5 | 04:50		20:59 (5)	05:33		19:57 (2)	06:27		19:15 (1)	07:19	07:17	08:10
| 21:43	9	21:08 (5)	21:03	25	20:22 (2)	19:55	10	19:25 (1)	18:42	16:34	15:55
6 | 04:51		21:00 (5)	05:35		19:57 (2)	06:29			07:21	07:19	08:11
| 21:42	7	21:07 (5)	21:01	24	20:21 (2)	19:52			18:39	16:32	15:55
7 | 04:52		21:01 (5)	05:36		19:56 (3)	06:30			07:23	07:21	08:12
| 21:41	6	21:07 (5)	20:59	24	20:20 (2)	19:50			18:37	16:30	15:54
8 | 04:53		21:03 (5)	05:38		19:54 (3)	06:32			07:25	07:23	08:14
| 21:41	3	21:06 (5)	20:57	25	20:19 (2)	19:48			18:35	16:28	15:54
9 | 04:54			05:40		19:52 (3)	06:34			07:27	07:25	08:15
| 21:40			20:55	25	20:17 (2)	19:45			18:32	16:27	15:54
10 | 04:55			05:42		19:51 (3)	06:36			07:28	07:27	08:16
| 21:39			20:53	24	20:15 (2)	19:43			18:30	16:25	15:53
11 | 04:56		20:05 (2)	05:43		19:50 (3)	06:37			07:30	07:29	08:17
| 21:38	8	20:13 (2)	20:51	20	20:10 (2)	19:40			18:27	16:23	15:53
12 | 04:58		20:03 (2)	05:45		19:50 (3)	06:39			07:32	07:31	08:18
| 21:37	12	20:15 (2)	20:49	19	20:09 (3)	19:38			18:25	16:22	15:53
13 | 04:59		20:02 (2)	05:47		19:49 (3)	06:41			07:34	07:33	08:19
| 21:37	14	20:16 (2)	20:47	20	20:09 (3)	19:35			18:23	16:20	15:53
14 | 05:00		20:01 (2)	05:48		19:49 (3)	06:42			07:36	07:34	08:20
| 21:36	16	20:17 (2)	20:45	19	20:08 (3)	19:33			18:20	16:18	15:53
15 | 05:01		20:00 (2)	05:50		19:49 (3)	06:44			07:38	07:36	08:21
| 21:34	18	20:18 (2)	20:43	20	20:09 (3)	19:30			18:18	16:17	15:53
16 | 05:03		19:59 (2)	05:52		19:49 (3)	06:46			07:39	07:38	08:22
| 21:33	20	20:19 (2)	20:41	20	20:09 (3)	19:28			18:16	16:15	15:53
17 | 05:04		19:59 (2)	05:54		19:49 (3)	06:48			07:41	07:40	08:23
| 21:32	21	20:20 (2)	20:38	18	20:07 (3)	19:26			18:14	16:14	15:53
18 | 05:05		19:58 (2)	05:55		19:49 (3)	06:49			07:43	07:42	08:24
| 21:31	23	20:21 (2)	20:36	18	20:07 (3)	19:23			18:11	16:12	15:53
19 | 05:07		19:58 (2)	05:57		19:49 (3)	06:51			07:45	07:44	08:25
| 21:30	23	20:21 (2)	20:34	15	20:04 (3)	19:21			18:09	16:11	15:54
20 | 05:08		19:57 (2)	05:59		19:51 (3)	06:53			07:47	07:45	08:25
| 21:28	25	20:22 (2)	20:32	12	20:03 (3)	19:18			18:07	16:10	15:54
21 | 05:09		19:57 (2)	06:01		19:53 (3)	06:55			07:49	07:47	08:26
| 21:27	26	20:23 (2)	20:30	8	20:01 (3)	19:16			18:05	16:08	15:54
22 | 05:11		19:56 (2)	06:02		19:18 (1)	06:56			07:51	07:49	08:26
| 21:26	27	20:23 (2)	20:27	11	19:29 (1)	19:13			18:02	16:07	15:55
23 | 05:12		19:57 (2)	06:04		19:16 (1)	06:58			07:53	07:51	08:27
| 21:24	27	20:24 (2)	20:25	15	19:31 (1)	19:11			18:00	16:06	15:55
24 | 05:14		19:56 (2)	06:06		19:15 (1)	07:00			07:54	07:52	08:27
| 21:23	28	20:24 (2)	20:23	18	19:33 (1)	19:08			17:58	16:05	15:56
25 | 05:15		19:55 (2)	06:08		19:13 (1)	07:02			06:56	07:54	08:28
| 21:21	29	20:24 (2)	20:21	20	19:33 (1)	19:06			16:56	16:04	15:57
26 | 05:17		19:56 (2)	06:09		19:12 (1)	07:03			06:58	07:56	08:28
| 21:20	29	20:25 (2)	20:18	21	19:33 (1)	19:04			16:54	16:03	15:57
27 | 05:18		19:55 (2)	06:11		19:12 (1)	07:05			07:00	07:58	08:28
| 21:18	29	20:24 (2)	20:16	22	19:34 (1)	19:01			16:52	16:02	15:58
28 | 05:20		19:55 (2)	06:13		19:11 (1)	07:07			07:02	07:59	08:28
| 21:17	30	20:25 (2)	20:14	22	19:33 (1)	18:59			16:50	16:01	15:59
29 | 05:22		19:55 (2)	06:15		19:11 (1)	07:09			07:04	08:01	08:29
| 21:15	29	20:24 (2)	20:11	22	19:33 (1)	18:56			16:48	16:00	16:00
30 | 05:23		19:55 (2)	06:16		19:11 (1)	07:11			07:06	08:02	08:29
| 21:13	30	20:25 (2)	20:09	22	19:33 (1)	18:54			16:46	15:59	16:01
31 | 05:25		19:55 (2)	06:18		19:10 (1)				07:08		08:29
| 21:12	29	20:24 (2)	20:07	22	19:32 (1)				16:44		16:02
Sonnenscheinstunden	510		459			382			329	260	235
astr.max.mögl.Beschattung		564		643			86				
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40				
Reduktion Betriebsdauer		0.91		0.91			0.91				
Reduktion Windrichtung		0.66		0.67			0.68				
Gesamte Reduktion		0.27		0.30			0.25				
Met.wahrsch.Beschattung		151		191			21				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CO - IO93

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März		April			Mai			Juni		
1	08:29	07:59		07:02		06:48			05:40		19:40 (3)	04:51		
	16:03	16:54		17:49		19:46			20:41	23	20:03 (2)	21:30		
2	08:28	07:57		07:00		06:46			05:38		19:40 (3)	04:50		20:53 (5)
	16:04	16:56		17:50		19:48			20:42	25	20:05 (2)	21:31	4	20:57 (5)
3	08:28	07:56		06:58		06:43			05:36		19:41 (3)	04:49		20:51 (5)
	16:05	16:57		17:52		19:50			20:44	25	20:06 (2)	21:32	7	20:58 (5)
4	08:28	07:54		06:55		06:41			05:34		19:43 (3)	04:48		20:50 (5)
	16:06	16:59		17:54		19:52			20:46	24	20:07 (2)	21:33	9	20:59 (5)
5	08:28	07:52		06:53		06:38		19:17 (1)	05:32		19:44 (2)	04:48		20:50 (5)
	16:08	17:01		17:56		19:53	8	19:25 (1)	20:48	25	20:09 (2)	21:34	10	21:00 (5)
6	08:27	07:50		06:51		06:36		19:14 (1)	05:30		19:43 (2)	04:47		20:49 (5)
	16:09	17:03		17:58		19:55	14	19:28 (1)	20:50	26	20:09 (2)	21:35	12	21:01 (5)
7	08:27	07:49		06:48		06:34		19:12 (1)	05:28		19:42 (2)	04:46		20:48 (5)
	16:10	17:05		18:00		19:57	16	19:28 (1)	20:51	27	20:09 (2)	21:36	13	21:01 (5)
8	08:26	07:47		06:46		06:31		19:10 (1)	05:26		19:41 (2)	04:46		20:49 (5)
	16:12	17:07		18:02		19:59	20	19:30 (1)	20:53	29	20:10 (2)	21:37	14	21:03 (5)
9	08:26	07:45		06:44		06:29		19:10 (1)	05:24		19:42 (2)	04:45		20:49 (5)
	16:13	17:09		18:04		20:01	20	19:30 (1)	20:55	29	20:11 (2)	21:38	15	21:04 (5)
10	08:25	07:43		06:41		06:27		19:08 (1)	05:22		19:41 (2)	04:45		20:48 (5)
	16:15	17:11		18:06		20:03	22	19:30 (1)	20:57	29	20:10 (2)	21:39	16	21:04 (5)
11	08:25	07:41		06:39		06:24		19:08 (1)	05:20		19:40 (2)	04:44		20:48 (5)
	16:16	17:13		18:07		20:04	22	19:30 (1)	20:58	30	20:10 (2)	21:40	17	21:05 (5)
12	08:24	07:39		06:37		06:22		19:08 (1)	05:19		19:41 (2)	04:44		20:49 (5)
	16:18	17:15		18:09		20:06	23	19:31 (1)	21:00	30	20:11 (2)	21:41	17	21:06 (5)
13	08:23	07:37		06:34		06:20		19:07 (1)	05:17		19:41 (2)	04:44		20:48 (5)
	16:19	17:17		18:11		20:08	23	19:30 (1)	21:02	29	20:10 (2)	21:41	18	21:06 (5)
14	08:22	07:35		06:32		06:17		19:07 (1)	05:15		19:41 (2)	04:43		20:48 (5)
	16:21	17:19		18:13		20:10	22	19:29 (1)	21:03	30	20:11 (2)	21:42	18	21:06 (5)
15	08:21	07:33		06:29		06:15		19:08 (1)	05:14		19:41 (2)	04:43		20:48 (5)
	16:22	17:21		18:15		20:12	21	19:29 (1)	21:05	29	20:10 (2)	21:43	19	21:07 (5)
16	08:20	07:31		06:27		06:13		19:08 (1)	05:12		19:42 (2)	04:43		20:49 (5)
	16:24	17:23		18:17		20:13	20	19:28 (1)	21:07	28	20:10 (2)	21:43	18	21:07 (5)
17	08:19	07:29		06:25		06:10		19:08 (1)	05:10		19:41 (2)	04:43		20:49 (5)
	16:26	17:25		18:19		20:15	18	19:26 (1)	21:08	29	20:10 (2)	21:44	19	21:08 (5)
18	08:18	07:27		06:22		06:08		19:09 (1)	05:09		19:42 (2)	04:43		20:49 (5)
	16:28	17:27		18:21		20:17	16	19:25 (1)	21:10	28	20:10 (2)	21:44	19	21:08 (5)
19	08:17	07:25		06:20		06:06		19:11 (1)	05:07		19:42 (2)	04:43		20:49 (5)
	16:29	17:29		18:22		20:19	12	19:23 (1)	21:11	27	20:09 (2)	21:44	19	21:08 (5)
20	08:16	07:22		06:17		06:03		19:15 (1)	05:06		19:43 (2)	04:43		20:49 (5)
	16:31	17:31		18:24		20:21	10	19:53 (3)	21:13	26	20:09 (2)	21:45	19	21:08 (5)
21	08:15	07:20		06:15		06:01		19:44 (3)	05:04		19:44 (2)	04:43		20:49 (5)
	16:33	17:33		18:26		20:23	11	19:55 (3)	21:15	24	20:08 (2)	21:45	19	21:08 (5)
22	08:14	07:18		06:12		05:59		19:42 (3)	05:03		19:44 (2)	04:43		20:50 (5)
	16:35	17:35		18:28		20:24	14	19:56 (3)	21:16	23	20:07 (2)	21:45	19	21:09 (5)
23	08:12	07:16		06:10		05:57		19:41 (3)	05:01		19:45 (2)	04:43		20:50 (5)
	16:36	17:37		18:30		20:26	16	19:57 (3)	21:18	22	20:07 (2)	21:45	19	21:09 (5)
24	08:11	07:14		06:08		05:55		19:40 (3)	05:00		19:46 (2)	04:44		20:50 (5)
	16:38	17:39		18:32		20:28	18	19:58 (3)	21:19	20	20:06 (2)	21:45	19	21:09 (5)
25	08:10	07:11		06:05		05:52		19:39 (3)	04:59		19:47 (2)	04:44		20:51 (5)
	16:40	17:41		18:33		20:30	20	19:59 (3)	21:21	18	20:05 (2)	21:45	19	21:10 (5)
26	08:08	07:09		06:03		05:50		19:39 (3)	04:58		19:48 (2)	04:44		20:51 (5)
	16:42	17:43		18:35		20:32	20	19:59 (3)	21:22	17	20:05 (2)	21:45	19	21:10 (5)
27	08:07	07:07		06:00		05:48		19:39 (3)	04:56		19:50 (2)	04:45		20:51 (5)
	16:44	17:45		18:37		20:33	20	19:59 (3)	21:23	13	20:03 (2)	21:45	19	21:10 (5)
28	08:05	07:05		05:58		05:46		19:39 (3)	04:55		19:52 (2)	04:45		20:51 (5)
	16:46	17:47		18:39		20:35	19	19:58 (3)	21:25	10	20:02 (2)	21:45	19	21:10 (5)
29	08:04			06:55		05:44		19:39 (3)	04:54		19:54 (2)	04:46		20:52 (5)
	16:48			19:41		20:37	19	19:58 (3)	21:26	6	20:00 (2)	21:45	18	21:10 (5)
30	08:02			06:53		05:42		19:39 (3)	04:53			04:47		20:52 (5)
	16:50			19:42		20:39	22	20:01 (2)	21:27			21:45	17	21:09 (5)
31	08:01			06:51					04:52					
	16:52			19:44					21:29					
Sonnenscheinstunden		252		367		419			492			508		
astr.max.mögl.Beschattung							466			701			470	
Red.Sonnenscheinwahrsch.							0.41			0.51			0.45	
Reduktion Betriebsdauer							0.91			0.91			0.91	
Reduktion Windrichtung							0.68			0.66			0.63	
Gesamte Reduktion							0.25			0.31			0.26	
Met.wahrsch.Beschattung							118			217			123	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CO - IO93

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober		November	Dezember
1 | 04:47		20:53 (5)	05:26		19:51 (2)	06:20		19:07 (1)	07:12		07:10	08:04
| 21:45	16	21:09 (5)	21:10	30	20:21 (2)	20:04	22	19:29 (1)	18:51		16:42	15:58
2 | 04:48		20:53 (5)	05:28		19:51 (2)	06:22		19:07 (1)	07:14		07:12	08:05
| 21:44	16	21:09 (5)	21:08	30	20:21 (2)	20:02	22	19:29 (1)	18:49		16:40	15:57
3 | 04:49		20:53 (5)	05:30		19:51 (2)	06:23		19:07 (1)	07:16		07:14	08:07
| 21:44	15	21:08 (5)	21:06	30	20:21 (2)	20:00	20	19:27 (1)	18:47		16:38	15:57
4 | 04:50		20:54 (5)	05:31		19:51 (2)	06:25		19:07 (1)	07:18		07:15	08:08
| 21:43	14	21:08 (5)	21:05	29	20:20 (2)	19:57	20	19:27 (1)	18:44		16:36	15:56
5 | 04:50		20:54 (5)	05:33		19:52 (2)	06:27		19:09 (1)	07:19		07:17	08:10
| 21:43	14	21:08 (5)	21:03	28	20:20 (2)	19:55	16	19:25 (1)	18:42		16:34	15:55
6 | 04:51		20:55 (5)	05:35		19:52 (2)	06:29		19:09 (1)	07:21		07:19	08:11
| 21:42	12	21:07 (5)	21:01	27	20:19 (2)	19:52	14	19:23 (1)	18:39		16:32	15:55
7 | 04:52		20:56 (5)	05:36		19:52 (2)	06:30		19:12 (1)	07:23		07:21	08:12
| 21:41	11	21:07 (5)	20:59	26	20:18 (2)	19:50	8	19:20 (1)	18:37		16:30	15:54
8 | 04:53		20:57 (5)	05:38		19:54 (2)	06:32			07:25		07:23	08:14
| 21:41	9	21:06 (5)	20:57	24	20:18 (2)	19:48			18:35		16:28	15:54
9 | 04:54		20:58 (5)	05:40		19:52 (3)	06:34			07:27		07:25	08:15
| 21:40	8	21:06 (5)	20:55	24	20:16 (2)	19:45			18:32		16:27	15:54
10 | 04:55		20:59 (5)	05:42		19:50 (3)	06:36			07:28		07:27	08:16
| 21:39	6	21:05 (5)	20:53	25	20:15 (2)	19:43			18:30		16:25	15:53
11 | 04:56		21:01 (5)	05:43		19:48 (3)	06:37			07:30		07:29	08:17
| 21:38	3	21:04 (5)	20:51	25	20:13 (2)	19:40			18:27		16:23	15:53
12 | 04:58			05:45		19:48 (3)	06:39			07:32		07:31	08:18
| 21:37			20:49	23	20:11 (2)	19:38			18:25		16:22	15:53
13 | 04:59			05:47		19:47 (3)	06:41			07:34		07:33	08:19
| 21:37			20:47	21	20:08 (2)	19:35			18:23		16:20	15:53
14 | 05:00			05:48		19:46 (3)	06:42			07:36		07:34	08:20
| 21:36			20:45	20	20:06 (3)	19:33			18:20		16:18	15:53
15 | 05:01		20:01 (2)	05:50		19:46 (3)	06:44			07:38		07:36	08:21
| 21:34	8	20:09 (2)	20:43	20	20:06 (3)	19:30			18:18		16:17	15:53
16 | 05:03		19:59 (2)	05:52		19:46 (3)	06:46			07:39		07:38	08:22
| 21:33	12	20:11 (2)	20:41	20	20:06 (3)	19:28			18:16		16:15	15:53
17 | 05:04		19:59 (2)	05:54		19:46 (3)	06:48			07:41		07:40	08:23
| 21:32	14	20:13 (2)	20:38	19	20:05 (3)	19:26			18:14		16:14	15:53
18 | 05:05		19:57 (2)	05:55		19:46 (3)	06:49			07:43		07:42	08:24
| 21:31	17	20:14 (2)	20:36	19	20:05 (3)	19:23			18:11		16:12	15:53
19 | 05:07		19:56 (2)	05:57		19:46 (3)	06:51			07:45		07:44	08:25
| 21:30	19	20:15 (2)	20:34	18	20:04 (3)	19:21			18:09		16:11	15:54
20 | 05:08		19:55 (2)	05:59		19:46 (3)	06:53			07:47		07:45	08:25
| 21:28	21	20:16 (2)	20:32	17	20:03 (3)	19:18			18:07		16:10	15:54
21 | 05:09		19:55 (2)	06:01		19:48 (3)	06:55			07:49		07:47	08:26
| 21:27	22	20:17 (2)	20:30	13	20:01 (3)	19:16			18:05		16:08	15:54
22 | 05:11		19:54 (2)	06:02		19:48 (3)	06:56			07:51		07:49	08:26
| 21:26	24	20:18 (2)	20:27	10	19:58 (3)	19:13			18:02		16:07	15:55
23 | 05:12		19:54 (2)	06:04		19:18 (1)	06:58			07:53		07:51	08:27
| 21:24	25	20:19 (2)	20:25	11	19:56 (3)	19:11			18:00		16:06	15:55
24 | 05:14		19:53 (2)	06:06		19:15 (1)	07:00			07:54		07:52	08:27
| 21:23	26	20:19 (2)	20:23	12	19:27 (1)	19:08			17:58		16:05	15:56
25 | 05:15		19:52 (2)	06:08		19:12 (1)	07:02			06:56		07:54	08:28
| 21:21	27	20:19 (2)	20:21	16	19:28 (1)	19:06			16:56		16:04	15:57
26 | 05:17		19:52 (2)	06:09		19:11 (1)	07:03			06:58		07:56	08:28
| 21:20	28	20:20 (2)	20:18	18	19:29 (1)	19:04			16:54		16:03	15:57
27 | 05:18		19:52 (2)	06:11		19:10 (1)	07:05			07:00		07:58	08:28
| 21:18	28	20:20 (2)	20:16	20	19:30 (1)	19:01			16:52		16:02	15:58
28 | 05:20		19:52 (2)	06:13		19:08 (1)	07:07			07:02		07:59	08:28
| 21:17	29	20:21 (2)	20:14	22	19:30 (1)	18:59			16:50		16:01	15:59
29 | 05:22		19:51 (2)	06:15		19:08 (1)	07:09			07:04		08:01	08:29
| 21:15	30	20:21 (2)	20:11	22	19:30 (1)	18:56			16:48		16:00	16:00
30 | 05:23		19:52 (2)	06:16		19:08 (1)	07:11			07:06		08:02	08:29
| 21:13	29	20:21 (2)	20:09	22	19:30 (1)	18:54			16:46		15:59	16:01
31 | 05:25		19:51 (2)	06:18		19:07 (1)				07:08			08:29
| 21:12	30	20:21 (2)	20:07	23	19:30 (1)				16:44			16:02
Sonnenscheinstunden	510		459			382			329		260	235
astr.max.mögl.Beschattung		513		664			122					
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40					
Reduktion Betriebsdauer		0.91		0.91			0.91					
Reduktion Windrichtung		0.66		0.67			0.68					
Gesamte Reduktion		0.27		0.30			0.25					
Met.wahrsch.Beschattung		137		197			31					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CP - 1094

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40		19:40 (3)	04:51		20:52 (5)
	16:03		16:54		17:49		19:46			20:41	24	20:04 (2)	21:30	3	20:55 (5)
2	08:28		07:57		07:00		06:46			05:38		19:40 (3)	04:50		20:51 (5)
	16:04		16:56		17:50		19:48			20:42	25	20:05 (2)	21:31	6	20:57 (5)
3	08:28		07:56		06:58		06:43			05:36		19:42 (3)	04:49		20:50 (5)
	16:05		16:57		17:52		19:50			20:44	25	20:07 (2)	21:32	8	20:58 (5)
4	08:28		07:54		06:55		06:41			05:34		19:43 (3)	04:48		20:49 (5)
	16:06		16:59		17:54		19:52			20:46	24	20:07 (2)	21:33	10	20:59 (5)
5	08:28		07:52		06:53		06:38		19:18 (1)	05:32		19:44 (2)	04:48		20:49 (5)
	16:08		17:01		17:56		19:53	7	19:25 (1)	20:48	25	20:09 (2)	21:34	11	21:00 (5)
6	08:27		07:50		06:51		06:36		19:15 (1)	05:30		19:43 (2)	04:47		20:49 (5)
	16:09		17:03		17:58		19:55	13	19:28 (1)	20:50	26	20:09 (2)	21:35	12	21:01 (5)
7	08:27		07:49		06:48		06:34		19:12 (1)	05:28		19:42 (2)	04:46		20:48 (5)
	16:10		17:05		18:00		19:57	17	19:29 (1)	20:51	27	20:09 (2)	21:36	13	21:01 (5)
8	08:26		07:47		06:46		06:31		19:11 (1)	05:26		19:41 (2)	04:46		20:48 (5)
	16:12		17:07		18:02		19:59	19	19:30 (1)	20:53	29	20:10 (2)	21:37	15	21:03 (5)
9	08:26		07:45		06:44		06:29		19:10 (1)	05:24		19:42 (2)	04:45		20:48 (5)
	16:13		17:09		18:04		20:01	21	19:31 (1)	20:55	29	20:11 (2)	21:38	16	21:04 (5)
10	08:25		07:43		06:41		06:27		19:08 (1)	05:22		19:41 (2)	04:45		20:48 (5)
	16:15		17:11		18:06		20:03	22	19:30 (1)	20:57	29	20:10 (2)	21:39	16	21:04 (5)
11	08:25		07:41		06:39		06:24		19:08 (1)	05:20		19:41 (2)	04:44		20:48 (5)
	16:16		17:13		18:07		20:04	23	19:31 (1)	20:58	29	20:10 (2)	21:40	17	21:05 (5)
12	08:24		07:39		06:37		06:22		19:08 (1)	05:19		19:41 (2)	04:44		20:48 (5)
	16:18		17:15		18:09		20:06	23	19:31 (1)	21:00	30	20:11 (2)	21:41	18	21:06 (5)
13	08:23		07:37		06:34		06:20		19:07 (1)	05:17		19:41 (2)	04:44		20:47 (5)
	16:19		17:17		18:11		20:08	23	19:30 (1)	21:02	29	20:10 (2)	21:41	19	21:06 (5)
14	08:22		07:35		06:32		06:17		19:07 (1)	05:15		19:41 (2)	04:43		20:48 (5)
	16:21		17:19		18:13		20:10	23	19:30 (1)	21:03	30	20:11 (2)	21:42	18	21:06 (5)
15	08:21		07:33		06:29		06:15		19:08 (1)	05:14		19:41 (2)	04:43		20:48 (5)
	16:22		17:21		18:15		20:12	21	19:29 (1)	21:05	29	20:10 (2)	21:43	19	21:07 (5)
16	08:20		07:31		06:27		06:13		19:09 (1)	05:12		19:42 (2)	04:43		20:48 (5)
	16:24		17:23		18:17		20:13	19	19:28 (1)	21:07	28	20:10 (2)	21:43	19	21:07 (5)
17	08:19		07:29		06:25		06:10		19:09 (1)	05:10		19:42 (2)	04:43		20:48 (5)
	16:26		17:25		18:19		20:15	17	19:26 (1)	21:08	27	20:09 (2)	21:44	20	21:08 (5)
18	08:18		07:27		06:22		06:08		19:10 (1)	05:09		19:43 (2)	04:43		20:48 (5)
	16:28		17:27		18:21		20:17	15	19:25 (1)	21:10	26	20:09 (2)	21:44	20	21:08 (5)
19	08:17		07:25		06:20		06:06		19:12 (1)	05:07		19:42 (2)	04:43		20:49 (5)
	16:29		17:29		18:22		20:19	11	19:23 (1)	21:11	26	20:08 (2)	21:44	19	21:08 (5)
20	08:16		07:22		06:17		06:03		19:16 (1)	05:06		19:43 (2)	04:43		20:49 (5)
	16:31		17:31		18:24		20:21	9	19:53 (3)	21:13	25	20:08 (2)	21:45	19	21:08 (5)
21	08:15		07:20		06:15		06:01		19:44 (3)	05:04		19:44 (2)	04:43		20:49 (5)
	16:33		17:33		18:26		20:23	11	19:55 (3)	21:15	24	20:08 (2)	21:45	19	21:08 (5)
22	08:14		07:18		06:12		05:59		19:42 (3)	05:03		19:44 (2)	04:43		20:50 (5)
	16:35		17:35		18:28		20:24	14	19:56 (3)	21:16	23	20:07 (2)	21:45	19	21:09 (5)
23	08:12		07:16		06:10		05:57		19:41 (3)	05:01		19:45 (2)	04:43		20:50 (5)
	16:36		17:37		18:30		20:26	16	19:57 (3)	21:18	21	20:06 (2)	21:45	19	21:09 (5)
24	08:11		07:14		06:08		05:55		19:40 (3)	05:00		19:47 (2)	04:44		20:49 (5)
	16:38		17:39		18:32		20:28	18	19:58 (3)	21:19	19	20:06 (2)	21:45	20	21:09 (5)
25	08:10		07:11		06:05		05:52		19:39 (3)	04:59		19:48 (2)	04:44		20:50 (5)
	16:40		17:41		18:33		20:30	20	19:59 (3)	21:21	17	20:05 (2)	21:45	20	21:10 (5)
26	08:08		07:09		06:03		05:50		19:39 (3)	04:58		19:49 (2)	04:44		20:50 (5)
	16:42		17:43		18:35		20:32	20	19:59 (3)	21:22	15	20:04 (2)	21:45	19	21:09 (5)
27	08:07		07:07		06:00		05:48		19:39 (3)	04:56		19:51 (2)	04:45		20:51 (5)
	16:44		17:45		18:37		20:33	20	19:59 (3)	21:23	12	20:03 (2)	21:45	19	21:10 (5)
28	08:05		07:05		05:58		05:46		19:39 (3)	04:55		19:53 (2)	04:45		20:51 (5)
	16:46		17:47		18:39		20:35	19	19:58 (3)	21:25	8	20:01 (2)	21:45	19	21:10 (5)
29	08:04				06:55		05:44		19:39 (3)	04:54			04:46		20:52 (5)
	16:48				19:41		20:37	19	19:58 (3)	21:26			21:45	18	21:10 (5)
30	08:02				06:53		05:42		19:39 (3)	04:53			04:47		20:51 (5)
	16:50				19:42		20:39	22	20:01 (2)	21:27			21:45	18	21:09 (5)
31	08:01				06:51					04:52					
	16:52				19:44					21:29					
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung								462			681			488	
Red.Sonnenscheinwahrsch.								0.41			0.51			0.45	
Reduktion Betriebsdauer								0.91			0.91			0.91	
Reduktion Windrichtung								0.68			0.66			0.63	
Gesamte Reduktion								0.25			0.31			0.26	
Met.wahrsch.Beschattung								117			211			128	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CP - 1094

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober		November	Dezember
1 | 04:47		20:52 (5)	05:26		19:52 (2)	06:20		19:07 (1)	07:12		07:10	08:04
| 21:45	17	21:09 (5)	21:10	29	20:21 (2)	20:04	23	19:30 (1)	18:51		16:42	15:58
2 | 04:48		20:53 (5)	05:28		19:51 (2)	06:22		19:07 (1)	07:14		07:12	08:05
| 21:44	16	21:09 (5)	21:08	29	20:20 (2)	20:02	22	19:29 (1)	18:49		16:40	15:57
3 | 04:49		20:52 (5)	05:30		19:52 (2)	06:23		19:07 (1)	07:16		07:14	08:07
| 21:44	16	21:08 (5)	21:06	29	20:21 (2)	20:00	21	19:28 (1)	18:47		16:38	15:57
4 | 04:50		20:53 (5)	05:31		19:51 (2)	06:25		19:08 (1)	07:18		07:15	08:08
| 21:43	15	21:08 (5)	21:05	29	20:20 (2)	19:57	19	19:27 (1)	18:44		16:36	15:56
5 | 04:50		20:54 (5)	05:33		19:52 (2)	06:27		19:09 (1)	07:19		07:17	08:10
| 21:43	14	21:08 (5)	21:03	28	20:20 (2)	19:55	17	19:26 (1)	18:42		16:34	15:55
6 | 04:51		20:55 (5)	05:35		19:52 (2)	06:29		19:10 (1)	07:21		07:19	08:11
| 21:42	12	21:07 (5)	21:01	27	20:19 (2)	19:52	13	19:23 (1)	18:39		16:32	15:55
7 | 04:52		20:55 (5)	05:36		19:53 (2)	06:30		19:13 (1)	07:23		07:21	08:12
| 21:41	12	21:07 (5)	20:59	25	20:18 (2)	19:50	7	19:20 (1)	18:37		16:30	15:54
8 | 04:53		20:56 (5)	05:38		19:54 (2)	06:32			07:25		07:23	08:14
| 21:41	10	21:06 (5)	20:57	24	20:18 (2)	19:48			18:35		16:28	15:54
9 | 04:54		20:57 (5)	05:40		19:52 (3)	06:34			07:27		07:25	08:15
| 21:40	9	21:06 (5)	20:55	24	20:16 (2)	19:45			18:32		16:27	15:54
10 | 04:55		20:58 (5)	05:42		19:51 (3)	06:36			07:28		07:27	08:16
| 21:39	7	21:05 (5)	20:53	25	20:16 (2)	19:43			18:30		16:25	15:53
11 | 04:56		21:00 (5)	05:43		19:49 (3)	06:37			07:30		07:29	08:17
| 21:38	4	21:04 (5)	20:51	24	20:13 (2)	19:40			18:27		16:23	15:53
12 | 04:58			05:45		19:48 (3)	06:39			07:32		07:31	08:18
| 21:37			20:49	24	20:12 (2)	19:38			18:25		16:22	15:53
13 | 04:59			05:47		19:48 (3)	06:41			07:34		07:33	08:19
| 21:37			20:47	21	20:09 (2)	19:35			18:23		16:20	15:53
14 | 05:00			05:48		19:46 (3)	06:42			07:36		07:34	08:20
| 21:36			20:45	20	20:06 (3)	19:33			18:20		16:18	15:53
15 | 05:01		20:03 (2)	05:50		19:46 (3)	06:44			07:38		07:36	08:21
| 21:34	5	20:08 (2)	20:43	20	20:06 (3)	19:30			18:18		16:17	15:53
16 | 05:03		20:00 (2)	05:52		19:46 (3)	06:46			07:39		07:38	08:22
| 21:33	10	20:10 (2)	20:41	20	20:06 (3)	19:28			18:16		16:15	15:53
17 | 05:04		19:59 (2)	05:54		19:46 (3)	06:48			07:41		07:40	08:23
| 21:32	14	20:13 (2)	20:38	19	20:05 (3)	19:26			18:14		16:14	15:53
18 | 05:05		19:58 (2)	05:55		19:46 (3)	06:49			07:43		07:42	08:24
| 21:31	16	20:14 (2)	20:36	19	20:05 (3)	19:23			18:11		16:12	15:53
19 | 05:07		19:57 (2)	05:57		19:46 (3)	06:51			07:45		07:44	08:25
| 21:30	18	20:15 (2)	20:34	18	20:04 (3)	19:21			18:09		16:11	15:54
20 | 05:08		19:56 (2)	05:59		19:47 (3)	06:53			07:47		07:45	08:25
| 21:28	19	20:15 (2)	20:32	16	20:03 (3)	19:18			18:07		16:10	15:54
21 | 05:09		19:55 (2)	06:01		19:48 (3)	06:55			07:49		07:47	08:26
| 21:27	22	20:17 (2)	20:30	13	20:01 (3)	19:16			18:05		16:08	15:54
22 | 05:11		19:54 (2)	06:02		19:48 (3)	06:56			07:51		07:49	08:26
| 21:26	23	20:17 (2)	20:27	10	19:58 (3)	19:13			18:02		16:07	15:55
23 | 05:12		19:54 (2)	06:04		19:18 (1)	06:58			07:53		07:51	08:27
| 21:24	25	20:19 (2)	20:25	11	19:56 (3)	19:11			18:00		16:06	15:55
24 | 05:14		19:54 (2)	06:06		19:15 (1)	07:00			07:54		07:52	08:27
| 21:23	25	20:19 (2)	20:23	12	19:27 (1)	19:08			17:58		16:05	15:56
25 | 05:15		19:53 (2)	06:08		19:12 (1)	07:02			06:56		07:54	08:28
| 21:21	26	20:19 (2)	20:21	16	19:28 (1)	19:06			16:56		16:04	15:57
26 | 05:17		19:53 (2)	06:09		19:11 (1)	07:03			06:58		07:56	08:28
| 21:20	27	20:20 (2)	20:18	18	19:29 (1)	19:04			16:54		16:03	15:57
27 | 05:18		19:52 (2)	06:11		19:10 (1)	07:05			07:00		07:58	08:28
| 21:18	28	20:20 (2)	20:16	20	19:30 (1)	19:01			16:52		16:02	15:58
28 | 05:20		19:52 (2)	06:13		19:09 (1)	07:07			07:02		07:59	08:28
| 21:17	29	20:21 (2)	20:14	21	19:30 (1)	18:59			16:50		16:01	15:59
29 | 05:22		19:51 (2)	06:15		19:08 (1)	07:09			07:04		08:01	08:29
| 21:15	29	20:20 (2)	20:11	22	19:30 (1)	18:56			16:48		16:00	16:00
30 | 05:23		19:52 (2)	06:16		19:08 (1)	07:11			07:06		08:02	08:29
| 21:13	29	20:21 (2)	20:09	23	19:31 (1)	18:54			16:46		15:59	16:01
31 | 05:25		19:51 (2)	06:18		19:07 (1)				07:08			08:29
| 21:12	30	20:21 (2)	20:07	23	19:30 (1)				16:44			16:02
Sonnenscheinstunden	510		459			382			329		260	235
astr.max.mögl.Beschattung		507		659			122					
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40					
Reduktion Betriebsdauer		0.91		0.91			0.91					
Reduktion Windrichtung		0.65		0.67			0.68					
Gesamte Reduktion		0.27		0.30			0.25					
Met.wahrsch.Beschattung		135		196			31					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CQ - IO95

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April			Mai			Juni		
1	08:29	07:59	07:02	06:48			05:40		19:40 (3)	04:51		20:47 (5)
	16:03	16:54	17:49	19:46			20:41	24	20:04 (2)	21:30	8	20:55 (5)
2	08:28	07:57	07:00	06:46			05:38		19:41 (3)	04:50		20:47 (5)
	16:04	16:56	17:50	19:48			20:42	24	20:05 (2)	21:31	10	20:57 (5)
3	08:28	07:56	06:58	06:43			05:36		19:42 (2)	04:49		20:46 (5)
	16:05	16:57	17:52	19:50			20:44	24	20:06 (2)	21:32	12	20:58 (5)
4	08:28	07:54	06:55	06:41			05:34		19:41 (2)	04:48		20:45 (5)
	16:06	16:59	17:54	19:52			20:46	26	20:07 (2)	21:33	14	20:59 (5)
5	08:28	07:52	06:53	06:38		19:15 (1)	05:32		19:41 (2)	04:48		20:46 (5)
	16:08	17:01	17:56	19:53	11	19:26 (1)	20:48	27	20:08 (2)	21:34	14	21:00 (5)
6	08:27	07:50	06:51	06:36		19:13 (1)	05:30		19:41 (2)	04:47		20:45 (5)
	16:09	17:03	17:58	19:55	15	19:28 (1)	20:50	27	20:08 (2)	21:35	16	21:01 (5)
7	08:27	07:49	06:48	06:34		19:11 (1)	05:28		19:40 (2)	04:46		20:45 (5)
	16:10	17:05	18:00	19:57	18	19:29 (1)	20:51	28	20:08 (2)	21:36	16	21:01 (5)
8	08:26	07:47	06:46	06:31		19:10 (1)	05:26		19:39 (2)	04:46		20:45 (5)
	16:12	17:07	18:02	19:59	20	19:30 (1)	20:53	29	20:08 (2)	21:37	18	21:03 (5)
9	08:26	07:45	06:44	06:29		19:09 (1)	05:24		19:40 (2)	04:45		20:45 (5)
	16:13	17:09	18:04	20:01	21	19:30 (1)	20:55	29	20:09 (2)	21:38	19	21:04 (5)
10	08:25	07:43	06:41	06:27		19:08 (1)	05:22		19:40 (2)	04:45		20:45 (5)
	16:15	17:11	18:06	20:03	22	19:30 (1)	20:57	29	20:09 (2)	21:39	19	21:04 (5)
11	08:25	07:41	06:39	06:24		19:08 (1)	05:20		19:39 (2)	04:44		20:45 (5)
	16:16	17:13	18:07	20:04	22	19:30 (1)	20:58	29	20:08 (2)	21:40	19	21:04 (5)
12	08:24	07:39	06:37	06:22		19:08 (1)	05:19		19:40 (2)	04:44		20:45 (5)
	16:18	17:15	18:09	20:06	22	19:30 (1)	21:00	29	20:09 (2)	21:41	20	21:05 (5)
13	08:23	07:37	06:34	06:20		19:07 (1)	05:17		19:40 (2)	04:44		20:45 (5)
	16:19	17:17	18:11	20:08	22	19:29 (1)	21:02	28	20:08 (2)	21:41	20	21:05 (5)
14	08:22	07:35	06:32	06:17		19:07 (1)	05:15		19:41 (2)	04:43		20:45 (5)
	16:21	17:19	18:13	20:10	21	19:28 (1)	21:03	27	20:08 (2)	21:42	20	21:05 (5)
15	08:21	07:33	06:29	06:15		19:08 (1)	05:14		19:40 (2)	04:43		20:45 (5)
	16:22	17:21	18:15	20:12	20	19:28 (1)	21:05	27	20:07 (2)	21:43	20	21:05 (5)
16	08:20	07:31	06:27	06:13		19:09 (1)	05:12		19:41 (2)	04:43		20:46 (5)
	16:24	17:23	18:17	20:13	18	19:27 (1)	21:07	26	20:07 (2)	21:43	20	21:06 (5)
17	08:19	07:29	06:25	06:10		19:09 (1)	05:10		19:41 (2)	04:43		20:46 (5)
	16:26	17:25	18:19	20:15	16	19:25 (1)	21:08	25	20:06 (2)	21:44	20	21:06 (5)
18	08:18	07:27	06:22	06:08		19:11 (1)	05:09		19:42 (2)	04:43		20:46 (5)
	16:28	17:27	18:20	20:17	12	19:23 (1)	21:10	24	20:06 (2)	21:44	20	21:06 (5)
19	08:17	07:25	06:20	06:06		19:14 (1)	05:07		19:43 (2)	04:43		20:46 (5)
	16:29	17:29	18:22	20:19	9	19:51 (3)	21:11	22	20:05 (2)	21:44	20	21:06 (5)
20	08:16	07:22	06:17	06:03		19:44 (3)	05:06		19:44 (2)	04:43		20:46 (5)
	16:31	17:31	18:24	20:21	9	19:53 (3)	21:13	21	20:05 (2)	21:45	20	21:06 (5)
21	08:15	07:20	06:15	06:01		19:42 (3)	05:04		19:45 (2)	04:43		20:46 (5)
	16:33	17:33	18:26	20:23	13	19:55 (3)	21:15	19	20:04 (2)	21:45	20	21:06 (5)
22	08:14	07:18	06:12	05:59		19:40 (3)	05:03		19:45 (2)	04:43		20:47 (5)
	16:35	17:35	18:28	20:24	16	19:56 (3)	21:16	17	20:02 (2)	21:45	20	21:07 (5)
23	08:12	07:16	06:10	05:57		19:39 (3)	05:01		19:47 (2)	04:43		20:47 (5)
	16:36	17:37	18:30	20:26	18	19:57 (3)	21:18	14	20:01 (2)	21:45	20	21:07 (5)
24	08:11	07:14	06:08	05:55		19:39 (3)	05:00		19:49 (2)	04:44		20:47 (5)
	16:38	17:39	18:32	20:28	19	19:58 (3)	21:19	11	20:00 (2)	21:45	20	21:07 (5)
25	08:10	07:11	06:05	05:52		19:38 (3)	04:59		19:52 (2)	04:44		20:48 (5)
	16:40	17:41	18:33	20:30	20	19:58 (3)	21:21	6	19:58 (2)	21:45	20	21:08 (5)
26	08:08	07:09	06:03	05:50		19:38 (3)	04:58			04:44		20:48 (5)
	16:42	17:43	18:35	20:32	20	19:58 (3)	21:22			21:45	20	21:08 (5)
27	08:07	07:07	06:00	05:48		19:38 (3)	04:56			04:45		20:48 (5)
	16:44	17:45	18:37	20:33	19	19:57 (3)	21:23			21:45	21	21:09 (5)
28	08:05	07:05	05:58	05:46		19:38 (3)	04:55			04:45		20:48 (5)
	16:46	17:47	18:39	20:35	19	19:57 (3)	21:25			21:45	20	21:08 (5)
29	08:04		06:55	05:44		19:38 (3)	04:54			04:46		20:49 (5)
	16:48		19:41	20:37	23	20:01 (2)	21:26			21:45	20	21:09 (5)
30	08:02		06:53	05:42		19:39 (3)	04:53		20:49 (5)	04:47		20:49 (5)
	16:50		19:42	20:39	24	20:03 (2)	21:27	5	20:54 (5)	21:45	19	21:08 (5)
31	08:01		06:51				04:52		20:48 (5)			
	16:52		19:44				21:29	7	20:55 (5)			
Sonnenscheinstunden	252	274	367	419			492			508		
astr.max.mögl.Beschattung					469			604			545	
Red.Sonnenscheinwahrsch.					0.41			0.51			0.45	
Reduktion Betriebsdauer					0.91			0.91			0.91	
Reduktion Windrichtung					0.68			0.66			0.63	
Gesamte Reduktion					0.25			0.31			0.26	
Met.wahrsch.Beschattung					119			187			143	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang		(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende		(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CQ - IO95

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober	November	Dezember
1	04:47	20:49 (5)	05:26	19:50 (2)	06:20	19:07 (1)	07:12	07:10	08:04
	21:45	20 21:09 (5)	21:10	29 20:19 (2)	20:04	22 19:29 (1)	18:51	16:42	15:58
2	04:48	20:50 (5)	05:28	19:50 (2)	06:22	19:07 (1)	07:14	07:12	08:05
	21:44	19 21:09 (5)	21:08	29 20:19 (2)	20:02	22 19:29 (1)	18:49	16:40	15:57
3	04:49	20:50 (5)	05:30	19:50 (2)	06:23	19:06 (1)	07:16	07:14	08:07
	21:44	18 21:08 (5)	21:06	29 20:19 (2)	20:00	21 19:27 (1)	18:47	16:38	15:57
4	04:50	20:50 (5)	05:31	19:49 (2)	06:25	19:07 (1)	07:18	07:15	08:08
	21:43	18 21:08 (5)	21:05	29 20:18 (2)	19:57	20 19:27 (1)	18:44	16:36	15:56
5	04:50	20:51 (5)	05:33	19:50 (2)	06:27	19:08 (1)	07:19	07:17	08:10
	21:43	17 21:08 (5)	21:03	28 20:18 (2)	19:55	18 19:26 (1)	18:42	16:34	15:55
6	04:51	20:51 (5)	05:35	19:50 (2)	06:29	19:08 (1)	07:21	07:19	08:11
	21:42	16 21:07 (5)	21:01	27 20:17 (2)	19:52	15 19:23 (1)	18:39	16:32	15:55
7	04:52	20:52 (5)	05:36	19:50 (2)	06:30	19:10 (1)	07:23	07:21	08:12
	21:41	15 21:07 (5)	20:59	27 20:17 (2)	19:50	11 19:21 (1)	18:37	16:30	15:54
8	04:53	20:53 (5)	05:38	19:51 (2)	06:32	19:15 (1)	07:25	07:23	08:14
	21:41	13 21:06 (5)	20:57	26 20:17 (2)	19:48	1 19:16 (1)	18:35	16:28	15:54
9	04:54	20:53 (5)	05:40	19:51 (2)	06:34		07:27	07:25	08:15
	21:40	13 21:06 (5)	20:55	25 20:16 (2)	19:45		18:32	16:27	15:54
10	04:55	20:54 (5)	05:42	19:52 (2)	06:36		07:28	07:27	08:16
	21:39	11 21:05 (5)	20:53	23 20:15 (2)	19:43		18:30	16:25	15:53
11	04:56	20:55 (5)	05:43	19:49 (3)	06:37		07:30	07:29	08:17
	21:38	9 21:04 (5)	20:51	25 20:14 (2)	19:40		18:27	16:23	15:53
12	04:58	20:56 (5)	05:45	19:48 (3)	06:39		07:32	07:31	08:18
	21:37	7 21:03 (5)	20:49	25 20:13 (2)	19:38		18:25	16:22	15:53
13	04:59	20:57 (5)	05:47	19:47 (3)	06:41		07:34	07:33	08:19
	21:37	6 21:03 (5)	20:47	24 20:11 (2)	19:35		18:23	16:20	15:53
14	05:00	20:59 (5)	05:48	19:46 (3)	06:42		07:36	07:34	08:20
	21:36	2 21:01 (5)	20:45	22 20:08 (2)	19:33		18:20	16:18	15:53
15	05:01		05:50	19:46 (3)	06:44		07:38	07:36	08:21
	21:34		20:43	19 20:05 (3)	19:30		18:18	16:17	15:53
16	05:03		05:52	19:46 (3)	06:46		07:39	07:38	08:22
	21:33		20:41	19 20:05 (3)	19:28		18:16	16:15	15:53
17	05:04		05:54	19:45 (3)	06:48		07:41	07:40	08:23
	21:32		20:38	19 20:04 (3)	19:26		18:14	16:14	15:53
18	05:05		05:55	19:45 (3)	06:49		07:43	07:42	08:24
	21:31		20:36	19 20:04 (3)	19:23		18:11	16:12	15:53
19	05:07	20:00 (2)	05:57	19:44 (3)	06:51		07:45	07:44	08:25
	21:30	9 20:09 (2)	20:34	19 20:03 (3)	19:21		18:09	16:11	15:54
20	05:08	19:57 (2)	05:59	19:45 (3)	06:53		07:47	07:45	08:25
	21:28	13 20:10 (2)	20:32	18 20:03 (3)	19:18		18:07	16:10	15:54
21	05:09	19:57 (2)	06:01	19:46 (3)	06:55		07:49	07:47	08:26
	21:27	15 20:12 (2)	20:30	15 20:01 (3)	19:16		18:05	16:08	15:54
22	05:11	19:55 (2)	06:02	19:46 (3)	06:56		07:51	07:49	08:26
	21:26	18 20:13 (2)	20:27	12 19:58 (3)	19:13		18:02	16:07	15:55
23	05:12	19:55 (2)	06:04	19:48 (3)	06:58		07:53	07:51	08:27
	21:24	20 20:15 (2)	20:25	8 19:56 (3)	19:11		18:00	16:06	15:55
24	05:14	19:54 (2)	06:06	19:17 (1)	07:00		07:54	07:52	08:27
	21:23	21 20:15 (2)	20:23	10 19:54 (3)	19:08		17:58	16:05	15:56
25	05:15	19:53 (2)	06:08	19:13 (1)	07:02		06:56	07:54	08:28
	21:21	23 20:16 (2)	20:21	13 19:26 (1)	19:06		16:56	16:04	15:57
26	05:17	19:53 (2)	06:09	19:12 (1)	07:03		06:58	07:56	08:28
	21:20	24 20:17 (2)	20:18	16 19:28 (1)	19:04		16:54	16:03	15:57
27	05:18	19:52 (2)	06:11	19:11 (1)	07:05		07:00	07:58	08:28
	21:18	25 20:17 (2)	20:16	18 19:29 (1)	19:01		16:52	16:02	15:58
28	05:20	19:52 (2)	06:13	19:09 (1)	07:07		07:02	07:59	08:28
	21:17	26 20:18 (2)	20:14	20 19:29 (1)	18:59		16:50	16:01	15:59
29	05:22	19:51 (2)	06:15	19:08 (1)	07:09		07:04	08:01	08:29
	21:15	27 20:18 (2)	20:11	21 19:29 (1)	18:56		16:48	16:00	16:00
30	05:23	19:51 (2)	06:16	19:08 (1)	07:11		07:06	08:02	08:29
	21:13	28 20:19 (2)	20:09	22 19:30 (1)	18:54		16:46	15:59	16:01
31	05:25	19:50 (2)	06:18	19:07 (1)			07:08		08:29
	21:12	28 20:18 (2)	20:07	22 19:29 (1)			16:44		16:02
Sonnenscheinstunden	510		459	382			329	260	235
astr.max.mögl.Beschattung		461		658		130			
Red.Sonnenscheinwahrsch.		0.45		0.49		0.40			
Reduktion Betriebsdauer		0.91		0.91		0.91			
Reduktion Windrichtung		0.65		0.67		0.68			
Gesamte Reduktion		0.26		0.30		0.25			
Met.wahrsch.Beschattung		122		195		33			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CR - IO96

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April			Mai			Juni		
1	08:29	07:59	07:02	06:48			05:40		19:40 (3)	04:51		20:46 (5)
	16:03	16:54	17:49	19:46			20:41	25	20:05 (2)	21:30	9	20:55 (5)
2	08:28	07:57	07:00	06:46			05:38		19:41 (3)	04:50		20:46 (5)
	16:04	16:56	17:50	19:48			20:42	24	20:05 (2)	21:31	11	20:57 (5)
3	08:28	07:56	06:58	06:43			05:36		19:42 (2)	04:49		20:45 (5)
	16:05	16:57	17:52	19:50			20:44	24	20:06 (2)	21:32	13	20:58 (5)
4	08:28	07:54	06:55	06:41			05:34		19:41 (2)	04:48		20:45 (5)
	16:06	16:59	17:54	19:52			20:46	26	20:07 (2)	21:33	14	20:59 (5)
5	08:28	07:52	06:53	06:38		19:15 (1)	05:32		19:41 (2)	04:48		20:45 (5)
	16:08	17:01	17:56	19:53	11	19:26 (1)	20:48	27	20:08 (2)	21:34	15	21:00 (5)
6	08:27	07:50	06:51	06:36		19:13 (1)	05:30		19:40 (2)	04:47		20:45 (5)
	16:09	17:03	17:58	19:55	15	19:28 (1)	20:50	28	20:08 (2)	21:35	16	21:01 (5)
7	08:27	07:49	06:48	06:34		19:11 (1)	05:28		19:40 (2)	04:46		20:44 (5)
	16:10	17:05	18:00	19:57	18	19:29 (1)	20:51	28	20:08 (2)	21:36	17	21:01 (5)
8	08:26	07:47	06:46	06:31		19:10 (1)	05:26		19:39 (2)	04:46		20:44 (5)
	16:12	17:07	18:02	19:59	20	19:30 (1)	20:53	29	20:08 (2)	21:37	19	21:03 (5)
9	08:26	07:45	06:44	06:29		19:09 (1)	05:24		19:40 (2)	04:45		20:45 (5)
	16:13	17:09	18:04	20:01	21	19:30 (1)	20:55	29	20:09 (2)	21:38	19	21:04 (5)
10	08:25	07:43	06:41	06:27		19:08 (1)	05:22		19:39 (2)	04:45		20:44 (5)
	16:15	17:11	18:06	20:03	22	19:30 (1)	20:57	29	20:08 (2)	21:39	19	21:03 (5)
11	08:25	07:41	06:39	06:24		19:08 (1)	05:20		19:39 (2)	04:44		20:45 (5)
	16:16	17:13	18:07	20:04	22	19:30 (1)	20:58	29	20:08 (2)	21:40	19	21:04 (5)
12	08:24	07:39	06:37	06:22		19:08 (1)	05:19		19:40 (2)	04:44		20:45 (5)
	16:18	17:15	18:09	20:06	22	19:30 (1)	21:00	28	20:08 (2)	21:41	20	21:05 (5)
13	08:23	07:37	06:34	06:20		19:07 (1)	05:17		19:40 (2)	04:44		20:44 (5)
	16:19	17:17	18:11	20:08	22	19:29 (1)	21:02	28	20:08 (2)	21:41	20	21:04 (5)
14	08:22	07:35	06:32	06:17		19:07 (1)	05:15		19:41 (2)	04:43		20:45 (5)
	16:21	17:19	18:13	20:10	21	19:28 (1)	21:03	27	20:08 (2)	21:42	20	21:05 (5)
15	08:21	07:33	06:29	06:15		19:08 (1)	05:14		19:41 (2)	04:43		20:45 (5)
	16:22	17:21	18:15	20:12	20	19:28 (1)	21:05	26	20:07 (2)	21:43	20	21:05 (5)
16	08:20	07:31	06:27	06:13		19:09 (1)	05:12		19:42 (2)	04:43		20:45 (5)
	16:24	17:23	18:17	20:13	18	19:27 (1)	21:07	25	20:07 (2)	21:43	20	21:05 (5)
17	08:19	07:29	06:25	06:10		19:09 (1)	05:10		19:42 (2)	04:43		20:45 (5)
	16:26	17:25	18:19	20:15	15	19:24 (1)	21:08	24	20:06 (2)	21:44	21	21:06 (5)
18	08:18	07:27	06:22	06:08		19:11 (1)	05:09		19:43 (2)	04:43		20:45 (5)
	16:28	17:27	18:20	20:17	11	19:22 (1)	21:10	23	20:06 (2)	21:44	21	21:06 (5)
19	08:17	07:25	06:20	06:06		19:15 (1)	05:07		19:43 (2)	04:43		20:46 (5)
	16:29	17:29	18:22	20:19	8	19:51 (3)	21:11	21	20:04 (2)	21:44	20	21:06 (5)
20	08:16	07:22	06:17	06:03		19:44 (3)	05:06		19:44 (2)	04:43		20:46 (5)
	16:31	17:31	18:24	20:21	9	19:53 (3)	21:13	20	20:04 (2)	21:45	20	21:06 (5)
21	08:15	07:20	06:15	06:01		19:42 (3)	05:04		19:45 (2)	04:43		20:46 (5)
	16:33	17:33	18:26	20:23	13	19:55 (3)	21:15	18	20:03 (2)	21:45	20	21:06 (5)
22	08:14	07:18	06:12	05:59		19:40 (3)	05:03		19:46 (2)	04:43		20:47 (5)
	16:35	17:35	18:28	20:24	16	19:56 (3)	21:16	15	20:01 (2)	21:45	20	21:07 (5)
23	08:12	07:16	06:10	05:57		19:39 (3)	05:01		19:48 (2)	04:43		20:47 (5)
	16:36	17:37	18:30	20:26	18	19:57 (3)	21:18	12	20:00 (2)	21:45	20	21:07 (5)
24	08:11	07:14	06:08	05:55		19:39 (3)	05:00		19:50 (2)	04:44		20:47 (5)
	16:38	17:39	18:32	20:28	19	19:58 (3)	21:19	8	19:58 (2)	21:45	20	21:07 (5)
25	08:10	07:11	06:05	05:52		19:38 (3)	04:59			04:44		20:47 (5)
	16:40	17:41	18:33	20:30	20	19:58 (3)	21:21			21:45	21	21:08 (5)
26	08:08	07:09	06:03	05:50		19:38 (3)	04:58			04:44		20:47 (5)
	16:42	17:43	18:35	20:32	20	19:58 (3)	21:22			21:45	20	21:07 (5)
27	08:07	07:07	06:00	05:48		19:38 (3)	04:56			04:45		20:48 (5)
	16:44	17:45	18:37	20:33	19	19:57 (3)	21:23			21:45	20	21:08 (5)
28	08:05	07:05	05:58	05:46		19:38 (3)	04:55			04:45		20:48 (5)
	16:46	17:47	18:39	20:35	20	19:58 (2)	21:25			21:45	20	21:08 (5)
29	08:04		06:55	05:44		19:39 (3)	04:54		20:50 (5)	04:46		20:48 (5)
	16:48		19:41	20:37	22	20:01 (2)	21:26	2	20:52 (5)	21:45	20	21:08 (5)
30	08:02		06:53	05:42		19:39 (3)	04:53		20:48 (5)	04:47		20:48 (5)
	16:50		19:42	20:39	24	20:03 (2)	21:27	6	20:54 (5)	21:45	20	21:08 (5)
31	08:01		06:51				04:52		20:47 (5)			
	16:52		19:44				21:29	8	20:55 (5)			
Sonnenscheinstunden	252	274	367	419			492			508		
astr.max.mögl.Beschattung					466			589			554	
Red.Sonnenscheinwahrsch.					0.41			0.51			0.45	
Reduktion Betriebsdauer					0.91			0.91			0.91	
Reduktion Windrichtung					0.68			0.66			0.63	
Gesamte Reduktion					0.25			0.31			0.26	
Met.wahrsch.Beschattung					118			182			145	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang		(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende		(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CR - IO96

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober	November	Dezember
1	04:47	20:49 (S)	05:26	19:50 (2)	06:20	19:07 (1)	07:12	07:10	08:04
	21:45	19 21:08 (S)	21:10	29 20:19 (2)	20:04	22 19:29 (1)	18:51	16:42	15:58
2	04:48	20:49 (S)	05:28	19:50 (2)	06:22	19:07 (1)	07:14	07:12	08:05
	21:44	20 21:09 (S)	21:08	28 20:18 (2)	20:02	22 19:29 (1)	18:49	16:40	15:57
3	04:49	20:49 (S)	05:30	19:50 (2)	06:23	19:06 (1)	07:16	07:14	08:07
	21:44	19 21:08 (S)	21:06	29 20:19 (2)	20:00	21 19:27 (1)	18:47	16:38	15:57
4	04:50	20:50 (S)	05:31	19:49 (2)	06:25	19:07 (1)	07:18	07:15	08:08
	21:43	18 21:08 (S)	21:05	29 20:18 (2)	19:57	20 19:27 (1)	18:44	16:36	15:56
5	04:50	20:50 (S)	05:33	19:50 (2)	06:27	19:08 (1)	07:19	07:17	08:10
	21:43	18 21:08 (S)	21:03	28 20:18 (2)	19:55	18 19:26 (1)	18:42	16:34	15:55
6	04:51	20:51 (S)	05:35	19:49 (2)	06:29	19:08 (1)	07:21	07:19	08:11
	21:42	16 21:07 (S)	21:01	28 20:17 (2)	19:52	15 19:23 (1)	18:39	16:32	15:55
7	04:52	20:51 (S)	05:36	19:50 (2)	06:30	19:10 (1)	07:23	07:21	08:12
	21:41	16 21:07 (S)	20:59	27 20:17 (2)	19:50	11 19:21 (1)	18:37	16:30	15:54
8	04:53	20:52 (S)	05:38	19:51 (2)	06:32	19:14 (1)	07:25	07:23	08:14
	21:41	14 21:06 (S)	20:57	26 20:17 (2)	19:48	3 19:17 (1)	18:35	16:28	15:54
9	04:54	20:53 (S)	05:40	19:51 (2)	06:34		07:27	07:25	08:15
	21:40	13 21:06 (S)	20:55	25 20:16 (2)	19:45		18:32	16:27	15:54
10	04:55	20:53 (S)	05:42	19:52 (2)	06:36		07:28	07:27	08:16
	21:39	12 21:05 (S)	20:53	23 20:15 (2)	19:43		18:30	16:25	15:53
11	04:56	20:54 (S)	05:43	19:49 (3)	06:37		07:30	07:29	08:17
	21:38	10 21:04 (S)	20:51	25 20:14 (2)	19:40		18:27	16:23	15:53
12	04:58	20:55 (S)	05:45	19:48 (3)	06:39		07:32	07:31	08:18
	21:37	8 21:03 (S)	20:49	25 20:13 (2)	19:38		18:25	16:22	15:53
13	04:59	20:56 (S)	05:47	19:47 (3)	06:41		07:34	07:33	08:19
	21:37	7 21:03 (S)	20:47	24 20:11 (2)	19:35		18:23	16:20	15:53
14	05:00	20:57 (S)	05:48	19:46 (3)	06:42		07:36	07:34	08:20
	21:36	4 21:01 (S)	20:45	22 20:08 (2)	19:33		18:20	16:18	15:53
15	05:01		05:50	19:46 (3)	06:44		07:38	07:36	08:21
	21:34		20:43	18 20:04 (3)	19:30		18:18	16:17	15:53
16	05:03		05:52	19:46 (3)	06:46		07:39	07:38	08:22
	21:33		20:41	19 20:05 (3)	19:28		18:16	16:15	15:53
17	05:04		05:54	19:45 (3)	06:48		07:41	07:40	08:23
	21:32		20:38	19 20:04 (3)	19:26		18:14	16:14	15:53
18	05:05		05:55	19:45 (3)	06:49		07:43	07:42	08:24
	21:31		20:36	19 20:04 (3)	19:23		18:11	16:12	15:53
19	05:07	20:02 (2)	05:57	19:44 (3)	06:51		07:45	07:44	08:25
	21:30	4 20:06 (2)	20:34	19 20:03 (3)	19:21		18:09	16:11	15:54
20	05:08	19:58 (2)	05:59	19:45 (3)	06:53		07:47	07:45	08:25
	21:28	11 20:09 (2)	20:32	18 20:03 (3)	19:18		18:07	16:10	15:54
21	05:09	19:57 (2)	06:01	19:46 (3)	06:55		07:49	07:47	08:26
	21:27	14 20:11 (2)	20:30	15 20:01 (3)	19:16		18:05	16:08	15:54
22	05:11	19:56 (2)	06:02	19:46 (3)	06:56		07:51	07:49	08:26
	21:26	16 20:12 (2)	20:27	12 19:58 (3)	19:13		18:02	16:07	15:55
23	05:12	19:55 (2)	06:04	19:48 (3)	06:58		07:53	07:51	08:27
	21:24	19 20:14 (2)	20:25	8 19:56 (3)	19:11		18:00	16:06	15:55
24	05:14	19:54 (2)	06:06	19:18 (1)	07:00		07:54	07:52	08:27
	21:23	21 20:15 (2)	20:23	8 19:54 (3)	19:08		17:58	16:05	15:56
25	05:15	19:53 (2)	06:08	19:14 (1)	07:02		06:56	07:54	08:28
	21:21	22 20:15 (2)	20:21	11 19:25 (1)	19:06		16:56	16:04	15:57
26	05:17	19:53 (2)	06:09	19:12 (1)	07:03		06:58	07:56	08:28
	21:20	23 20:16 (2)	20:18	15 19:27 (1)	19:04		16:54	16:03	15:57
27	05:18	19:52 (2)	06:11	19:11 (1)	07:05		07:00	07:58	08:28
	21:18	25 20:17 (2)	20:16	18 19:29 (1)	19:01		16:52	16:02	15:58
28	05:20	19:52 (2)	06:13	19:09 (1)	07:07		07:02	07:59	08:28
	21:17	26 20:18 (2)	20:14	20 19:29 (1)	18:59		16:50	16:01	15:59
29	05:22	19:51 (2)	06:15	19:08 (1)	07:09		07:04	08:01	08:29
	21:15	26 20:17 (2)	20:11	21 19:29 (1)	18:56		16:48	16:00	16:00
30	05:23	19:51 (2)	06:16	19:08 (1)	07:11		07:06	08:02	08:29
	21:13	27 20:18 (2)	20:09	22 19:30 (1)	18:54		16:46	15:59	16:01
31	05:25	19:50 (2)	06:18	19:07 (1)			07:08		08:29
	21:12	28 20:18 (2)	20:07	22 19:29 (1)			16:44		16:02
Sonnenscheinstunden	510		459	382			329	260	235
astr.max.mögl.Beschattung		456		652		132			
Red.Sonnenscheinwahrsch.		0.45		0.49		0.40			
Reduktion Betriebsdauer		0.91		0.91		0.91			
Reduktion Windrichtung		0.65		0.67		0.68			
Gesamte Reduktion		0.26		0.30		0.25			
Met.wahrsch.Beschattung		120		193		33			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CS - 1097

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März		April			Mai			Juni		
1	08:29	07:59		07:02		06:48			05:40		19:42 (2)	04:51		20:42 (5)
	16:03	16:54		17:49		19:46			20:41	22	20:04 (2)	21:30	13	20:55 (5)
2	08:28	07:57		07:00		06:46			05:38		19:41 (2)	04:50		20:43 (5)
	16:04	16:56		17:50		19:48			20:42	24	20:05 (2)	21:31	14	20:57 (5)
3	08:28	07:56		06:58		06:43			05:36		19:40 (2)	04:49		20:42 (5)
	16:05	16:57		17:52		19:50			20:44	25	20:05 (2)	21:32	16	20:58 (5)
4	08:28	07:54		06:55		06:41		19:16 (1)	05:34		19:39 (2)	04:48		20:42 (5)
	16:06	16:59		17:54		19:52	8	19:24 (1)	20:46	27	20:06 (2)	21:33	17	20:59 (5)
5	08:28	07:52		06:53		06:38		19:14 (1)	05:32		19:39 (2)	04:48		20:42 (5)
	16:08	17:01		17:56		19:53	13	19:27 (1)	20:48	28	20:07 (2)	21:34	18	21:00 (5)
6	08:27	07:50		06:51		06:36		19:12 (1)	05:30		19:39 (2)	04:47		20:42 (5)
	16:09	17:03		17:58		19:55	16	19:28 (1)	20:50	28	20:07 (2)	21:35	19	21:01 (5)
7	08:27	07:49		06:48		06:34		19:10 (1)	05:28		19:38 (2)	04:46		20:41 (5)
	16:10	17:05		18:00		19:57	19	19:29 (1)	20:51	28	20:06 (2)	21:36	20	21:01 (5)
8	08:26	07:47		06:46		06:31		19:09 (1)	05:26		19:38 (2)	04:46		20:42 (5)
	16:12	17:07		18:02		19:59	20	19:29 (1)	20:53	28	20:06 (2)	21:37	20	21:02 (5)
9	08:26	07:45		06:44		06:29		19:09 (1)	05:24		19:39 (2)	04:45		20:42 (5)
	16:13	17:09		18:04		20:01	21	19:30 (1)	20:55	28	20:07 (2)	21:38	20	21:02 (5)
10	08:25	07:43		06:41		06:27		19:07 (1)	05:22		19:39 (2)	04:45		20:42 (5)
	16:15	17:11		18:06		20:03	22	19:29 (1)	20:57	27	20:06 (2)	21:39	20	21:02 (5)
11	08:25	07:41		06:39		06:24		19:07 (1)	05:20		19:38 (2)	04:44		20:42 (5)
	16:16	17:13		18:07		20:04	22	19:29 (1)	20:58	28	20:06 (2)	21:40	21	21:03 (5)
12	08:24	07:39		06:37		06:22		19:08 (1)	05:19		19:39 (2)	04:44		20:43 (5)
	16:18	17:15		18:09		20:06	21	19:29 (1)	21:00	27	20:06 (2)	21:41	20	21:03 (5)
13	08:23	07:37		06:34		06:20		19:07 (1)	05:17		19:39 (2)	04:44		20:42 (5)
	16:19	17:17		18:11		20:08	21	19:28 (1)	21:02	26	20:05 (2)	21:41	21	21:03 (5)
14	08:22	07:35		06:32		06:17		19:08 (1)	05:15		19:40 (2)	04:43		20:42 (5)
	16:21	17:19		18:13		20:10	19	19:27 (1)	21:03	25	20:05 (2)	21:42	21	21:03 (5)
15	08:21	07:33		06:29		06:15		19:08 (1)	05:14		19:40 (2)	04:43		20:43 (5)
	16:22	17:21		18:15		20:12	18	19:26 (1)	21:05	24	20:04 (2)	21:43	20	21:03 (5)
16	08:20	07:31		06:27		06:13		19:10 (1)	05:12		19:42 (2)	04:43		20:43 (5)
	16:24	17:23		18:17		20:13	15	19:25 (1)	21:07	22	20:04 (2)	21:43	21	21:04 (5)
17	08:19	07:29		06:25		06:10		19:10 (1)	05:10		19:42 (2)	04:43		20:43 (5)
	16:26	17:25		18:19		20:15	13	19:23 (1)	21:08	21	20:03 (2)	21:44	21	21:04 (5)
18	08:18	07:27		06:22		06:08		19:13 (1)	05:09		19:43 (2)	04:43		20:43 (5)
	16:27	17:27		18:20		20:17	6	19:19 (1)	21:10	19	20:02 (2)	21:44	21	21:04 (5)
19	08:17	07:25		06:20		06:06			05:07		19:44 (2)	04:43		20:44 (5)
	16:29	17:29		18:22		20:19			21:11	16	20:00 (2)	21:44	20	21:04 (5)
20	08:16	07:22		06:17		06:03			05:06		19:46 (2)	04:43		20:44 (5)
	16:31	17:31		18:24		20:21			21:13	13	19:59 (2)	21:45	20	21:04 (5)
21	08:15	07:20		06:15		06:01			05:04		19:48 (2)	04:43		20:44 (5)
	16:33	17:33		18:26		20:23			21:15	10	19:58 (2)	21:45	20	21:04 (5)
22	08:14	07:18		06:12		05:59			05:03		19:51 (2)	04:43		20:45 (5)
	16:35	17:35		18:28		20:24			21:16	3	19:54 (2)	21:45	20	21:05 (5)
23	08:12	07:16		06:10		05:57			05:01			04:43		20:45 (5)
	16:36	17:37		18:30		20:26			21:18			21:45	20	21:05 (5)
24	08:11	07:14		06:08		05:55			05:00			04:44		20:44 (5)
	16:38	17:39		18:32		20:28			21:19			21:45	21	21:05 (5)
25	08:10	07:11		06:05		05:52			04:59			04:44		20:45 (5)
	16:40	17:41		18:33		20:30			21:21			21:45	21	21:06 (5)
26	08:08	07:09		06:03		05:50			04:58			04:44		20:45 (5)
	16:42	17:43		18:35		20:32			21:22			21:45	21	21:06 (5)
27	08:07	07:07		06:00		05:48		19:50 (2)	04:56		20:48 (5)	04:45		20:46 (5)
	16:44	17:45		18:37		20:33	8	19:58 (2)	21:23	2	20:50 (5)	21:45	20	21:06 (5)
28	08:05	07:05		05:58		05:46		19:47 (2)	04:55		20:46 (5)	04:45		20:46 (5)
	16:46	17:47		18:39		20:35	14	20:01 (2)	21:25	5	20:51 (5)	21:45	20	21:06 (5)
29	08:04			06:55		05:44		19:44 (2)	04:54		20:45 (5)	04:46		20:46 (5)
	16:48			19:41		20:37	18	20:02 (2)	21:26	7	20:52 (5)	21:45	21	21:07 (5)
30	08:02			06:53		05:42		19:43 (2)	04:53		20:44 (5)	04:47		20:46 (5)
	16:50			19:42		20:39	20	20:03 (2)	21:27	10	20:54 (5)	21:45	20	21:06 (5)
31	08:01			06:51					04:52		20:43 (5)			
	16:52			19:44					21:29	12	20:55 (5)			
Sonnenscheinstunden	252	274		367		419			492			508		
astr.max.mögl.Beschattung						314				535			587	
Red.Sonnenscheinwahrsch.						0.41				0.51			0.45	
Reduktion Betriebsdauer						0.91				0.91			0.91	
Reduktion Windrichtung						0.68				0.66			0.63	
Gesamte Reduktion						0.26				0.31			0.26	
Met.wahrsch.Beschattung						80				165			154	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CS - 1097

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober	November	Dezember
1 | 04:47		20:47 (S) | 05:26		19:50 (2) | 06:20		19:06 (1) | 07:12	| 07:10	| 08:04
| 21:45	20	21:07 (S) | 21:10	27	20:17 (2) | 20:04	22	19:28 (1) | 18:51	| 16:42	| 15:58
2 | 04:48		20:47 (S) | 05:28		19:49 (2) | 06:22		19:06 (1) | 07:14	| 07:12	| 08:05
| 21:44	20	21:07 (S) | 21:08	27	20:16 (2) | 20:02	22	19:28 (1) | 18:49	| 16:40	| 15:57
3 | 04:49		20:47 (S) | 05:30		19:49 (2) | 06:23		19:06 (1) | 07:16	| 07:14	| 08:07
| 21:44	20	21:07 (S) | 21:06	28	20:17 (2) | 20:00	21	19:27 (1) | 18:47	| 16:38	| 15:57
4 | 04:50		20:47 (S) | 05:31		19:48 (2) | 06:25		19:06 (1) | 07:18	| 07:15	| 08:08
| 21:43	20	21:07 (S) | 21:05	28	20:16 (2) | 19:57	20	19:26 (1) | 18:44	| 16:36	| 15:56
5 | 04:50		20:48 (S) | 05:33		19:48 (2) | 06:27		19:07 (1) | 07:19	| 07:17	| 08:10
| 21:43	19	21:07 (S) | 21:03	29	20:17 (2) | 19:55	19	19:26 (1) | 18:42	| 16:34	| 15:55
6 | 04:51		20:48 (S) | 05:35		19:48 (2) | 06:29		19:07 (1) | 07:21	| 07:19	| 08:11
| 21:42	19	21:07 (S) | 21:01	28	20:16 (2) | 19:52	17	19:24 (1) | 18:39	| 16:32	| 15:55
7 | 04:52		20:49 (S) | 05:36		19:48 (2) | 06:30		19:09 (1) | 07:23	| 07:21	| 08:12
| 21:41	18	21:07 (S) | 20:59	28	20:16 (2) | 19:50	13	19:22 (1) | 18:37	| 16:30	| 15:54
8 | 04:53		20:49 (S) | 05:38		19:49 (2) | 06:32		19:11 (1) | 07:25	| 07:23	| 08:14
| 21:41	17	21:06 (S) | 20:57	27	20:16 (2) | 19:48	8	19:19 (1) | 18:35	| 16:28	| 15:54
9 | 04:54		20:50 (S) | 05:40		19:49 (2) | 06:34		| 07:27	| 07:25	| 08:15
| 21:40	16	21:06 (S) | 20:55	26	20:15 (2) | 19:45		| 18:32	| 16:27	| 15:54
10 | 04:55		20:50 (S) | 05:42		19:49 (2) | 06:36		| 07:28	| 07:27	| 08:16
| 21:39	15	21:05 (S) | 20:53	26	20:15 (2) | 19:43		| 18:30	| 16:25	| 15:53
11 | 04:56		20:51 (S) | 05:43		19:49 (2) | 06:37		| 07:30	| 07:29	| 08:17
| 21:38	13	21:04 (S) | 20:51	24	20:13 (2) | 19:40		| 18:27	| 16:23	| 15:53
12 | 04:58		20:51 (S) | 05:45		19:50 (2) | 06:39		| 07:32	| 07:31	| 08:18
| 21:37	12	21:03 (S) | 20:49	23	20:13 (2) | 19:38		| 18:25	| 16:22	| 15:53
13 | 04:59		20:52 (S) | 05:47		19:52 (2) | 06:41		| 07:34	| 07:33	| 08:19
| 21:37	11	21:03 (S) | 20:47	20	20:12 (2) | 19:35		| 18:23	| 16:20	| 15:53
14 | 05:00		20:53 (S) | 05:48		19:52 (2) | 06:42		| 07:36	| 07:34	| 08:20
| 21:36	8	21:01 (S) | 20:45	17	20:09 (2) | 19:33		| 18:20	| 16:18	| 15:53
15 | 05:01		20:54 (S) | 05:50		19:55 (2) | 06:44		| 07:38	| 07:36	| 08:21
| 21:34	6	21:00 (S) | 20:43	12	20:07 (2) | 19:30		| 18:18	| 16:17	| 15:53
16 | 05:03		20:55 (S) | 05:52		19:59 (2) | 06:46		| 07:39	| 07:38	| 08:22
| 21:33	4	20:59 (S) | 20:41	5	20:04 (2) | 19:28		| 18:16	| 16:15	| 15:53
17 | 05:04		| 05:54		| 06:48		| 07:41	| 07:40	| 08:23
| 21:32		| 20:38		| 19:26		| 18:14	| 16:14	| 15:53
18 | 05:05		| 05:55		| 06:49		| 07:43	| 07:42	| 08:24
| 21:31		| 20:36		| 19:23		| 18:11	| 16:12	| 15:53
19 | 05:07		| 05:57		| 06:51		| 07:45	| 07:44	| 08:25
| 21:30		| 20:34		| 19:21		| 18:09	| 16:11	| 15:54
20 | 05:08		| 05:59		| 06:53		| 07:47	| 07:45	| 08:25
| 21:28		| 20:32		| 19:18		| 18:07	| 16:10	| 15:54
21 | 05:09		| 06:01		| 06:55		| 07:49	| 07:47	| 08:26
| 21:27		| 20:30		| 19:16		| 18:05	| 16:08	| 15:54
22 | 05:11		19:59 (2) | 06:02		| 06:56		| 07:51	| 07:49	| 08:26
| 21:26	7	20:06 (2) | 20:27		| 19:13		| 18:02	| 16:07	| 15:55
23 | 05:12		19:57 (2) | 06:04		| 06:58		| 07:53	| 07:51	| 08:27
| 21:24	12	20:09 (2) | 20:25		| 19:11		| 18:00	| 16:06	| 15:55
24 | 05:14		19:55 (2) | 06:06		| 07:00		| 07:54	| 07:52	| 08:27
| 21:23	16	20:11 (2) | 20:23		| 19:08		| 17:58	| 16:05	| 15:56
25 | 05:15		19:54 (2) | 06:08		19:16 (1) | 07:02		| 06:56	| 07:54	| 08:28
| 21:21	17	20:11 (2) | 20:21	7	19:23 (1) | 19:06		| 16:56	| 16:04	| 15:57
26 | 05:17		19:53 (2) | 06:09		19:13 (1) | 07:03		| 06:58	| 07:56	| 08:28
| 21:20	20	20:13 (2) | 20:18	13	19:26 (1) | 19:04		| 16:54	| 16:03	| 15:57
27 | 05:18		19:52 (2) | 06:11		19:11 (1) | 07:05		| 07:00	| 07:58	| 08:28
| 21:18	21	20:13 (2) | 20:16	16	19:27 (1) | 19:01		| 16:52	| 16:02	| 15:58
28 | 05:20		19:52 (2) | 06:13		19:09 (1) | 07:07		| 07:02	| 07:59	| 08:28
| 21:17	23	20:15 (2) | 20:14	18	19:27 (1) | 18:59		| 16:50	| 16:01	| 15:59
29 | 05:22		19:51 (2) | 06:15		19:08 (1) | 07:09		| 07:04	| 08:01	| 08:29
| 21:15	24	20:15 (2) | 20:11	20	19:28 (1) | 18:56		| 16:48	| 16:00	| 16:00
30 | 05:23		19:50 (2) | 06:16		19:08 (1) | 07:11		| 07:06	| 08:02	| 08:29
| 21:13	26	20:16 (2) | 20:09	21	19:29 (1) | 18:54		| 16:46	| 15:59	| 16:01
31 | 05:25		19:49 (2) | 06:18		19:07 (1) |		| 07:08		| 08:29
| 21:12	27	20:16 (2) | 20:07	21	19:28 (1) |		| 16:44		| 16:02
Sonnenscheinstunden | 510		| 459		| 382		| 329	| 260	| 235
astr.max.mögl.Beschattung |	431	|	491	|	142	|	|	|
Red.Sonnenscheinwahrsch. |	0.45	|	0.49	|	0.40	|	|	|
Reduktion Betriebsdauer |	0.91	|	0.91	|	0.91	|	|	|
Reduktion Windrichtung |	0.65	|	0.67	|	0.68	|	|	|
Gesamte Reduktion |	0.26	|	0.30	|	0.25	|	|	|
Met.wahrsch.Beschattung |	113	|	146	|	36	|	|	|

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CT - 1098

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40		19:41 (2)	04:51		20:41 (5)
	16:03		16:54		17:49		19:46			20:41	23	20:04 (2)	21:30	14	20:55 (5)
2	08:28		07:57		07:00		06:46			05:38		19:40 (2)	04:50		20:42 (5)
	16:04		16:56		17:50		19:48			20:42	25	20:05 (2)	21:31	15	20:57 (5)
3	08:28		07:56		06:58		06:43			05:36		19:39 (2)	04:49		20:41 (5)
	16:05		16:57		17:52		19:50			20:44	26	20:05 (2)	21:32	17	20:58 (5)
4	08:28		07:54		06:55		06:41		19:16 (1)	05:34		19:38 (2)	04:48		20:41 (5)
	16:06		16:59		17:54		19:52	8	19:24 (1)	20:46	27	20:05 (2)	21:33	18	20:59 (5)
5	08:28		07:52		06:53		06:38		19:13 (1)	05:32		19:39 (2)	04:48		20:42 (5)
	16:08		17:01		17:56		19:53	14	19:27 (1)	20:48	27	20:06 (2)	21:34	18	21:00 (5)
6	08:27		07:50		06:51		06:36		19:12 (1)	05:30		19:38 (2)	04:47		20:41 (5)
	16:09		17:03		17:58		19:55	16	19:28 (1)	20:50	28	20:06 (2)	21:35	19	21:00 (5)
7	08:27		07:49		06:48		06:34		19:10 (1)	05:28		19:38 (2)	04:46		20:41 (5)
	16:10		17:05		18:00		19:57	18	19:28 (1)	20:51	28	20:06 (2)	21:36	19	21:00 (5)
8	08:26		07:47		06:46		06:31		19:09 (1)	05:26		19:38 (2)	04:46		20:41 (5)
	16:12		17:07		18:02		19:59	20	19:29 (1)	20:53	28	20:06 (2)	21:37	20	21:01 (5)
9	08:26		07:45		06:44		06:29		19:09 (1)	05:24		19:38 (2)	04:45		20:42 (5)
	16:13		17:09		18:04		20:01	21	19:30 (1)	20:55	28	20:06 (2)	21:38	20	21:02 (5)
10	08:25		07:43		06:41		06:27		19:07 (1)	05:22		19:38 (2)	04:45		20:41 (5)
	16:15		17:11		18:06		20:03	22	19:29 (1)	20:57	28	20:06 (2)	21:39	20	21:01 (5)
11	08:25		07:41		06:39		06:24		19:07 (1)	05:20		19:38 (2)	04:44		20:42 (5)
	16:16		17:13		18:07		20:04	22	19:29 (1)	20:58	27	20:05 (2)	21:40	20	21:02 (5)
12	08:24		07:39		06:37		06:22		19:08 (1)	05:19		19:39 (2)	04:44		20:42 (5)
	16:18		17:15		18:09		20:06	21	19:29 (1)	21:00	26	20:05 (2)	21:41	20	21:02 (5)
13	08:23		07:37		06:34		06:20		19:07 (1)	05:17		19:39 (2)	04:44		20:41 (5)
	16:19		17:17		18:11		20:08	21	19:28 (1)	21:02	25	20:04 (2)	21:41	21	21:02 (5)
14	08:22		07:35		06:32		06:17		19:08 (1)	05:15		19:40 (2)	04:43		20:42 (5)
	16:21		17:19		18:13		20:10	19	19:27 (1)	21:03	24	20:04 (2)	21:42	20	21:02 (5)
15	08:21		07:33		06:29		06:15		19:09 (1)	05:14		19:40 (2)	04:43		20:42 (5)
	16:22		17:21		18:15		20:12	17	19:26 (1)	21:05	23	20:03 (2)	21:43	21	21:03 (5)
16	08:20		07:31		06:27		06:13		19:10 (1)	05:12		19:42 (2)	04:43		20:42 (5)
	16:24		17:23		18:17		20:13	15	19:25 (1)	21:07	21	20:03 (2)	21:43	21	21:03 (5)
17	08:19		07:29		06:25		06:10		19:11 (1)	05:10		19:42 (2)	04:43		20:42 (6)
	16:26		17:25		18:19		20:15	11	19:22 (1)	21:08	20	20:02 (2)	21:44	21	21:03 (5)
18	08:18		07:27		06:22		06:08		19:14 (1)	05:09		19:44 (2)	04:43		20:42 (6)
	16:27		17:27		18:20		20:17	4	19:18 (1)	21:10	17	20:01 (2)	21:44	22	21:04 (6)
19	08:17		07:25		06:20		06:06			05:07		19:44 (2)	04:43		20:42 (6)
	16:29		17:29		18:22		20:19			21:11	15	19:59 (2)	21:44	22	21:04 (6)
20	08:16		07:22		06:17		06:03			05:06		19:47 (2)	04:43		20:42 (6)
	16:31		17:31		18:24		20:21			21:13	11	19:58 (2)	21:45	22	21:04 (5)
21	08:15		07:20		06:15		06:01			05:04		19:50 (2)	04:43		20:42 (6)
	16:33		17:33		18:26		20:23			21:15	5	19:55 (2)	21:45	22	21:04 (5)
22	08:14		07:18		06:12		05:59			05:03			04:43		20:43 (6)
	16:35		17:35		18:28		20:24			21:16			21:45	22	21:05 (5)
23	08:12		07:16		06:10		05:57			05:01			04:43		20:43 (6)
	16:36		17:37		18:30		20:26			21:18			21:45	22	21:05 (5)
24	08:11		07:14		06:08		05:55			05:00			04:44		20:43 (6)
	16:38		17:39		18:32		20:28			21:19			21:45	22	21:05 (6)
25	08:10		07:11		06:05		05:52			04:59			04:44		20:44 (6)
	16:40		17:41		18:33		20:30			21:21			21:45	21	21:05 (5)
26	08:08		07:09		06:03		05:50			04:58			04:44		20:44 (5)
	16:42		17:43		18:35		20:32			21:22			21:45	21	21:05 (5)
27	08:07		07:07		06:00		05:48		19:48 (2)	04:56		20:46 (5)	04:45		20:45 (5)
	16:44		17:45		18:37		20:33	10	19:58 (2)	21:23	4	20:50 (5)	21:45	21	21:06 (5)
28	08:05		07:05		05:58		05:46		19:45 (2)	04:55		20:44 (5)	04:45		20:45 (5)
	16:46		17:47		18:39		20:35	16	20:01 (2)	21:25	7	20:51 (5)	21:45	20	21:05 (5)
29	08:04				06:55		05:44		19:44 (2)	04:54		20:43 (5)	04:46		20:46 (5)
	16:48				19:41		20:37	18	20:02 (2)	21:26	9	20:52 (5)	21:45	20	21:06 (5)
30	08:02				06:53		05:42		19:42 (2)	04:53		20:43 (5)	04:47		20:45 (5)
	16:50				19:42		20:39	21	20:03 (2)	21:27	11	20:54 (5)	21:45	21	21:06 (5)
31	08:01				06:51					04:52		20:42 (5)			
	16:52				19:44					21:29	13	20:55 (5)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung								314			526			602	
Red.Sonnenscheinwahrsch.								0.41			0.51			0.45	
Reduktion Betriebsdauer								0.91			0.91			0.91	
Reduktion Windrichtung								0.68			0.66			0.63	
Gesamte Reduktion								0.26			0.31			0.26	
Met.wahrsch.Beschattung								80			162			158	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

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	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CT - 1098

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober	November	Dezember
1	04:47		20:46 (5)	05:26		19:49 (2)	06:20		19:06 (1)	07:12	07:10	08:04
	21:45	20	21:06 (5)	21:10	27	20:16 (2)	20:04	22	19:28 (1)	18:51	16:42	15:58
2	04:48		20:46 (5)	05:28		19:48 (2)	06:22		19:06 (1)	07:14	07:12	08:05
	21:44	21	21:07 (5)	21:08	27	20:15 (2)	20:02	22	19:28 (1)	18:49	16:40	15:57
3	04:49		20:46 (5)	05:30		19:49 (2)	06:23		19:06 (1)	07:16	07:14	08:07
	21:44	20	21:06 (5)	21:06	27	20:16 (2)	20:00	21	19:27 (1)	18:47	16:38	15:57
4	04:50		20:46 (5)	05:31		19:48 (2)	06:25		19:06 (1)	07:18	07:15	08:08
	21:43	20	21:06 (5)	21:05	28	20:16 (2)	19:57	20	19:26 (1)	18:44	16:36	15:56
5	04:50		20:47 (5)	05:33		19:48 (2)	06:27		19:07 (1)	07:19	07:17	08:10
	21:43	20	21:07 (5)	21:03	28	20:16 (2)	19:55	19	19:26 (1)	18:42	16:34	15:55
6	04:51		20:47 (5)	05:35		19:47 (2)	06:29		19:07 (1)	07:21	07:19	08:11
	21:42	20	21:07 (5)	21:01	28	20:15 (2)	19:52	16	19:23 (1)	18:39	16:32	15:55
7	04:52		20:48 (5)	05:36		19:48 (2)	06:30		19:08 (1)	07:23	07:21	08:12
	21:41	19	21:07 (5)	20:59	28	20:16 (2)	19:50	14	19:22 (1)	18:37	16:30	15:54
8	04:53		20:48 (5)	05:38		19:48 (2)	06:32		19:11 (1)	07:25	07:23	08:14
	21:41	18	21:06 (5)	20:57	28	20:16 (2)	19:48	8	19:19 (1)	18:35	16:28	15:54
9	04:54		20:49 (5)	05:40		19:48 (2)	06:34			07:27	07:25	08:15
	21:40	17	21:06 (5)	20:55	26	20:14 (2)	19:45			18:32	16:27	15:54
10	04:55		20:49 (5)	05:42		19:49 (2)	06:36			07:28	07:27	08:16
	21:39	16	21:05 (5)	20:53	25	20:14 (2)	19:43			18:30	16:25	15:53
11	04:56		20:50 (5)	05:43		19:49 (2)	06:37			07:30	07:29	08:17
	21:38	14	21:04 (5)	20:51	24	20:13 (2)	19:40			18:27	16:23	15:53
12	04:58		20:50 (5)	05:45		19:50 (2)	06:39			07:32	07:31	08:18
	21:37	13	21:03 (5)	20:49	22	20:12 (2)	19:38			18:25	16:22	15:53
13	04:59		20:51 (5)	05:47		19:51 (2)	06:41			07:34	07:33	08:19
	21:37	12	21:03 (5)	20:47	21	20:12 (2)	19:35			18:23	16:20	15:53
14	05:00		20:51 (5)	05:48		19:51 (2)	06:42			07:36	07:34	08:20
	21:36	10	21:01 (5)	20:45	18	20:09 (2)	19:33			18:20	16:18	15:53
15	05:01		20:52 (5)	05:50		19:53 (2)	06:44			07:38	07:36	08:21
	21:34	8	21:00 (5)	20:43	15	20:08 (2)	19:30			18:18	16:17	15:53
16	05:03		20:53 (5)	05:52		19:57 (2)	06:46			07:39	07:38	08:22
	21:33	6	20:59 (5)	20:41	8	20:05 (2)	19:28			18:16	16:15	15:53
17	05:04		20:56 (5)	05:54			06:48			07:41	07:40	08:23
	21:32	3	20:59 (5)	20:38			19:26			18:14	16:14	15:53
18	05:05			05:55			06:49			07:43	07:42	08:24
	21:31			20:36			19:23			18:11	16:12	15:53
19	05:07			05:57			06:51			07:45	07:44	08:25
	21:30			20:34			19:21			18:09	16:11	15:54
20	05:08			05:59			06:53			07:47	07:45	08:25
	21:28			20:32			19:18			18:07	16:10	15:54
21	05:09			06:01			06:55			07:49	07:47	08:26
	21:27			20:30			19:16			18:05	16:08	15:54
22	05:11			06:02			06:56			07:51	07:49	08:26
	21:26			20:27			19:13			18:02	16:07	15:55
23	05:12		19:58 (2)	06:04			06:58			07:53	07:51	08:27
	21:24	9	20:07 (2)	20:25			19:11			18:00	16:06	15:55
24	05:14		19:56 (2)	06:06			07:00			07:54	07:52	08:27
	21:23	13	20:09 (2)	20:23			19:08			17:58	16:05	15:56
25	05:15		19:54 (2)	06:08		19:16 (1)	07:02			06:56	07:54	08:28
	21:21	16	20:10 (2)	20:21	6	19:22 (1)	19:06			16:56	16:04	15:57
26	05:17		19:54 (2)	06:09		19:13 (1)	07:03			06:58	07:56	08:28
	21:20	18	20:12 (2)	20:18	12	19:25 (1)	19:04			16:54	16:03	15:57
27	05:18		19:52 (2)	06:11		19:12 (1)	07:05			07:00	07:58	08:28
	21:18	20	20:12 (2)	20:16	15	19:27 (1)	19:01			16:52	16:02	15:58
28	05:20		19:52 (2)	06:13		19:09 (1)	07:07			07:02	07:59	08:28
	21:17	22	20:14 (2)	20:14	18	19:27 (1)	18:59			16:50	16:01	15:59
29	05:22		19:51 (2)	06:15		19:08 (1)	07:09			07:04	08:01	08:29
	21:15	23	20:14 (2)	20:11	20	19:28 (1)	18:56			16:48	16:00	16:00
30	05:23		19:50 (2)	06:16		19:08 (1)	07:11			07:06	08:02	08:29
	21:13	25	20:15 (2)	20:09	21	19:29 (1)	18:54			16:46	15:59	16:01
31	05:25		19:49 (2)	06:18		19:07 (1)				07:08		08:29
	21:12	26	20:15 (2)	20:07	21	19:28 (1)				16:44		16:02
Sonnenscheinstunden	510			459			382			329	260	235
astr.max.mögl.Beschattung		429			493			142				
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40				
Reduktion Betriebsdauer		0.91			0.91			0.91				
Reduktion Windrichtung		0.65			0.67			0.68				
Gesamte Reduktion		0.26			0.30			0.25				
Met.wahrsch.Beschattung		113			146			36				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CU - IO99

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April			Mai			Juni		
1	08:29	07:59	07:02	06:48			05:40		19:39 (2)	04:51		20:42 (6)
	16:03	16:54	17:49	19:46			20:41	24	20:03 (2)	21:30	10	20:52 (6)
2	08:28	07:57	07:00	06:46			05:38		19:38 (2)	04:50		20:42 (6)
	16:04	16:56	17:50	19:48			20:42	25	20:03 (2)	21:31	12	20:54 (6)
3	08:28	07:56	06:58	06:43			05:36		19:37 (2)	04:49		20:41 (6)
	16:05	16:57	17:52	19:50			20:44	27	20:04 (2)	21:32	14	20:55 (6)
4	08:28	07:54	06:55	06:41		19:14 (1)	05:34		19:37 (2)	04:48		20:40 (6)
	16:06	16:59	17:54	19:52	10	19:24 (1)	20:46	27	20:04 (2)	21:33	16	20:56 (6)
5	08:28	07:52	06:53	06:38		19:12 (1)	05:32		19:37 (2)	04:48		20:40 (6)
	16:08	17:01	17:56	19:53	15	19:27 (1)	20:48	28	20:05 (2)	21:34	17	20:57 (6)
6	08:27	07:50	06:51	06:36		19:11 (1)	05:30		19:37 (2)	04:47		20:39 (6)
	16:09	17:03	17:58	19:55	17	19:28 (1)	20:50	27	20:04 (2)	21:35	18	20:57 (6)
7	08:27	07:49	06:48	06:34		19:09 (1)	05:28		19:37 (2)	04:46		20:38 (6)
	16:10	17:05	18:00	19:57	19	19:28 (1)	20:51	27	20:04 (2)	21:36	19	20:57 (6)
8	08:26	07:47	06:46	06:31		19:08 (1)	05:26		19:37 (2)	04:46		20:39 (6)
	16:12	17:07	18:02	19:59	21	19:29 (1)	20:53	27	20:04 (2)	21:37	19	20:58 (6)
9	08:26	07:45	06:44	06:29		19:08 (1)	05:24		19:37 (2)	04:45		20:39 (6)
	16:13	17:09	18:04	20:01	21	19:29 (1)	20:55	27	20:04 (2)	21:38	20	20:59 (6)
10	08:25	07:43	06:41	06:27		19:07 (1)	05:22		19:37 (2)	04:45		20:38 (6)
	16:15	17:11	18:06	20:03	21	19:28 (1)	20:57	26	20:03 (2)	21:39	21	20:59 (6)
11	08:25	07:41	06:39	06:24		19:07 (1)	05:20		19:37 (2)	04:44		20:38 (6)
	16:16	17:13	18:07	20:04	21	19:28 (1)	20:58	26	20:03 (2)	21:40	22	21:00 (6)
12	08:24	07:39	06:37	06:22		19:07 (1)	05:19		19:39 (2)	04:44		20:39 (6)
	16:18	17:15	18:09	20:06	21	19:28 (1)	21:00	24	20:03 (2)	21:41	22	21:01 (6)
13	08:23	07:37	06:34	06:20		19:07 (1)	05:17		19:39 (2)	04:44		20:38 (6)
	16:19	17:17	18:11	20:08	20	19:27 (1)	21:02	23	20:02 (2)	21:41	22	21:00 (6)
14	08:22	07:35	06:32	06:17		19:08 (1)	05:15		19:40 (2)	04:43		20:38 (6)
	16:21	17:19	18:13	20:10	18	19:26 (1)	21:03	21	20:01 (2)	21:42	23	21:01 (6)
15	08:21	07:33	06:29	06:15		19:09 (1)	05:14		19:41 (2)	04:43		20:38 (6)
	16:22	17:21	18:15	20:12	16	19:25 (1)	21:05	19	20:00 (2)	21:43	23	21:01 (6)
16	08:20	07:31	06:27	06:13		19:10 (1)	05:12		19:42 (2)	04:43		20:39 (6)
	16:24	17:23	18:17	20:13	13	19:23 (1)	21:07	17	19:59 (2)	21:43	23	21:02 (6)
17	08:19	07:29	06:25	06:10		19:12 (1)	05:10		19:43 (2)	04:43		20:39 (6)
	16:26	17:25	18:19	20:15	7	19:19 (1)	21:08	15	19:58 (2)	21:44	23	21:02 (6)
18	08:18	07:27	06:22	06:08			05:09		19:45 (2)	04:43		20:39 (6)
	16:27	17:27	18:20	20:17			21:10	11	19:56 (2)	21:44	23	21:02 (6)
19	08:17	07:25	06:20	06:06			05:07		19:48 (2)	04:43		20:39 (6)
	16:29	17:29	18:22	20:19			21:11	5	19:53 (2)	21:44	23	21:02 (6)
20	08:16	07:22	06:17	06:03			05:06			04:43		20:39 (6)
	16:31	17:31	18:24	20:21			21:13			21:45	23	21:02 (6)
21	08:15	07:20	06:15	06:01			05:04			04:43		20:39 (6)
	16:33	17:33	18:26	20:23			21:15			21:45	23	21:02 (6)
22	08:14	07:18	06:12	05:59			05:03			04:43		20:40 (6)
	16:35	17:35	18:28	20:24			21:16			21:45	23	21:03 (6)
23	08:12	07:16	06:10	05:57			05:01			04:43		20:40 (6)
	16:36	17:37	18:30	20:26			21:18			21:45	23	21:03 (6)
24	08:11	07:14	06:08	05:55			05:00			04:44		20:40 (6)
	16:38	17:39	18:32	20:28			21:19			21:45	23	21:03 (6)
25	08:10	07:11	06:05	05:52			04:59			04:44		20:41 (6)
	16:40	17:41	18:33	20:30			21:21			21:45	23	21:04 (6)
26	08:08	07:09	06:03	05:50		19:47 (2)	04:58			04:44		20:41 (6)
	16:42	17:43	18:35	20:32	10	19:57 (2)	21:22			21:45	23	21:04 (6)
27	08:07	07:07	06:00	05:48		19:44 (2)	04:56			04:45		20:41 (6)
	16:44	17:45	18:37	20:33	15	19:59 (2)	21:23			21:45	23	21:04 (6)
28	08:05	07:05	05:58	05:46		19:42 (2)	04:55			04:45		20:41 (6)
	16:46	17:47	18:39	20:35	19	20:01 (2)	21:25			21:45	23	21:04 (6)
29	08:04		06:55	05:44		19:41 (2)	04:54			04:46		20:42 (6)
	16:48		19:41	20:37	21	20:02 (2)	21:26			21:45	22	21:04 (6)
30	08:02		06:53	05:42		19:40 (2)	04:53			04:47		20:42 (6)
	16:50		19:42	20:39	23	20:03 (2)	21:27			21:45	22	21:04 (6)
31	08:01		06:51				04:52		20:44 (6)			
	16:52		19:44				21:29	6	20:50 (6)			
Sonnenscheinstunden	252	274	367	419			492			508		
astr.max.mögl.Beschattung					328			432			621	
Red.Sonnenscheinwahrsch.					0.41			0.51			0.45	
Reduktion Betriebsdauer					0.91			0.91			0.91	
Reduktion Windrichtung					0.68			0.66			0.63	
Gesamte Reduktion					0.25			0.31			0.26	
Met.wahrsch.Beschattung					84			134			164	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CU - IO99

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober	November	Dezember
1	04:47	20:43 (6)	05:26	19:49 (2)	06:20	19:06 (1)	07:12	07:10	08:04
	21:45	21:04 (6)	21:10	20:13 (2)	20:04	19:27 (1)	18:51	16:42	15:58
2	04:48	20:43 (6)	05:28	19:48 (2)	06:22	19:06 (1)	07:14	07:12	08:05
	21:44	21:04 (6)	21:08	20:13 (2)	20:02	19:27 (1)	18:49	16:40	15:57
3	04:49	20:43 (6)	05:30	19:48 (2)	06:23	19:05 (1)	07:16	07:14	08:07
	21:44	21:04 (6)	21:06	20:14 (2)	20:00	19:26 (1)	18:47	16:38	15:57
4	04:50	20:44 (6)	05:31	19:47 (2)	06:25	19:05 (1)	07:18	07:15	08:08
	21:43	21:04 (6)	21:05	20:14 (2)	19:57	19:26 (1)	18:44	16:36	15:56
5	04:50	20:44 (6)	05:33	19:47 (2)	06:27	19:06 (1)	07:19	07:17	08:10
	21:43	21:04 (6)	21:03	20:14 (2)	19:55	19:25 (1)	18:42	16:34	15:55
6	04:51	20:45 (6)	05:35	19:46 (2)	06:29	19:06 (1)	07:21	07:19	08:11
	21:42	21:04 (6)	21:01	20:14 (2)	19:52	19:23 (1)	18:39	16:32	15:55
7	04:52	20:46 (6)	05:36	19:46 (2)	06:30	19:07 (1)	07:23	07:21	08:12
	21:41	21:04 (6)	20:59	20:14 (2)	19:50	19:22 (1)	18:37	16:30	15:54
8	04:53	20:47 (6)	05:38	19:47 (2)	06:32	19:09 (1)	07:25	07:23	08:14
	21:41	21:03 (6)	20:57	20:14 (2)	19:48	19:20 (1)	18:35	16:28	15:54
9	04:54	20:48 (6)	05:40	19:46 (2)	06:34		07:27	07:25	08:15
	21:40	21:03 (6)	20:55	20:13 (2)	19:45		18:32	16:27	15:54
10	04:55	20:49 (6)	05:42	19:47 (2)	06:36		07:28	07:27	08:16
	21:39	21:02 (6)	20:53	20:13 (2)	19:43		18:30	16:25	15:53
11	04:56	20:50 (6)	05:43	19:47 (2)	06:37		07:30	07:29	08:17
	21:38	21:01 (6)	20:51	20:12 (2)	19:40		18:27	16:23	15:53
12	04:58	20:51 (6)	05:45	19:47 (2)	06:39		07:32	07:31	08:18
	21:37	21:00 (6)	20:49	20:11 (2)	19:38		18:25	16:22	15:53
13	04:59	20:54 (6)	05:47	19:48 (2)	06:41		07:34	07:33	08:19
	21:37	20:57 (6)	20:47	20:11 (2)	19:35		18:23	16:20	15:53
14	05:00		05:48	19:49 (2)	06:42		07:36	07:34	08:20
	21:36		20:45	20:09 (2)	19:33		18:20	16:18	15:53
15	05:01		05:50	19:50 (2)	06:44		07:38	07:36	08:21
	21:34		20:43	20:08 (2)	19:30		18:18	16:17	15:53
16	05:03		05:52	19:52 (2)	06:46		07:39	07:38	08:22
	21:33		20:40	20:06 (2)	19:28		18:16	16:15	15:53
17	05:04		05:54	19:54 (2)	06:48		07:41	07:40	08:23
	21:32		20:38	20:03 (2)	19:26		18:14	16:14	15:53
18	05:05		05:55		06:49		07:43	07:42	08:24
	21:31		20:36		19:23		18:11	16:12	15:53
19	05:07		05:57		06:51		07:45	07:44	08:25
	21:30		20:34		19:21		18:09	16:11	15:54
20	05:08		05:59		06:53		07:47	07:45	08:25
	21:28		20:32		19:18		18:07	16:10	15:54
21	05:09		06:01		06:55		07:49	07:47	08:26
	21:27		20:30		19:16		18:05	16:08	15:54
22	05:11		06:02		06:56		07:51	07:49	08:26
	21:26		20:27		19:13		18:02	16:07	15:55
23	05:12		06:04		06:58		07:53	07:51	08:27
	21:24		20:25		19:11		18:00	16:06	15:55
24	05:14		06:06		07:00		07:54	07:52	08:27
	21:23		20:23		19:08		17:58	16:05	15:56
25	05:15	19:56 (2)	06:08		07:02		06:56	07:54	08:28
	21:21	20:05 (2)	20:21		19:06		16:56	16:04	15:57
26	05:17	19:55 (2)	06:09	19:14 (1)	07:03		06:58	07:56	08:28
	21:20	20:08 (2)	20:18	19:23 (1)	19:04		16:54	16:03	15:57
27	05:18	19:53 (2)	06:11	19:12 (1)	07:05		07:00	07:58	08:28
	21:18	20:09 (2)	20:16	19:25 (1)	19:01		16:52	16:02	15:58
28	05:20	19:52 (2)	06:13	19:09 (1)	07:07		07:02	07:59	08:28
	21:17	20:10 (2)	20:14	19:26 (1)	18:59		16:50	16:01	15:59
29	05:22	19:51 (2)	06:15	19:08 (1)	07:09		07:04	08:01	08:29
	21:15	20:11 (2)	20:11	19:27 (1)	18:56		16:48	16:00	16:00
30	05:23	19:50 (2)	06:16	19:08 (1)	07:11		07:06	08:02	08:29
	21:13	20:12 (2)	20:09	19:27 (1)	18:54		16:46	15:59	16:01
31	05:25	19:49 (2)	06:18	19:06 (1)			07:08		08:29
	21:12	20:12 (2)	20:07	19:27 (1)			16:44		16:02
Sonnenscheinstunden	510		459	382			329	260	235
astr.max.mögl.Beschattung	328		496	146					
Red.Sonnenscheinwahrsch.	0.45		0.49	0.40					
Reduktion Betriebsdauer	0.91		0.91	0.91					
Reduktion Windrichtung	0.65		0.67	0.68					
Gesamte Reduktion	0.26		0.30	0.25					
Met.wahrsch.Beschattung	86		147	37					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CV - IO100

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März		April			Mai			Juni		
1	08:29	07:59		07:02	06:48				05:40		19:38 (2)	04:51		20:40 (6)
	16:03	16:54		17:49	19:46				20:41	25	20:03 (2)	21:30	12	20:52 (6)
2	08:28	07:57		07:00	06:46				05:38		19:38 (2)	04:50		20:40 (6)
	16:04	16:56		17:50	19:48				20:42	25	20:03 (2)	21:31	14	20:54 (6)
3	08:28	07:56		06:58	06:43				05:36		19:37 (2)	04:49		20:39 (6)
	16:05	16:57		17:52	19:50				20:44	26	20:03 (2)	21:32	16	20:55 (6)
4	08:28	07:54		06:55	06:41		19:14 (1)		05:34		19:37 (2)	04:48		20:38 (6)
	16:06	16:59		17:54	19:52	10	19:24 (1)		20:46	26	20:03 (2)	21:33	17	20:55 (6)
5	08:28	07:52		06:53	06:38		19:12 (1)		05:32		19:37 (2)	04:48		20:39 (6)
	16:08	17:01		17:56	19:53	15	19:27 (1)		20:48	27	20:04 (2)	21:34	18	20:57 (6)
6	08:27	07:50		06:51	06:36		19:11 (1)		05:30		19:37 (2)	04:47		20:38 (6)
	16:09	17:03		17:58	19:55	17	19:28 (1)		20:50	27	20:04 (2)	21:35	19	20:57 (6)
7	08:27	07:49		06:48	06:34		19:09 (1)		05:28		19:37 (2)	04:46		20:37 (6)
	16:10	17:05		18:00	19:57	19	19:28 (1)		20:51	27	20:04 (2)	21:36	20	20:57 (6)
8	08:26	07:47		06:46	06:31		19:08 (1)		05:26		19:36 (2)	04:46		20:38 (6)
	16:12	17:07		18:02	19:59	21	19:29 (1)		20:53	27	20:03 (2)	21:37	20	20:58 (6)
9	08:26	07:45		06:44	06:29		19:08 (1)		05:24		19:37 (2)	04:45		20:38 (6)
	16:13	17:09		18:04	20:01	21	19:29 (1)		20:55	27	20:04 (2)	21:38	21	20:59 (6)
10	08:25	07:43		06:41	06:27		19:07 (1)		05:22		19:37 (2)	04:45		20:37 (6)
	16:15	17:11		18:06	20:03	21	19:28 (1)		20:57	26	20:03 (2)	21:39	22	20:59 (6)
11	08:25	07:41		06:39	06:24		19:07 (1)		05:20		19:37 (2)	04:44		20:37 (6)
	16:16	17:13		18:07	20:04	21	19:28 (1)		20:58	25	20:02 (2)	21:40	22	20:59 (6)
12	08:24	07:39		06:37	06:22		19:07 (1)		05:19		19:39 (2)	04:44		20:38 (6)
	16:18	17:15		18:09	20:06	21	19:28 (1)		21:00	23	20:02 (2)	21:41	22	21:00 (6)
13	08:23	07:37		06:34	06:20		19:07 (1)		05:17		19:39 (2)	04:44		20:37 (6)
	16:19	17:17		18:11	20:08	19	19:26 (1)		21:02	22	20:01 (2)	21:41	23	21:00 (6)
14	08:22	07:35		06:32	06:17		19:06 (1)		05:15		19:40 (2)	04:43		20:37 (6)
	16:21	17:19		18:13	20:10	18	19:26 (1)		21:03	21	20:01 (2)	21:42	23	21:00 (6)
15	08:21	07:33		06:29	06:15		19:09 (1)		05:14		19:41 (2)	04:43		20:38 (6)
	16:22	17:21		18:15	20:12	15	19:24 (1)		21:05	18	19:59 (2)	21:43	23	21:01 (6)
16	08:20	07:31		06:27	06:13		19:11 (1)		05:12		19:43 (2)	04:43		20:38 (6)
	16:24	17:23		18:17	20:13	12	19:23 (1)		21:07	15	19:58 (2)	21:43	23	21:01 (6)
17	08:19	07:29		06:25	06:10		19:12 (1)		05:10		19:44 (2)	04:43		20:38 (6)
	16:26	17:25		18:19	20:15	7	19:19 (1)		21:08	12	19:56 (2)	21:44	23	21:01 (6)
18	08:18	07:27		06:22	06:08				05:09		19:46 (2)	04:43		20:38 (6)
	16:27	17:27		18:20	20:17				21:10	9	19:55 (2)	21:44	24	21:02 (6)
19	08:17	07:25		06:20	06:06				05:07			04:43		20:38 (6)
	16:29	17:29		18:22	20:19				21:11			21:44	24	21:02 (6)
20	08:16	07:22		06:17	06:03				05:06			04:43		20:38 (6)
	16:31	17:31		18:24	20:21				21:13			21:45	24	21:02 (6)
21	08:15	07:20		06:15	06:01				05:04			04:43		20:38 (6)
	16:33	17:33		18:26	20:23				21:15			21:45	24	21:02 (6)
22	08:14	07:18		06:12	05:59				05:03			04:43		20:39 (6)
	16:35	17:35		18:28	20:24				21:16			21:45	24	21:03 (6)
23	08:12	07:16		06:10	05:57				05:01			04:43		20:39 (6)
	16:36	17:37		18:30	20:26				21:18			21:45	24	21:03 (6)
24	08:11	07:14		06:08	05:55				05:00			04:44		20:39 (6)
	16:38	17:39		18:32	20:28				21:19			21:45	24	21:03 (6)
25	08:10	07:11		06:05	05:52				04:59			04:44		20:40 (6)
	16:40	17:41		18:33	20:30				21:21			21:45	23	21:03 (6)
26	08:08	07:09		06:03	05:50		19:46 (2)		04:58			04:44		20:40 (6)
	16:42	17:43		18:35	20:32	11	19:57 (2)		21:22			21:45	23	21:03 (6)
27	08:07	07:07		06:00	05:48		19:43 (2)		04:56			04:45		20:41 (6)
	16:44	17:45		18:37	20:33	16	19:59 (2)		21:23			21:45	23	21:04 (6)
28	08:05	07:05		05:58	05:46		19:42 (2)		04:55			04:45		20:40 (6)
	16:46	17:47		18:39	20:35	19	20:01 (2)		21:25			21:45	23	21:03 (6)
29	08:04			06:55	05:44		19:40 (2)		04:54			04:46		20:41 (6)
	16:48			19:41	20:37	22	20:02 (2)		21:26			21:45	23	21:04 (6)
30	08:02			06:53	05:42		19:39 (2)		04:53		20:44 (6)	04:47		20:41 (6)
	16:50			19:42	20:39	23	20:02 (2)		21:27	5	20:49 (6)	21:45	22	21:03 (6)
31	08:01			06:51					04:52		20:42 (6)			
	16:52			19:44					21:29	9	20:51 (6)			
Sonnenscheinstunden		252	274	367	419				492			508		
astr.max.mögl.Beschattung						328				422			643	
Red.Sonnenscheinwahrsch.						0.41				0.51			0.45	
Reduktion Betriebsdauer						0.91				0.91			0.91	
Reduktion Windrichtung						0.68				0.66			0.64	
Gesamte Reduktion						0.25				0.31			0.26	
Met.wahrsch.Beschattung						84				131			170	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CV - IO100

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober	November	Dezember
1 | 04:47		20:42 (6)	05:26		19:49 (2)	06:20		19:06 (1)	07:12	07:10	08:04
| 21:45	22	21:04 (6)	21:10	24	20:13 (2)	20:04	21	19:27 (1)	18:51	16:42	15:58
2 | 04:48		20:42 (6)	05:28		19:48 (2)	06:22		19:06 (1)	07:14	07:12	08:05
| 21:44	22	21:04 (6)	21:08	25	20:13 (2)	20:02	21	19:27 (1)	18:49	16:40	15:57
3 | 04:49		20:42 (6)	05:30		19:48 (2)	06:23		19:05 (1)	07:16	07:14	08:07
| 21:44	21	21:03 (6)	21:06	25	20:13 (2)	20:00	21	19:26 (1)	18:47	16:38	15:57
4 | 04:50		20:43 (6)	05:31		19:47 (2)	06:25		19:05 (1)	07:18	07:15	08:08
| 21:43	20	21:03 (6)	21:05	26	20:13 (2)	19:57	21	19:26 (1)	18:44	16:36	15:56
5 | 04:50		20:43 (6)	05:33		19:47 (2)	06:27		19:06 (1)	07:19	07:17	08:10
| 21:43	20	21:03 (6)	21:03	27	20:14 (2)	19:55	19	19:25 (1)	18:42	16:34	15:55
6 | 04:51		20:44 (6)	05:35		19:46 (2)	06:29		19:06 (1)	07:21	07:19	08:11
| 21:42	19	21:03 (6)	21:01	27	20:13 (2)	19:52	17	19:23 (1)	18:39	16:32	15:55
7 | 04:52		20:45 (6)	05:36		19:46 (2)	06:30		19:07 (1)	07:23	07:21	08:12
| 21:41	18	21:03 (6)	20:59	27	20:13 (2)	19:50	15	19:22 (1)	18:37	16:30	15:54
8 | 04:53		20:45 (6)	05:38		19:47 (2)	06:32		19:09 (1)	07:25	07:23	08:14
| 21:41	18	21:03 (6)	20:57	27	20:14 (2)	19:48	11	19:20 (1)	18:35	16:28	15:54
9 | 04:54		20:46 (6)	05:40		19:46 (2)	06:34			07:27	07:25	08:15
| 21:40	17	21:03 (6)	20:55	27	20:13 (2)	19:45			18:32	16:27	15:54
10 | 04:55		20:47 (6)	05:42		19:47 (2)	06:36			07:28	07:27	08:16
| 21:39	15	21:02 (6)	20:53	26	20:13 (2)	19:43			18:30	16:25	15:53
11 | 04:56		20:48 (6)	05:43		19:46 (2)	06:37			07:30	07:29	08:17
| 21:38	13	21:01 (6)	20:51	26	20:12 (2)	19:40			18:27	16:23	15:53
12 | 04:58		20:49 (6)	05:45		19:47 (2)	06:39			07:32	07:31	08:18
| 21:37	11	21:00 (6)	20:49	24	20:11 (2)	19:38			18:25	16:22	15:53
13 | 04:59		20:51 (6)	05:47		19:48 (2)	06:41			07:34	07:33	08:19
| 21:37	8	20:59 (6)	20:47	23	20:11 (2)	19:35			18:23	16:20	15:53
14 | 05:00			05:48		19:48 (2)	06:42			07:36	07:34	08:20
| 21:36			20:45	21	20:09 (2)	19:33			18:20	16:18	15:53
15 | 05:01			05:50		19:50 (2)	06:44			07:38	07:36	08:21
| 21:34			20:43	18	20:08 (2)	19:30			18:18	16:17	15:53
16 | 05:03			05:52		19:51 (2)	06:46			07:39	07:38	08:22
| 21:33			20:40	15	20:06 (2)	19:28			18:16	16:15	15:53
17 | 05:04			05:54		19:53 (2)	06:48			07:41	07:40	08:23
| 21:32			20:38	10	20:03 (2)	19:26			18:14	16:14	15:53
18 | 05:05			05:55			06:49			07:43	07:42	08:24
| 21:31			20:36			19:23			18:11	16:12	15:53
19 | 05:07			05:57			06:51			07:45	07:44	08:25
| 21:30			20:34			19:21			18:09	16:11	15:54
20 | 05:08			05:59			06:53			07:47	07:45	08:25
| 21:28			20:32			19:18			18:07	16:10	15:54
21 | 05:09			06:01			06:55			07:49	07:47	08:26
| 21:27			20:30			19:16			18:05	16:08	15:54
22 | 05:11			06:02			06:56			07:51	07:49	08:26
| 21:26			20:27			19:13			18:02	16:07	15:55
23 | 05:12			06:04			06:58			07:53	07:51	08:27
| 21:24			20:25			19:11			18:00	16:06	15:55
24 | 05:14			06:06			07:00			07:54	07:52	08:27
| 21:23			20:23			19:08			17:58	16:05	15:56
25 | 05:15		19:58 (2)	06:08			07:02			06:56	07:54	08:28
| 21:21	4	20:02 (2)	20:21			19:06			16:56	16:04	15:57
26 | 05:17		19:55 (2)	06:09		19:15 (1)	07:03			06:58	07:56	08:28
| 21:20	11	20:06 (2)	20:18	7	19:22 (1)	19:04			16:54	16:03	15:57
27 | 05:18		19:53 (2)	06:11		19:12 (1)	07:05			07:00	07:58	08:28
| 21:18	15	20:08 (2)	20:16	13	19:25 (1)	19:01			16:52	16:02	15:58
28 | 05:20		19:52 (2)	06:13		19:10 (1)	07:07			07:02	07:59	08:28
| 21:17	17	20:09 (2)	20:14	15	19:25 (1)	18:59			16:50	16:01	15:59
29 | 05:22		19:51 (2)	06:15		19:09 (1)	07:09			07:04	08:01	08:29
| 21:15	19	20:10 (2)	20:11	18	19:27 (1)	18:56			16:48	16:00	16:00
30 | 05:23		19:50 (2)	06:16		19:08 (1)	07:11			07:06	08:02	08:29
| 21:13	21	20:11 (2)	20:09	19	19:27 (1)	18:54			16:46	15:59	16:01
31 | 05:25		19:49 (2)	06:18		19:06 (1)				07:08		08:29
| 21:12	23	20:12 (2)	20:07	21	19:27 (1)				16:44		16:02
Sonnenscheinstunden	510		459			382			329	260	235
astr.max.mögl.Beschattung		334		491			146				
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40				
Reduktion Betriebsdauer		0.91		0.91			0.91				
Reduktion Windrichtung		0.65		0.67			0.68				
Gesamte Reduktion		0.26		0.30			0.25				
Met.wahrsch.Beschattung		88		146			37				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)	
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)	

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CW - IO101

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40		19:37 (2)	04:51		20:36 (6)
	16:03		16:54		17:49		19:46			20:41	25	20:02 (2)	21:30	16	20:52 (6)
2	08:28		07:57		07:00		06:46			05:38		19:36 (2)	04:50		20:36 (6)
	16:04		16:56		17:50		19:48			20:42	26	20:02 (2)	21:31	18	20:54 (6)
3	08:28		07:56		06:58		06:43		19:17 (1)	05:36		19:35 (2)	04:49		20:35 (6)
	16:05		16:57		17:52		19:50	5	19:22 (1)	20:44	27	20:02 (2)	21:32	19	20:54 (6)
4	08:28		07:54		06:55		06:41		19:13 (1)	05:34		19:35 (2)	04:48		20:35 (6)
	16:06		16:59		17:54		19:52	12	19:25 (1)	20:46	27	20:02 (2)	21:33	19	20:54 (6)
5	08:28		07:52		06:53		06:38		19:11 (1)	05:32		19:36 (2)	04:48		20:35 (6)
	16:08		17:01		17:56		19:53	15	19:26 (1)	20:48	27	20:03 (2)	21:34	21	20:56 (6)
6	08:27		07:50		06:51		06:36		19:10 (1)	05:30		19:36 (2)	04:47		20:34 (6)
	16:09		17:03		17:58		19:55	18	19:28 (1)	20:50	26	20:02 (2)	21:35	22	20:56 (6)
7	08:27		07:49		06:48		06:34		19:08 (1)	05:28		19:36 (2)	04:46		20:34 (6)
	16:10		17:05		18:00		19:57	20	19:28 (1)	20:51	26	20:02 (2)	21:36	22	20:56 (6)
8	08:26		07:47		06:46		06:31		19:08 (1)	05:26		19:36 (2)	04:46		20:34 (6)
	16:12		17:07		18:02		19:59	20	19:28 (1)	20:53	25	20:01 (2)	21:37	23	20:57 (6)
9	08:26		07:45		06:44		06:29		19:08 (1)	05:24		19:37 (2)	04:45		20:35 (6)
	16:13		17:09		18:04		20:01	20	19:28 (1)	20:55	24	20:01 (2)	21:38	22	20:57 (6)
10	08:25		07:43		06:41		06:27		19:07 (1)	05:22		19:37 (2)	04:45		20:34 (6)
	16:15		17:11		18:06		20:03	20	19:27 (1)	20:57	23	20:00 (2)	21:39	23	20:57 (6)
11	08:25		07:41		06:39		06:24		19:07 (1)	05:20		19:37 (2)	04:44		20:34 (6)
	16:16		17:13		18:07		20:04	20	19:27 (1)	20:58	22	19:59 (2)	21:40	24	20:58 (6)
12	08:24		07:39		06:37		06:22		19:07 (1)	05:19		19:38 (2)	04:44		20:35 (6)
	16:18		17:15		18:09		20:06	20	19:27 (1)	21:00	21	19:59 (2)	21:41	23	20:58 (6)
13	08:23		07:37		06:34		06:20		19:07 (1)	05:17		19:39 (2)	04:44		20:34 (6)
	16:19		17:17		18:11		20:08	18	19:25 (1)	21:02	19	19:58 (2)	21:41	24	20:58 (6)
14	08:22		07:35		06:32		06:17		19:08 (1)	05:15		19:41 (2)	04:43		20:34 (6)
	16:21		17:19		18:13		20:10	16	19:24 (1)	21:03	16	19:57 (2)	21:42	24	20:58 (6)
15	08:21		07:33		06:29		06:15		19:09 (1)	05:14		19:42 (2)	04:43		20:35 (6)
	16:22		17:21		18:15		20:12	14	19:23 (1)	21:05	13	19:55 (2)	21:43	24	20:59 (6)
16	08:20		07:31		06:27		06:13		19:11 (1)	05:12		19:44 (2)	04:43		20:35 (6)
	16:24		17:23		18:17		20:13	10	19:21 (1)	21:07	10	19:54 (2)	21:43	24	20:59 (6)
17	08:19		07:29		06:25		06:10			05:10			04:43		20:35 (6)
	16:26		17:25		18:19		20:15			21:08			21:44	24	20:59 (6)
18	08:18		07:27		06:22		06:08			05:09			04:43		20:35 (6)
	16:27		17:27		18:20		20:17			21:10			21:44	25	21:00 (6)
19	08:17		07:25		06:20		06:06			05:07			04:43		20:35 (6)
	16:29		17:29		18:22		20:19			21:11			21:44	25	21:00 (6)
20	08:16		07:22		06:17		06:03			05:06			04:43		20:35 (6)
	16:31		17:31		18:24		20:21			21:13			21:45	25	21:00 (6)
21	08:15		07:20		06:15		06:01			05:04			04:43		20:35 (6)
	16:33		17:33		18:26		20:23			21:15			21:45	25	21:00 (6)
22	08:14		07:18		06:12		05:59			05:03			04:43		20:36 (6)
	16:35		17:35		18:28		20:24			21:16			21:45	25	21:01 (6)
23	08:12		07:16		06:10		05:57			05:01			04:43		20:36 (6)
	16:36		17:37		18:30		20:26			21:18			21:45	25	21:01 (6)
24	08:11		07:14		06:08		05:55			05:00			04:44		20:36 (6)
	16:38		17:39		18:32		20:28			21:19			21:45	25	21:01 (6)
25	08:10		07:11		06:05		05:52		19:45 (2)	04:59			04:44		20:37 (6)
	16:40		17:41		18:33		20:30	10	19:55 (2)	21:21			21:45	25	21:02 (6)
26	08:08		07:09		06:03		05:50		19:42 (2)	04:58			04:44		20:37 (6)
	16:42		17:43		18:35		20:32	16	19:58 (2)	21:22			21:45	24	21:01 (6)
27	08:07		07:07		06:00		05:48		19:41 (2)	04:56			04:45		20:38 (6)
	16:44		17:45		18:37		20:33	18	19:59 (2)	21:23			21:45	24	21:02 (6)
28	08:05		07:05		05:58		05:46		19:39 (2)	04:55		20:40 (6)	04:45		20:37 (6)
	16:46		17:47		18:39		20:35	21	20:00 (2)	21:25	7	20:47 (6)	21:45	25	21:02 (6)
29	08:04				06:55		05:44		19:38 (2)	04:54		20:38 (6)	04:46		20:38 (6)
	16:48				19:41		20:37	23	20:01 (2)	21:26	11	20:49 (6)	21:45	24	21:02 (6)
30	08:02				06:53		05:42		19:37 (2)	04:53		20:37 (6)	04:47		20:38 (6)
	16:50				19:42		20:39	24	20:01 (2)	21:27	14	20:51 (6)	21:45	24	21:02 (6)
31	08:01				06:51					04:52		20:36 (6)			
	16:52				19:44					21:29	15	20:51 (6)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung								340			404			693	
Red.Sonnenscheinwahrsch.								0.41			0.51			0.45	
Reduktion Betriebsdauer								0.91			0.91			0.91	
Reduktion Windrichtung								0.68			0.66			0.64	
Gesamte Reduktion								0.25			0.31			0.26	
Met.wahrsch.Beschattung								87			125			183	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CW - IO101

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober	November	Dezember
1	04:47		20:39 (6)	05:26		19:49 (2)	06:20	19:06 (1)	07:12	07:10	08:04
	21:45	23	21:02 (6)	21:10	21	20:10 (2)	20:04	20	19:26 (1)	18:51	16:42	15:58
2	04:48		20:39 (6)	05:28		19:47 (2)	06:22		19:06 (1)	07:14	07:12	08:05
	21:44	23	21:02 (6)	21:08	23	20:10 (2)	20:02	20	19:26 (1)	18:49	16:40	15:57
3	04:49		20:39 (6)	05:30		19:47 (2)	06:23		19:05 (1)	07:16	07:14	08:07
	21:44	23	21:02 (6)	21:06	24	20:11 (2)	20:00	20	19:25 (1)	18:47	16:38	15:57
4	04:50		20:39 (6)	05:31		19:46 (2)	06:25		19:05 (1)	07:18	07:15	08:08
	21:43	23	21:02 (6)	21:05	25	20:11 (2)	19:57	20	19:25 (1)	18:44	16:36	15:56
5	04:50		20:40 (6)	05:33		19:46 (2)	06:27		19:05 (1)	07:19	07:17	08:10
	21:43	22	21:02 (6)	21:03	26	20:12 (2)	19:55	20	19:25 (1)	18:42	16:34	15:55
6	04:51		20:41 (6)	05:35		19:45 (2)	06:29		19:05 (1)	07:21	07:19	08:11
	21:42	21	21:02 (6)	21:01	26	20:11 (2)	19:52	18	19:23 (1)	18:39	16:32	15:55
7	04:52		20:41 (6)	05:36		19:45 (2)	06:30		19:06 (1)	07:23	07:21	08:12
	21:41	21	21:02 (6)	20:59	27	20:12 (2)	19:50	16	19:22 (1)	18:37	16:30	15:54
8	04:53		20:42 (6)	05:38		19:45 (2)	06:32		19:08 (1)	07:25	07:23	08:14
	21:41	20	21:02 (6)	20:57	27	20:12 (2)	19:48	12	19:20 (1)	18:35	16:28	15:54
9	04:54		20:42 (6)	05:40		19:45 (2)	06:34		19:10 (1)	07:27	07:25	08:15
	21:40	20	21:02 (6)	20:55	26	20:11 (2)	19:45	6	19:16 (1)	18:32	16:27	15:54
10	04:55		20:43 (6)	05:42		19:45 (2)	06:36			07:28	07:27	08:16
	21:39	18	21:01 (6)	20:53	26	20:11 (2)	19:43			18:30	16:25	15:53
11	04:56		20:44 (6)	05:43		19:45 (2)	06:37			07:30	07:29	08:17
	21:38	17	21:01 (6)	20:51	25	20:10 (2)	19:40			18:27	16:23	15:53
12	04:58		20:44 (6)	05:45		19:45 (2)	06:39			07:32	07:31	08:18
	21:37	16	21:00 (6)	20:49	25	20:10 (2)	19:38			18:25	16:22	15:53
13	04:59		20:45 (6)	05:47		19:46 (2)	06:41			07:34	07:33	08:19
	21:37	15	21:00 (6)	20:47	24	20:10 (2)	19:35			18:23	16:20	15:53
14	05:00		20:46 (6)	05:48		19:46 (2)	06:42			07:36	07:34	08:20
	21:36	12	20:58 (6)	20:45	22	20:08 (2)	19:33			18:20	16:18	15:53
15	05:01		20:48 (6)	05:50		19:47 (2)	06:44			07:38	07:36	08:21
	21:34	9	20:57 (6)	20:43	20	20:07 (2)	19:30			18:18	16:17	15:53
16	05:03		20:50 (6)	05:52		19:48 (2)	06:46			07:39	07:38	08:22
	21:33	4	20:54 (6)	20:40	18	20:06 (2)	19:28			18:16	16:15	15:53
17	05:04			05:54		19:49 (2)	06:48			07:41	07:40	08:23
	21:32			20:38	15	20:04 (2)	19:26			18:14	16:14	15:53
18	05:05			05:55		19:52 (2)	06:49			07:43	07:42	08:24
	21:31			20:36	9	20:01 (2)	19:23			18:11	16:12	15:53
19	05:07			05:57			06:51			07:45	07:44	08:25
	21:30			20:34			19:21			18:09	16:11	15:54
20	05:08			05:59			06:53			07:47	07:45	08:25
	21:28			20:32			19:18			18:07	16:10	15:54
21	05:09			06:01			06:55			07:49	07:47	08:26
	21:27			20:30			19:16			18:05	16:08	15:54
22	05:11			06:02			06:56			07:51	07:49	08:26
	21:26			20:27			19:13			18:02	16:07	15:55
23	05:12			06:04			06:58			07:53	07:51	08:27
	21:24			20:25			19:11			18:00	16:06	15:55
24	05:14			06:06			07:00			07:54	07:52	08:27
	21:23			20:23			19:08			17:58	16:05	15:56
25	05:15			06:08			07:02			06:56	07:54	08:28
	21:21			20:21			19:06			16:56	16:04	15:57
26	05:17			06:09			07:03			06:58	07:56	08:28
	21:20			20:18			19:04			16:54	16:03	15:57
27	05:18		19:56 (2)	06:11		19:13 (1)	07:05			07:00	07:58	08:28
	21:18	6	20:02 (2)	20:16	10	19:23 (1)	19:01			16:52	16:02	15:58
28	05:20		19:54 (2)	06:13		19:10 (1)	07:07			07:02	07:59	08:28
	21:17	11	20:05 (2)	20:14	14	19:24 (1)	18:59			16:50	16:01	15:59
29	05:22		19:51 (2)	06:15		19:09 (1)	07:09			07:04	08:01	08:29
	21:15	15	20:06 (2)	20:11	16	19:25 (1)	18:56			16:48	16:00	16:00
30	05:23		19:51 (2)	06:16		19:08 (1)	07:11			07:06	08:02	08:29
	21:13	17	20:08 (2)	20:09	18	19:26 (1)	18:54			16:46	15:59	16:01
31	05:25		19:49 (2)	06:18		19:06 (1)				07:08		08:29
	21:12	20	20:09 (2)	20:07	20	19:26 (1)				16:44		16:02
Sonnenscheinstunden	510			459			382			329	260	235
astr.max.mögl.Beschattung		356			487			152				
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40				
Reduktion Betriebsdauer		0.91			0.91			0.91				
Reduktion Windrichtung		0.64			0.67			0.68				
Gesamte Reduktion		0.26			0.30			0.25				
Met.wahrsch.Beschattung		93			144			38				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CX - IO102

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40		19:36 (2)	04:51		20:34 (6)
	16:03		16:54		17:49		19:46			20:41	25	20:01 (2)	21:30	18	20:52 (6)
2	08:28		07:57		07:00		06:46			05:38		19:36 (2)	04:50		20:35 (6)
	16:04		16:56		17:50		19:48			20:42	26	20:02 (2)	21:31	19	20:54 (6)
3	08:28		07:56		06:58		06:43		19:17 (1)	05:36		19:35 (2)	04:49		20:34 (6)
	16:05		16:57		17:52		19:50	6	19:23 (1)	20:44	27	20:02 (2)	21:32	20	20:54 (6)
4	08:28		07:54		06:55		06:41		19:13 (1)	05:34		19:35 (2)	04:48		20:34 (6)
	16:06		16:59		17:54		19:52	12	19:25 (1)	20:46	26	20:01 (2)	21:33	20	20:54 (6)
5	08:28		07:52		06:53		06:38		19:11 (1)	05:32		19:36 (2)	04:48		20:34 (6)
	16:08		17:01		17:56		19:53	16	19:27 (1)	20:48	26	20:02 (2)	21:34	21	20:55 (6)
6	08:27		07:50		06:51		06:36		19:10 (1)	05:30		19:36 (2)	04:47		20:33 (6)
	16:09		17:03		17:58		19:55	18	19:28 (1)	20:50	26	20:02 (2)	21:35	22	20:55 (6)
7	08:27		07:49		06:48		06:34		19:08 (1)	05:28		19:36 (2)	04:46		20:33 (6)
	16:10		17:05		18:00		19:57	20	19:28 (1)	20:51	25	20:01 (2)	21:36	22	20:55 (6)
8	08:26		07:47		06:46		06:31		19:08 (1)	05:26		19:36 (2)	04:46		20:33 (6)
	16:12		17:07		18:02		19:59	20	19:28 (1)	20:53	25	20:01 (2)	21:37	23	20:56 (6)
9	08:26		07:45		06:44		06:29		19:08 (1)	05:24		19:37 (2)	04:45		20:34 (6)
	16:13		17:09		18:04		20:01	20	19:28 (1)	20:55	24	20:01 (2)	21:38	23	20:57 (6)
10	08:25		07:43		06:41		06:27		19:07 (1)	05:22		19:37 (2)	04:45		20:33 (6)
	16:15		17:11		18:06		20:03	20	19:27 (1)	20:57	23	20:00 (2)	21:39	24	20:57 (6)
11	08:25		07:41		06:39		06:24		19:07 (1)	05:20		19:37 (2)	04:44		20:34 (6)
	16:16		17:13		18:07		20:04	20	19:27 (1)	20:58	22	19:59 (2)	21:40	23	20:57 (6)
12	08:24		07:39		06:37		06:22		19:07 (1)	05:19		19:39 (2)	04:44		20:34 (6)
	16:18		17:15		18:09		20:06	20	19:27 (1)	21:00	19	19:58 (2)	21:41	24	20:58 (6)
13	08:23		07:37		06:34		06:20		19:07 (1)	05:17		19:39 (2)	04:44		20:33 (6)
	16:19		17:17		18:11		20:08	18	19:25 (1)	21:02	18	19:57 (2)	21:41	24	20:57 (6)
14	08:22		07:35		06:32		06:17		19:08 (1)	05:15		19:41 (2)	04:43		20:34 (6)
	16:21		17:19		18:13		20:10	16	19:24 (1)	21:03	15	19:56 (2)	21:42	24	20:58 (6)
15	08:21		07:33		06:29		06:15		19:10 (1)	05:14		19:42 (2)	04:43		20:34 (6)
	16:22		17:21		18:15		20:12	13	19:23 (1)	21:05	12	19:54 (2)	21:43	24	20:58 (6)
16	08:20		07:31		06:27		06:13		19:12 (1)	05:12		19:46 (2)	04:43		20:34 (6)
	16:24		17:23		18:17		20:13	8	19:20 (1)	21:07	6	19:52 (2)	21:43	25	20:59 (6)
17	08:19		07:29		06:25		06:10			05:10			04:43		20:34 (6)
	16:26		17:25		18:19		20:15			21:08			21:44	25	20:59 (6)
18	08:18		07:27		06:22		06:08			05:09			04:43		20:34 (6)
	16:27		17:27		18:20		20:17			21:10			21:44	25	20:59 (6)
19	08:17		07:25		06:20		06:06			05:07			04:43		20:35 (6)
	16:29		17:29		18:22		20:19			21:11			21:44	24	20:59 (6)
20	08:16		07:22		06:17		06:03			05:06			04:43		20:35 (6)
	16:31		17:31		18:24		20:21			21:13			21:45	24	20:59 (6)
21	08:15		07:20		06:15		06:01			05:04			04:43		20:35 (6)
	16:33		17:33		18:26		20:23			21:15			21:45	24	20:59 (6)
22	08:14		07:18		06:12		05:59			05:03			04:43		20:36 (6)
	16:35		17:35		18:28		20:24			21:16			21:45	24	21:00 (6)
23	08:12		07:16		06:10		05:57			05:01			04:43		20:36 (6)
	16:36		17:37		18:30		20:26			21:18			21:45	24	21:00 (6)
24	08:11		07:14		06:08		05:55		19:49 (2)	05:00			04:44		20:35 (6)
	16:38		17:39		18:32		20:28	2	19:51 (2)	21:19			21:45	25	21:00 (6)
25	08:10		07:11		06:05		05:52		19:44 (2)	04:59			04:44		20:36 (6)
	16:40		17:41		18:33		20:30	12	19:56 (2)	21:21			21:45	25	21:01 (6)
26	08:08		07:09		06:03		05:50		19:42 (2)	04:58			04:44		20:36 (6)
	16:42		17:43		18:35		20:32	16	19:58 (2)	21:22			21:45	25	21:01 (6)
27	08:07		07:07		06:00		05:48		19:40 (2)	04:56		20:40 (6)	04:45		20:37 (6)
	16:44		17:45		18:37		20:33	19	19:59 (2)	21:23	6	20:46 (6)	21:45	24	21:01 (6)
28	08:05		07:05		05:58		05:46		19:39 (2)	04:55		20:38 (6)	04:45		20:37 (6)
	16:46		17:47		18:39		20:35	21	20:00 (2)	21:25	10	20:48 (6)	21:45	24	21:01 (6)
29	08:04				06:55		05:44		19:38 (2)	04:54		20:37 (6)	04:46		20:37 (6)
	16:48				19:41		20:37	23	20:01 (2)	21:26	13	20:50 (6)	21:45	25	21:02 (6)
30	08:02				06:53		05:42		19:37 (2)	04:53		20:36 (6)	04:47		20:37 (6)
	16:50				19:42		20:39	24	20:01 (2)	21:27	15	20:51 (6)	21:45	24	21:01 (6)
31	08:01				06:51					04:52		20:35 (6)			
	16:52				19:44					21:29	16	20:51 (6)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung								344				405			698
Red.Sonnenscheinwahrsch.								0.41				0.51			0.45
Reduktion Betriebsdauer								0.91				0.91			0.91
Reduktion Windrichtung								0.68				0.66			0.64
Gesamte Reduktion								0.25				0.31			0.26
Met.wahrsch.Beschattung								88				125			185

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CX - IO102

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober	November	Dezember
1	04:47		20:38 (6)	05:26		19:49 (2)	06:20	19:06 (1)	07:12	07:10	08:04
	21:45	24	21:02 (6)	21:10	20	20:09 (2)	20:04	20	19:26 (1)	18:51	16:42	15:58
2	04:48		20:38 (6)	05:28		19:47 (2)	06:22		19:06 (1)	07:14	07:12	08:05
	21:44	24	21:02 (6)	21:08	22	20:09 (2)	20:02	20	19:26 (1)	18:49	16:40	15:57
3	04:49		20:38 (6)	05:30		19:47 (2)	06:23		19:05 (1)	07:16	07:14	08:07
	21:44	23	21:01 (6)	21:06	23	20:10 (2)	20:00	20	19:25 (1)	18:47	16:38	15:57
4	04:50		20:39 (6)	05:31		19:46 (2)	06:25		19:05 (1)	07:18	07:15	08:08
	21:43	22	21:01 (6)	21:05	24	20:10 (2)	19:57	20	19:25 (1)	18:44	16:36	15:56
5	04:50		20:39 (6)	05:33		19:46 (2)	06:27		19:05 (1)	07:19	07:17	08:10
	21:43	23	21:02 (6)	21:03	25	20:11 (2)	19:55	20	19:25 (1)	18:42	16:34	15:55
6	04:51		20:40 (6)	05:35		19:45 (2)	06:29		19:05 (1)	07:21	07:19	08:11
	21:42	22	21:02 (6)	21:01	26	20:11 (2)	19:52	18	19:23 (1)	18:39	16:32	15:55
7	04:52		20:40 (6)	05:36		19:45 (2)	06:30		19:06 (1)	07:23	07:21	08:12
	21:41	22	21:02 (6)	20:59	26	20:11 (2)	19:50	16	19:22 (1)	18:37	16:30	15:54
8	04:53		20:41 (6)	05:38		19:45 (2)	06:32		19:08 (1)	07:25	07:23	08:14
	21:41	21	21:02 (6)	20:57	27	20:12 (2)	19:48	12	19:20 (1)	18:35	16:28	15:54
9	04:54		20:41 (6)	05:40		19:44 (2)	06:34		19:09 (1)	07:27	07:25	08:15
	21:40	20	21:01 (6)	20:55	27	20:11 (2)	19:45	7	19:16 (1)	18:32	16:27	15:54
10	04:55		20:42 (6)	05:42		19:45 (2)	06:36			07:28	07:27	08:16
	21:39	19	21:01 (6)	20:53	26	20:11 (2)	19:43			18:30	16:25	15:53
11	04:56		20:43 (6)	05:43		19:44 (2)	06:37			07:30	07:29	08:17
	21:38	18	21:01 (6)	20:51	26	20:10 (2)	19:40			18:27	16:23	15:53
12	04:58		20:43 (6)	05:45		19:45 (2)	06:39			07:32	07:31	08:18
	21:37	17	21:00 (6)	20:49	25	20:10 (2)	19:38			18:25	16:22	15:53
13	04:59		20:44 (6)	05:47		19:46 (2)	06:41			07:34	07:33	08:19
	21:37	16	21:00 (6)	20:47	24	20:10 (2)	19:35			18:23	16:20	15:53
14	05:00		20:45 (6)	05:48		19:45 (2)	06:42			07:36	07:34	08:20
	21:36	14	20:59 (6)	20:45	23	20:08 (2)	19:33			18:20	16:18	15:53
15	05:01		20:46 (6)	05:50		19:47 (2)	06:44			07:38	07:36	08:21
	21:34	11	20:57 (6)	20:43	20	20:07 (2)	19:30			18:18	16:17	15:53
16	05:03		20:48 (6)	05:52		19:48 (2)	06:46			07:39	07:38	08:22
	21:33	8	20:56 (6)	20:40	18	20:06 (2)	19:28			18:16	16:15	15:53
17	05:04			05:54		19:49 (2)	06:48			07:41	07:40	08:23
	21:32			20:38	15	20:04 (2)	19:26			18:14	16:14	15:53
18	05:05			05:55		19:51 (2)	06:49			07:43	07:42	08:24
	21:31			20:36	11	20:02 (2)	19:23			18:11	16:12	15:53
19	05:07			05:57			06:51			07:45	07:44	08:25
	21:30			20:34			19:21			18:09	16:11	15:54
20	05:08			05:59			06:53			07:47	07:45	08:25
	21:28			20:32			19:18			18:07	16:10	15:54
21	05:09			06:01			06:55			07:49	07:47	08:26
	21:27			20:30			19:16			18:05	16:08	15:54
22	05:11			06:02			06:56			07:51	07:49	08:26
	21:26			20:27			19:13			18:02	16:07	15:55
23	05:12			06:04			06:58			07:53	07:51	08:27
	21:24			20:25			19:11			18:00	16:06	15:55
24	05:14			06:06			07:00			07:54	07:52	08:27
	21:23			20:23			19:08			17:58	16:05	15:56
25	05:15			06:08			07:02			06:56	07:54	08:28
	21:21			20:21			19:06			16:56	16:04	15:57
26	05:17			06:09			07:03			06:58	07:56	08:28
	21:20			20:18			19:04			16:54	16:03	15:57
27	05:18			06:11		19:13 (1)	07:05			07:00	07:58	08:28
	21:18			20:16	9	19:22 (1)	19:01			16:52	16:02	15:58
28	05:20		19:55 (2)	06:13		19:10 (1)	07:07			07:02	07:59	08:28
	21:17	9	20:04 (2)	20:14	14	19:24 (1)	18:59			16:50	16:01	15:59
29	05:22		19:52 (2)	06:15		19:09 (1)	07:09			07:04	08:01	08:29
	21:15	13	20:05 (2)	20:11	16	19:25 (1)	18:56			16:48	16:00	16:00
30	05:23		19:51 (2)	06:16		19:08 (1)	07:11			07:06	08:02	08:29
	21:13	16	20:07 (2)	20:09	18	19:26 (1)	18:54			16:46	15:59	16:01
31	05:25		19:49 (2)	06:18		19:06 (1)				07:08		08:29
	21:12	19	20:08 (2)	20:07	20	19:26 (1)				16:44		16:02
Sonnenscheinstunden	510			459			382			329	260	235
astr.max.mögl.Beschattung		361			485			153				
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40				
Reduktion Betriebsdauer		0.91			0.91			0.91				
Reduktion Windrichtung		0.64			0.67			0.69				
Gesamte Reduktion		0.26			0.30			0.25				
Met.wahrsch.Beschattung		94			144			38				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CY - IO103

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40		19:35 (2)	04:51		20:31 (6)
	16:03		16:54		17:49		19:46			20:41	25	20:00 (2)	21:30	20	20:51 (6)
2	08:28		07:57		07:00		06:46			05:38		19:34 (2)	04:50		20:32 (6)
	16:04		16:56		17:50		19:48			20:42	26	20:00 (2)	21:31	21	20:53 (6)
3	08:28		07:56		06:58		06:43		19:14 (1)	05:36		19:34 (2)	04:49		20:31 (6)
	16:05		16:57		17:52		19:50	9	19:23 (1)	20:44	26	20:00 (2)	21:32	22	20:53 (6)
4	08:28		07:54		06:55		06:41		19:11 (1)	05:34		19:34 (2)	04:48		20:31 (6)
	16:06		16:59		17:54		19:52	14	19:25 (1)	20:46	26	20:00 (2)	21:33	22	20:53 (6)
5	08:28		07:52		06:53		06:38		19:10 (1)	05:32		19:35 (2)	04:48		20:31 (6)
	16:08		17:01		17:56		19:53	16	19:26 (1)	20:48	25	20:00 (2)	21:34	23	20:54 (6)
6	08:27		07:50		06:51		06:36		19:09 (1)	05:30		19:35 (2)	04:47		20:31 (6)
	16:09		17:03		17:58		19:55	18	19:27 (1)	20:50	25	20:00 (2)	21:35	23	20:54 (6)
7	08:27		07:49		06:48		06:34		19:07 (1)	05:28		19:35 (2)	04:46		20:30 (6)
	16:10		17:05		18:00		19:57	20	19:27 (1)	20:51	24	19:59 (2)	21:36	24	20:54 (6)
8	08:26		07:47		06:46		06:31		19:07 (1)	05:26		19:35 (2)	04:46		20:31 (6)
	16:12		17:07		18:02		19:59	20	19:27 (1)	20:53	23	19:58 (2)	21:37	24	20:55 (6)
9	08:26		07:45		06:44		06:29		19:07 (1)	05:24		19:36 (2)	04:45		20:31 (6)
	16:13		17:09		18:04		20:01	21	19:28 (1)	20:55	22	19:58 (2)	21:38	24	20:55 (6)
10	08:25		07:43		06:41		06:27		19:06 (1)	05:22		19:37 (2)	04:45		20:31 (6)
	16:15		17:11		18:06		20:03	20	19:26 (1)	20:57	20	19:57 (2)	21:39	24	20:55 (6)
11	08:25		07:41		06:39		06:24		19:06 (1)	05:20		19:37 (2)	04:44		20:31 (6)
	16:16		17:13		18:07		20:04	20	19:26 (1)	20:58	19	19:56 (2)	21:40	25	20:56 (6)
12	08:24		07:39		06:37		06:22		19:07 (1)	05:19		19:39 (2)	04:44		20:32 (6)
	16:18		17:15		18:09		20:06	19	19:26 (1)	21:00	16	19:55 (2)	21:41	24	20:56 (6)
13	08:23		07:37		06:34		06:20		19:07 (1)	05:17		19:40 (2)	04:44		20:31 (6)
	16:19		17:17		18:11		20:08	17	19:24 (1)	21:02	13	19:53 (2)	21:41	25	20:56 (6)
14	08:22		07:35		06:32		06:17		19:08 (1)	05:15		19:43 (2)	04:43		20:31 (6)
	16:21		17:19		18:13		20:10	15	19:23 (1)	21:03	9	19:52 (2)	21:42	25	20:56 (6)
15	08:21		07:33		06:29		06:15		19:10 (1)	05:14			04:43		20:32 (6)
	16:22		17:21		18:15		20:12	11	19:21 (1)	21:05			21:43	24	20:56 (6)
16	08:20		07:31		06:27		06:13		19:14 (1)	05:12			04:43		20:32 (6)
	16:24		17:23		18:17		20:13	2	19:16 (1)	21:07			21:43	25	20:57 (6)
17	08:19		07:29		06:25		06:10			05:10			04:43		20:32 (6)
	16:26		17:25		18:19		20:15			21:08			21:44	25	20:57 (6)
18	08:18		07:27		06:22		06:08			05:09			04:43		20:32 (6)
	16:27		17:27		18:20		20:17			21:10			21:44	25	20:57 (6)
19	08:17		07:25		06:20		06:06			05:07			04:43		20:32 (6)
	16:29		17:29		18:22		20:19			21:11			21:44	25	20:57 (6)
20	08:16		07:22		06:17		06:03			05:06			04:43		20:32 (6)
	16:31		17:31		18:24		20:21			21:13			21:45	25	20:57 (6)
21	08:15		07:20		06:15		06:01			05:04			04:43		20:32 (6)
	16:33		17:33		18:26		20:23			21:15			21:45	25	20:57 (6)
22	08:14		07:18		06:12		05:59			05:03			04:43		20:33 (6)
	16:35		17:35		18:28		20:24			21:16			21:45	25	20:58 (6)
23	08:12		07:16		06:10		05:57			05:01			04:43		20:33 (6)
	16:36		17:37		18:30		20:26			21:18			21:45	25	20:58 (6)
24	08:11		07:14		06:08		05:55		19:43 (2)	05:00			04:44		20:33 (6)
	16:38		17:39		18:32		20:28	11	19:54 (2)	21:19			21:45	25	20:58 (6)
25	08:10		07:11		06:05		05:52		19:41 (2)	04:59		20:39 (6)	04:44		20:34 (6)
	16:40		17:41		18:33		20:30	15	19:56 (2)	21:21	4	20:43 (6)	21:45	25	20:59 (6)
26	08:08		07:09		06:03		05:50		19:39 (2)	04:58		20:36 (6)	04:44		20:34 (6)
	16:42		17:43		18:35		20:32	19	19:58 (2)	21:22	10	20:46 (6)	21:45	25	20:59 (6)
27	08:07		07:07		06:00		05:48		19:38 (2)	04:56		20:35 (6)	04:45		20:35 (6)
	16:44		17:45		18:37		20:33	21	19:59 (2)	21:23	12	20:47 (6)	21:45	25	21:00 (6)
28	08:05		07:05		05:58		05:46		19:37 (2)	04:55		20:34 (6)	04:45		20:34 (6)
	16:46		17:47		18:39		20:35	22	19:59 (2)	21:25	14	20:48 (6)	21:45	25	20:59 (6)
29	08:04				06:55		05:44		19:36 (2)	04:54		20:33 (6)	04:46		20:35 (6)
	16:48				19:41		20:37	24	20:00 (2)	21:26	16	20:49 (6)	21:45	25	21:00 (6)
30	08:02				06:53		05:42		19:35 (2)	04:53		20:32 (6)	04:47		20:35 (6)
	16:50				19:42		20:39	25	20:00 (2)	21:27	18	20:50 (6)	21:45	24	20:59 (6)
31	08:01				06:51					04:52		20:32 (6)			
	16:52				19:44					21:29	19	20:51 (6)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung							359				392			724	
Red.Sonnenscheinwahrsch.							0.41				0.51			0.45	
Reduktion Betriebsdauer							0.91				0.91			0.91	
Reduktion Windrichtung							0.68				0.66			0.64	
Gesamte Reduktion							0.25				0.31			0.27	
Met.wahrsch.Beschattung							91				121			192	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CY - IO103

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober		November	Dezember
1 | 04:47		20:35 (6)	05:26		19:49 (2)	06:20		19:05 (1)	07:12		07:10	08:04
| 21:45	25	21:00 (6)	21:10	17	20:06 (2)	20:04	20	19:25 (1)	18:51		16:42	15:58
2 | 04:48		20:36 (6)	05:28		19:47 (2)	06:22		19:05 (1)	07:14		07:12	08:05
| 21:44	24	21:00 (6)	21:08	20	20:07 (2)	20:02	20	19:25 (1)	18:49		16:40	15:57
3 | 04:49		20:35 (6)	05:30		19:47 (2)	06:23		19:04 (1)	07:16		07:14	08:07
| 21:44	25	21:00 (6)	21:06	21	20:08 (2)	20:00	21	19:25 (1)	18:47		16:38	15:57
4 | 04:50		20:36 (6)	05:31		19:45 (2)	06:25		19:04 (1)	07:18		07:15	08:08
| 21:43	24	21:00 (6)	21:05	23	20:08 (2)	19:57	20	19:24 (1)	18:44		16:36	15:56
5 | 04:50		20:37 (6)	05:33		19:45 (2)	06:27		19:04 (1)	07:19		07:17	08:10
| 21:43	23	21:00 (6)	21:03	24	20:09 (2)	19:55	20	19:24 (1)	18:42		16:34	15:55
6 | 04:51		20:37 (6)	05:35		19:44 (2)	06:29		19:04 (1)	07:21		07:19	08:11
| 21:42	23	21:00 (6)	21:01	25	20:09 (2)	19:52	18	19:22 (1)	18:39		16:32	15:55
7 | 04:52		20:37 (6)	05:36		19:44 (2)	06:30		19:05 (1)	07:23		07:21	08:12
| 21:41	23	21:00 (6)	20:59	25	20:09 (2)	19:50	16	19:21 (1)	18:37		16:30	15:54
8 | 04:53		20:38 (6)	05:38		19:44 (2)	06:32		19:06 (1)	07:25		07:23	08:14
| 21:41	22	21:00 (6)	20:57	26	20:10 (2)	19:48	14	19:20 (1)	18:35		16:28	15:54
9 | 04:54		20:38 (6)	05:40		19:43 (2)	06:34		19:07 (1)	07:27		07:25	08:15
| 21:40	22	21:00 (6)	20:55	26	20:09 (2)	19:45	10	19:17 (1)	18:32		16:27	15:54
10 | 04:55		20:39 (6)	05:42		19:43 (2)	06:36			07:28		07:27	08:16
| 21:39	21	21:00 (6)	20:53	27	20:10 (2)	19:43			18:30		16:25	15:53
11 | 04:56		20:39 (6)	05:43		19:43 (2)	06:37			07:30		07:29	08:17
| 21:38	21	21:00 (6)	20:51	26	20:09 (2)	19:40			18:27		16:23	15:53
12 | 04:58		20:40 (6)	05:45		19:43 (2)	06:39			07:32		07:31	08:18
| 21:37	19	20:59 (6)	20:49	26	20:09 (2)	19:38			18:25		16:22	15:53
13 | 04:59		20:40 (6)	05:47		19:44 (2)	06:41			07:34		07:33	08:19
| 21:37	19	20:59 (6)	20:47	24	20:08 (2)	19:35			18:23		16:20	15:53
14 | 05:00		20:41 (6)	05:48		19:44 (2)	06:42			07:36		07:34	08:20
| 21:36	17	20:58 (6)	20:45	23	20:07 (2)	19:33			18:20		16:18	15:53
15 | 05:01		20:42 (6)	05:50		19:44 (2)	06:44			07:38		07:36	08:21
| 21:34	15	20:57 (6)	20:43	23	20:07 (2)	19:30			18:18		16:17	15:53
16 | 05:03		20:43 (6)	05:52		19:45 (2)	06:46			07:39		07:38	08:22
| 21:33	13	20:56 (6)	20:40	21	20:06 (2)	19:28			18:16		16:15	15:53
17 | 05:04		20:45 (6)	05:54		19:46 (2)	06:48			07:41		07:40	08:23
| 21:32	11	20:56 (6)	20:38	18	20:04 (2)	19:26			18:14		16:14	15:53
18 | 05:05		20:47 (6)	05:55		19:48 (2)	06:49			07:43		07:42	08:24
| 21:31	7	20:54 (6)	20:36	14	20:02 (2)	19:23			18:11		16:12	15:53
19 | 05:07			05:57		19:49 (2)	06:51			07:45		07:44	08:25
| 21:30			20:34	10	19:59 (2)	19:21			18:09		16:11	15:54
20 | 05:08			05:59			06:53			07:47		07:45	08:25
| 21:28			20:32			19:18			18:07		16:10	15:54
21 | 05:09			06:01			06:55			07:49		07:47	08:26
| 21:27			20:30			19:16			18:05		16:08	15:54
22 | 05:11			06:02			06:56			07:51		07:49	08:26
| 21:26			20:27			19:13			18:02		16:07	15:55
23 | 05:12			06:04			06:58			07:53		07:51	08:27
| 21:24			20:25			19:11			18:00		16:06	15:55
24 | 05:14			06:06			07:00			07:54		07:52	08:27
| 21:23			20:23			19:08			17:58		16:05	15:56
25 | 05:15			06:08			07:02			06:56		07:54	08:28
| 21:21			20:21			19:06			16:56		16:04	15:57
26 | 05:17			06:09			07:03			06:58		07:56	08:28
| 21:20			20:18			19:04			16:54		16:03	15:57
27 | 05:18			06:11		19:15 (1)	07:05			07:00		07:58	08:28
| 21:18			20:16	4	19:19 (1)	19:01			16:52		16:02	15:58
28 | 05:20			06:13		19:11 (1)	07:07			07:02		07:59	08:28
| 21:17			20:14	11	19:22 (1)	18:59			16:50		16:01	15:59
29 | 05:22		19:55 (2)	06:15		19:09 (1)	07:09			07:04		08:01	08:29
| 21:15	5	20:00 (2)	20:11	15	19:24 (1)	18:56			16:48		16:00	16:00
30 | 05:23		19:52 (2)	06:16		19:08 (1)	07:11			07:06		08:02	08:29
| 21:13	11	20:03 (2)	20:09	17	19:25 (1)	18:54			16:46		15:59	16:01
31 | 05:25		19:50 (2)	06:18		19:06 (1)				07:08			08:29
| 21:12	14	20:04 (2)	20:07	19	19:25 (1)				16:44			16:02
Sonnenscheinstunden	510		459			382			329		260	235
astr.max.mögl.Beschattung		384		485			159					
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40					
Reduktion Betriebsdauer		0.91		0.91			0.91					
Reduktion Windrichtung		0.64		0.67			0.69					
Gesamte Reduktion		0.26		0.30			0.25					
Met.wahrsch.Beschattung		100		144			40					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CZ - IO104

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April		Mai			Juni		
1	08:29	07:59	07:02	06:48		05:40		19:32 (2)	04:51		20:27 (6)
	16:03	16:54	17:49	19:46		20:41	26	19:58 (2)	21:30	22	20:49 (6)
2	08:28	07:57	07:00	06:46	19:13 (1)	05:38		19:32 (2)	04:50		20:27 (6)
	16:04	16:56	17:50	19:48	8 19:21 (1)	20:42	25	19:57 (2)	21:31	23	20:50 (6)
3	08:28	07:56	06:58	06:43	19:11 (1)	05:36		19:31 (2)	04:49		20:27 (6)
	16:05	16:57	17:52	19:50	12 19:23 (1)	20:44	26	19:57 (2)	21:32	23	20:50 (6)
4	08:28	07:54	06:55	06:41	19:08 (1)	05:34		19:31 (2)	04:48		20:27 (6)
	16:06	16:59	17:54	19:52	16 19:24 (1)	20:46	26	19:57 (2)	21:33	23	20:50 (6)
5	08:28	07:52	06:53	06:38	19:07 (1)	05:32		19:33 (2)	04:48		20:27 (6)
	16:08	17:01	17:56	19:53	18 19:25 (1)	20:48	24	19:57 (2)	21:34	24	20:51 (6)
6	08:27	07:50	06:51	06:36	19:07 (1)	05:30		19:33 (2)	04:47		20:27 (6)
	16:09	17:03	17:58	19:55	19 19:26 (1)	20:50	23	19:56 (2)	21:35	24	20:51 (6)
7	08:27	07:48	06:48	06:34	19:05 (1)	05:28		19:33 (2)	04:46		20:27 (6)
	16:10	17:05	18:00	19:57	20 19:25 (1)	20:51	22	19:55 (2)	21:36	24	20:51 (6)
8	08:26	07:47	06:46	06:31	19:05 (1)	05:26		19:34 (2)	04:46		20:27 (6)
	16:12	17:07	18:02	19:59	21 19:26 (1)	20:53	20	19:54 (2)	21:37	25	20:52 (6)
9	08:26	07:45	06:44	06:29	19:05 (1)	05:24		19:35 (2)	04:45		20:28 (6)
	16:13	17:09	18:04	20:01	21 19:26 (1)	20:55	19	19:54 (2)	21:38	24	20:52 (6)
10	08:25	07:43	06:41	06:27	19:05 (1)	05:22		19:36 (2)	04:45		20:27 (6)
	16:15	17:11	18:06	20:03	19 19:24 (1)	20:57	16	19:52 (2)	21:39	25	20:52 (6)
11	08:25	07:41	06:39	06:24	19:05 (1)	05:20		19:37 (2)	04:44		20:28 (6)
	16:16	17:13	18:07	20:04	19 19:24 (1)	20:58	14	19:51 (2)	21:40	25	20:53 (6)
12	08:24	07:39	06:37	06:22	19:06 (1)	05:19		19:40 (2)	04:44		20:28 (6)
	16:18	17:15	18:09	20:06	17 19:23 (1)	21:00	9	19:49 (2)	21:41	25	20:53 (6)
13	08:23	07:37	06:34	06:20	19:06 (1)	05:17			04:44		20:28 (6)
	16:19	17:17	18:11	20:08	15 19:21 (1)	21:02			21:41	25	20:53 (6)
14	08:22	07:35	06:32	06:17	19:08 (1)	05:15			04:43		20:28 (6)
	16:21	17:19	18:13	20:10	11 19:19 (1)	21:03			21:42	25	20:53 (6)
15	08:21	07:33	06:29	06:15	19:12 (1)	05:14			04:43		20:28 (6)
	16:22	17:21	18:15	20:12	3 19:15 (1)	21:05			21:43	25	20:53 (6)
16	08:20	07:31	06:27	06:13		05:12			04:43		20:29 (6)
	16:24	17:23	18:17	20:13		21:07			21:43	25	20:54 (6)
17	08:19	07:29	06:25	06:10		05:10			04:43		20:29 (6)
	16:26	17:25	18:19	20:15		21:08			21:44	25	20:54 (6)
18	08:18	07:27	06:22	06:08		05:09			04:43		20:29 (6)
	16:27	17:27	18:20	20:17		21:10			21:44	25	20:54 (6)
19	08:17	07:25	06:20	06:06		05:07			04:43		20:29 (6)
	16:29	17:29	18:22	20:19		21:11			21:44	25	20:54 (6)
20	08:16	07:22	06:17	06:03		05:06			04:43		20:29 (6)
	16:31	17:31	18:24	20:21		21:13			21:45	25	20:54 (6)
21	08:15	07:20	06:15	06:01		05:04			04:43		20:29 (6)
	16:33	17:33	18:26	20:23		21:15			21:45	25	20:54 (6)
22	08:14	07:18	06:12	05:59	19:43 (2)	05:03			04:43		20:30 (6)
	16:35	17:35	18:28	20:24	6 19:49 (2)	21:16			21:45	25	20:55 (6)
23	08:12	07:16	06:10	05:57	19:39 (2)	05:01		20:34 (6)	04:43		20:30 (6)
	16:36	17:37	18:30	20:26	13 19:52 (2)	21:18	6	20:40 (6)	21:45	25	20:55 (6)
24	08:11	07:14	06:08	05:55	19:37 (2)	05:00		20:32 (6)	04:44		20:30 (6)
	16:38	17:39	18:32	20:28	17 19:54 (2)	21:19	11	20:43 (6)	21:45	25	20:55 (6)
25	08:10	07:11	06:05	05:52	19:36 (2)	04:59		20:31 (6)	04:44		20:31 (6)
	16:40	17:41	18:33	20:30	19 19:55 (2)	21:21	13	20:44 (6)	21:45	25	20:56 (6)
26	08:08	07:09	06:03	05:50	19:35 (2)	04:58		20:30 (6)	04:44		20:31 (6)
	16:42	17:43	18:35	20:32	21 19:56 (2)	21:22	15	20:45 (6)	21:45	25	20:56 (6)
27	08:07	07:07	06:00	05:48	19:34 (2)	04:56		20:29 (6)	04:45		20:31 (6)
	16:44	17:45	18:37	20:33	23 19:57 (2)	21:23	17	20:46 (6)	21:45	25	20:56 (6)
28	08:05	07:05	05:58	05:46	19:33 (2)	04:55		20:29 (6)	04:45		20:31 (6)
	16:46	17:47	18:39	20:35	24 19:57 (2)	21:25	18	20:47 (6)	21:45	25	20:56 (6)
29	08:04		06:55	05:44	19:33 (2)	04:54		20:28 (6)	04:46		20:32 (6)
	16:48		19:41	20:37	24 19:57 (2)	21:26	20	20:48 (6)	21:45	25	20:57 (6)
30	08:02		06:53	05:42	19:32 (2)	04:53		20:28 (6)	04:47		20:31 (6)
	16:50		19:42	20:39	26 19:58 (2)	21:27	20	20:48 (6)	21:45	25	20:56 (6)
31	08:01		06:51			04:52		20:27 (6)			
	16:52		19:44			21:29	22	20:49 (6)			
Sonnenscheinstunden	252	274	367	419		492			508		
astr.max.mögl.Beschattung				392			392			737	
Red.Sonnenscheinwahrsch.				0.41			0.51			0.45	
Reduktion Betriebsdauer				0.91			0.91			0.91	
Reduktion Windrichtung				0.68			0.66			0.64	
Gesamte Reduktion				0.25			0.31			0.27	
Met.wahrsch.Beschattung				100			120			197	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** CZ - IO104

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober	November	Dezember
1	04:47		20:32 (6)	05:26		19:49 (2)	06:20		19:04 (1)	07:12	07:10	08:04
	21:45	25	20:57 (6)	21:10	11	20:00 (2)	20:04	19	19:23 (1)	18:51	16:42	15:58
2	04:48		20:32 (6)	05:28		19:47 (2)	06:22		19:04 (1)	07:14	07:12	08:05
	21:44	25	20:57 (6)	21:08	15	20:02 (2)	20:02	19	19:23 (1)	18:49	16:40	15:57
3	04:49		20:32 (6)	05:30		19:46 (2)	06:23		19:02 (1)	07:16	07:14	08:07
	21:44	25	20:57 (6)	21:06	17	20:03 (2)	20:00	21	19:23 (1)	18:47	16:38	15:57
4	04:50		20:32 (6)	05:31		19:44 (2)	06:25		19:02 (1)	07:18	07:15	08:08
	21:43	25	20:57 (6)	21:05	20	20:04 (2)	19:57	21	19:23 (1)	18:44	16:36	15:56
5	04:50		20:33 (6)	05:33		19:44 (2)	06:27		19:02 (1)	07:19	07:17	08:10
	21:43	24	20:57 (6)	21:03	21	20:05 (2)	19:55	20	19:22 (1)	18:42	16:34	15:55
6	04:51		20:33 (6)	05:35		19:42 (2)	06:29		19:02 (1)	07:21	07:19	08:11
	21:42	25	20:58 (6)	21:01	23	20:05 (2)	19:52	19	19:21 (1)	18:39	16:32	15:55
7	04:52		20:34 (6)	05:36		19:42 (2)	06:30		19:02 (1)	07:23	07:21	08:12
	21:41	24	20:58 (6)	20:59	24	20:06 (2)	19:50	18	19:20 (1)	18:37	16:30	15:54
8	04:53		20:34 (6)	05:38		19:42 (2)	06:32		19:03 (1)	07:25	07:23	08:14
	21:41	24	20:58 (6)	20:57	24	20:06 (2)	19:48	16	19:19 (1)	18:35	16:28	15:54
9	04:54		20:34 (6)	05:40		19:41 (2)	06:34		19:04 (1)	07:27	07:25	08:15
	21:40	24	20:58 (6)	20:55	25	20:06 (2)	19:45	13	19:17 (1)	18:32	16:27	15:54
10	04:55		20:35 (6)	05:42		19:41 (2)	06:36		19:06 (1)	07:28	07:27	08:16
	21:39	23	20:58 (6)	20:53	26	20:07 (2)	19:43	8	19:14 (1)	18:30	16:25	15:53
11	04:56		20:35 (6)	05:43		19:40 (2)	06:37			07:30	07:29	08:17
	21:38	23	20:58 (6)	20:51	26	20:06 (2)	19:40			18:27	16:23	15:53
12	04:58		20:35 (6)	05:45		19:40 (2)	06:39			07:32	07:31	08:18
	21:37	22	20:57 (6)	20:49	26	20:06 (2)	19:38			18:25	16:22	15:53
13	04:59		20:36 (6)	05:47		19:41 (2)	06:41			07:34	07:33	08:19
	21:37	21	20:57 (6)	20:47	25	20:06 (2)	19:35			18:23	16:20	15:53
14	05:00		20:36 (6)	05:48		19:40 (2)	06:42			07:36	07:34	08:20
	21:36	21	20:57 (6)	20:45	25	20:05 (2)	19:33			18:20	16:18	15:53
15	05:01		20:37 (6)	05:50		19:41 (2)	06:44			07:38	07:36	08:21
	21:34	19	20:56 (6)	20:43	24	20:05 (2)	19:30			18:18	16:17	15:53
16	05:03		20:37 (6)	05:52		19:42 (2)	06:46			07:39	07:38	08:22
	21:33	18	20:55 (6)	20:40	22	20:04 (2)	19:28			18:16	16:15	15:53
17	05:04		20:39 (6)	05:54		19:42 (2)	06:48			07:41	07:40	08:23
	21:32	16	20:55 (6)	20:38	21	20:03 (2)	19:26			18:14	16:14	15:53
18	05:05		20:40 (6)	05:55		19:43 (2)	06:49			07:43	07:42	08:24
	21:31	14	20:54 (6)	20:36	19	20:02 (2)	19:23			18:11	16:12	15:53
19	05:07		20:41 (6)	05:57		19:43 (2)	06:51			07:45	07:44	08:25
	21:30	12	20:53 (6)	20:34	16	19:59 (2)	19:21			18:09	16:11	15:54
20	05:08		20:42 (6)	05:59		19:46 (2)	06:53			07:47	07:45	08:25
	21:28	9	20:51 (6)	20:32	11	19:57 (2)	19:18			18:07	16:10	15:54
21	05:09			06:01		19:50 (2)	06:55			07:49	07:47	08:26
	21:27			20:30	3	19:53 (2)	19:16			18:05	16:08	15:54
22	05:11			06:02			06:56			07:51	07:49	08:26
	21:26			20:27			19:13			18:02	16:07	15:55
23	05:12			06:04			06:58			07:53	07:51	08:27
	21:24			20:25			19:11			18:00	16:06	15:55
24	05:14			06:06			07:00			07:54	07:52	08:27
	21:23			20:23			19:08			17:58	16:05	15:56
25	05:15			06:08			07:02			06:56	07:54	08:28
	21:21			20:21			19:06			16:56	16:04	15:57
26	05:17			06:09			07:03			06:58	07:56	08:28
	21:20			20:18			19:04			16:54	16:03	15:57
27	05:18			06:11			07:05			07:00	07:58	08:28
	21:18			20:16			19:01			16:52	16:02	15:58
28	05:20			06:13		19:12 (1)	07:07			07:02	07:59	08:28
	21:17			20:14	4	19:16 (1)	18:59			16:50	16:01	15:59
29	05:22			06:15		19:09 (1)	07:09			07:04	08:01	08:29
	21:15			20:11	11	19:20 (1)	18:56			16:48	16:00	16:00
30	05:23			06:16		19:07 (1)	07:11			07:06	08:02	08:29
	21:13			20:09	15	19:22 (1)	18:54			16:46	15:59	16:01
31	05:25		19:52 (2)	06:18		19:05 (1)				07:08		08:29
	21:12	5	19:57 (2)	20:07	17	19:22 (1)				16:44		16:02
Sonnenscheinstunden	510			459			382			329	260	235
astr.max.mögl.Beschattung		424			471			174				
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40				
Reduktion Betriebsdauer		0.91			0.91			0.91				
Reduktion Windrichtung		0.64			0.67			0.69				
Gesamte Reduktion		0.26			0.30			0.25				
Met.wahrsch.Beschattung		111			140			44				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DA - IO105

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40		19:48 (3)	04:51		19:58 (2)
	16:03		16:54		17:49		19:46			20:41	20	20:08 (3)	21:30	27	20:25 (2)
2	08:28		07:57		07:00		06:46			05:38		19:48 (3)	04:50		19:59 (2)
	16:04		16:56		17:50		19:48			20:42	20	20:08 (3)	21:31	27	20:26 (2)
3	08:28		07:56		06:58		06:43			05:36		19:48 (3)	04:49		20:00 (2)
	16:05		16:57		17:52		19:50			20:44	20	20:08 (3)	21:32	25	20:25 (2)
4	08:28		07:54		06:55		06:41			05:34		19:48 (3)	04:48		20:00 (2)
	16:06		16:59		17:54		19:52			20:46	19	20:07 (3)	21:33	25	20:25 (2)
5	08:28		07:52		06:53		06:38			05:32		19:49 (3)	04:48		20:01 (2)
	16:08		17:01		17:56		19:53			20:48	19	20:08 (3)	21:34	24	20:25 (2)
6	08:27		07:50		06:51		06:36			05:30		19:49 (3)	04:47		20:01 (2)
	16:09		17:03		17:58		19:55			20:50	18	20:07 (3)	21:35	24	20:25 (2)
7	08:27		07:49		06:48		06:34			05:28		19:49 (3)	04:46		20:01 (2)
	16:10		17:05		18:00		19:57			20:51	17	20:06 (3)	21:36	23	20:24 (2)
8	08:26		07:47		06:46		06:31			05:26		19:50 (3)	04:46		20:02 (2)
	16:12		17:07		18:02		19:59			20:53	15	20:05 (3)	21:37	23	20:25 (2)
9	08:26		07:45		06:44		06:29			05:24		19:51 (3)	04:45		20:03 (2)
	16:13		17:09		18:04		20:01			20:55	24	20:16 (2)	21:38	22	20:25 (2)
10	08:25		07:43		06:41		06:27			05:22		19:52 (3)	04:45		20:03 (2)
	16:15		17:11		18:06		20:03			20:57	26	20:18 (2)	21:39	21	20:24 (2)
11	08:25		07:41		06:39		06:24		19:27 (1)	05:21		19:54 (3)	04:44		20:04 (2)
	16:16		17:13		18:07		20:04	8	19:35 (1)	20:58	24	20:19 (2)	21:40	20	20:24 (2)
12	08:24		07:39		06:37		06:22		19:24 (1)	05:19		20:01 (2)	04:44		20:05 (2)
	16:18		17:15		18:09		20:06	13	19:37 (1)	21:00	20	20:21 (2)	21:41	19	20:24 (2)
13	08:23		07:37		06:34		06:20		19:21 (1)	05:17		19:59 (2)	04:44		20:04 (2)
	16:19		17:17		18:11		20:08	17	19:38 (1)	21:02	23	20:22 (2)	21:41	20	20:24 (2)
14	08:22		07:35		06:32		06:17		19:20 (1)	05:15		19:59 (2)	04:43		20:05 (2)
	16:21		17:19		18:13		20:10	19	19:39 (1)	21:03	24	20:23 (2)	21:42	19	20:24 (2)
15	08:21		07:33		06:29		06:15		19:19 (1)	05:14		19:58 (2)	04:43		20:05 (2)
	16:22		17:21		18:15		20:12	21	19:40 (1)	21:05	25	20:23 (2)	21:43	19	20:24 (2)
16	08:20		07:31		06:27		06:13		19:19 (1)	05:12		19:58 (2)	04:43		20:06 (2)
	16:24		17:23		18:17		20:13	22	19:41 (1)	21:07	26	20:24 (2)	21:43	18	20:24 (2)
17	08:19		07:29		06:25		06:10		19:17 (1)	05:10		19:57 (2)	04:43		20:06 (2)
	16:26		17:25		18:19		20:15	23	19:40 (1)	21:08	27	20:24 (2)	21:44	18	20:24 (2)
18	08:18		07:27		06:22		06:08		19:17 (1)	05:09		19:57 (2)	04:43		20:07 (2)
	16:28		17:27		18:21		20:17	23	19:40 (1)	21:10	28	20:25 (2)	21:44	17	20:24 (2)
19	08:17		07:25		06:20		06:06		19:17 (1)	05:07		19:56 (2)	04:43		20:07 (2)
	16:29		17:29		18:22		20:19	23	19:40 (1)	21:11	29	20:25 (2)	21:44	17	20:24 (2)
20	08:16		07:22		06:17		06:03		19:17 (1)	05:06		19:56 (2)	04:43		20:07 (2)
	16:31		17:31		18:24		20:21	23	19:40 (1)	21:13	29	20:25 (2)	21:45	17	20:24 (2)
21	08:15		07:20		06:15		06:01		19:18 (1)	05:04		19:56 (2)	04:43		20:07 (2)
	16:33		17:33		18:26		20:23	21	19:39 (1)	21:15	30	20:26 (2)	21:45	17	20:24 (2)
22	08:14		07:18		06:12		05:59		19:17 (1)	05:03		19:56 (2)	04:43		20:08 (2)
	16:35		17:35		18:28		20:24	21	19:38 (1)	21:16	29	20:25 (2)	21:45	17	20:25 (2)
23	08:12		07:16		06:10		05:57		19:18 (1)	05:01		19:56 (2)	04:43		20:08 (2)
	16:36		17:37		18:30		20:26	19	19:37 (1)	21:18	29	20:25 (2)	21:45	17	20:25 (2)
24	08:11		07:14		06:08		05:55		19:19 (1)	05:00		19:56 (2)	04:44		20:08 (2)
	16:38		17:39		18:32		20:28	17	19:36 (1)	21:19	30	20:26 (2)	21:45	17	20:25 (2)
25	08:10		07:11		06:05		05:52		19:20 (1)	04:59		19:56 (2)	04:44		20:09 (2)
	16:40		17:41		18:33		20:30	16	20:00 (3)	21:21	30	20:26 (2)	21:45	17	20:26 (2)
26	08:08		07:09		06:03		05:50		19:22 (1)	04:58		19:57 (2)	04:44		20:08 (2)
	16:42		17:43		18:35		20:32	19	20:03 (3)	21:22	29	20:26 (2)	21:45	18	20:26 (2)
27	08:07		07:07		06:00		05:48		19:52 (3)	04:56		19:57 (2)	04:45		20:09 (2)
	16:44		17:45		18:37		20:33	12	20:04 (3)	21:23	29	20:26 (2)	21:45	18	20:27 (2)
28	08:05		07:05		05:58		05:46		19:51 (3)	04:55		19:57 (2)	04:45		20:08 (2)
	16:46		17:47		18:39		20:35	15	20:06 (3)	21:25	29	20:26 (2)	21:45	19	20:27 (2)
29	08:04				06:55		05:44		19:50 (3)	04:54		19:58 (2)	04:46		20:09 (2)
	16:48				19:41		20:37	17	20:07 (3)	21:26	28	20:26 (2)	21:45	19	20:28 (2)
30	08:02				06:53		05:42		19:49 (3)	04:53		19:58 (2)	04:47		20:08 (2)
	16:50				19:42		20:39	19	20:08 (3)	21:27	28	20:26 (2)	21:45	20	20:28 (2)
31	08:01				06:51					04:52		19:58 (2)			
	16:52				19:44					21:29	27	20:25 (2)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung								368				771			604
Red.Sonnenscheinwahrsch.								0.41				0.51			0.45
Reduktion Betriebsdauer								0.91				0.91			0.91
Reduktion Windrichtung								0.67				0.66			0.66
Gesamte Reduktion								0.25				0.31			0.27
Met.wahrsch.Beschattung								93				237			165

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DA - IO105

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober	November	Dezember
1	04:47		20:08 (2) / 05:26		20:12 (2) / 06:20		19:26 (1) / 07:12	07:10	08:04
	21:45	20	20:28 (2) / 21:10	19	20:31 (2) / 20:04	7	19:33 (1) / 18:51	16:42	15:58
2	04:48		20:08 (2) / 05:28		20:04 (3) / 06:22		07:14	07:12	08:05
	21:44	21	20:29 (2) / 21:08	25	20:29 (2) / 20:02		18:49	16:40	15:57
3	04:49		20:07 (2) / 05:30		20:02 (3) / 06:23		07:16	07:14	08:07
	21:44	22	20:29 (2) / 21:06	25	20:28 (2) / 20:00		18:47	16:38	15:57
4	04:50		20:07 (2) / 05:31		20:00 (3) / 06:25		07:18	07:15	08:08
	21:43	23	20:30 (2) / 21:05	22	20:24 (2) / 19:57		18:44	16:36	15:56
5	04:50		20:07 (2) / 05:33		20:00 (3) / 06:27		07:19	07:17	08:10
	21:43	23	20:30 (2) / 21:03	16	20:16 (3) / 19:55		18:42	16:34	15:55
6	04:51		20:07 (2) / 05:35		19:58 (3) / 06:29		07:21	07:19	08:11
	21:42	24	20:31 (2) / 21:01	18	20:16 (3) / 19:52		18:39	16:32	15:55
7	04:52		20:07 (2) / 05:36		19:58 (3) / 06:30		07:23	07:21	08:12
	21:41	25	20:32 (2) / 20:59	19	20:17 (3) / 19:50		18:37	16:30	15:54
8	04:53		20:07 (2) / 05:38		19:58 (3) / 06:32		07:25	07:23	08:14
	21:41	25	20:32 (2) / 20:57	19	20:17 (3) / 19:48		18:35	16:28	15:54
9	04:54		20:07 (2) / 05:40		19:57 (3) / 06:34		07:27	07:25	08:15
	21:40	26	20:33 (2) / 20:55	20	20:17 (3) / 19:45		18:32	16:27	15:54
10	04:55		20:07 (2) / 05:42		19:57 (3) / 06:36		07:28	07:27	08:16
	21:39	26	20:33 (2) / 20:53	20	20:17 (3) / 19:43		18:30	16:25	15:53
11	04:56		20:07 (2) / 05:43		19:57 (3) / 06:37		07:30	07:29	08:17
	21:38	26	20:33 (2) / 20:51	19	20:16 (3) / 19:40		18:27	16:23	15:53
12	04:58		20:07 (2) / 05:45		19:57 (3) / 06:39		07:32	07:31	08:18
	21:37	27	20:34 (2) / 20:49	19	20:16 (3) / 19:38		18:25	16:22	15:53
13	04:59		20:06 (2) / 05:47		19:58 (3) / 06:41		07:34	07:33	08:19
	21:37	28	20:34 (2) / 20:47	18	20:16 (3) / 19:35		18:23	16:20	15:53
14	05:00		20:06 (2) / 05:48		19:57 (3) / 06:42		07:36	07:34	08:20
	21:36	28	20:34 (2) / 20:45	18	20:15 (3) / 19:33		18:20	16:18	15:53
15	05:01		20:06 (2) / 05:50		19:59 (3) / 06:44		07:38	07:36	08:21
	21:34	28	20:34 (2) / 20:43	14	20:13 (3) / 19:30		18:18	16:17	15:53
16	05:03		20:06 (2) / 05:52		19:34 (1) / 06:46		07:39	07:38	08:22
	21:33	28	20:34 (2) / 20:41	14	20:12 (3) / 19:28		18:16	16:15	15:53
17	05:04		20:06 (2) / 05:54		19:28 (1) / 06:48		07:41	07:40	08:23
	21:32	29	20:35 (2) / 20:38	19	20:09 (3) / 19:26		18:14	16:14	15:53
18	05:05		20:06 (2) / 05:55		19:27 (1) / 06:49		07:43	07:42	08:24
	21:31	29	20:35 (2) / 20:36	14	19:41 (1) / 19:23		18:11	16:12	15:53
19	05:07		20:06 (2) / 05:57		19:24 (1) / 06:51		07:45	07:44	08:25
	21:30	29	20:35 (2) / 20:34	18	19:42 (1) / 19:21		18:09	16:11	15:54
20	05:08		20:06 (2) / 05:59		19:23 (1) / 06:53		07:47	07:45	08:25
	21:28	29	20:35 (2) / 20:32	20	19:43 (1) / 19:18		18:07	16:10	15:54
21	05:09		20:06 (2) / 06:01		19:23 (1) / 06:55		07:49	07:47	08:26
	21:27	30	20:36 (2) / 20:30	21	19:44 (1) / 19:16		18:05	16:08	15:54
22	05:11		20:06 (2) / 06:02		19:21 (1) / 06:56		07:51	07:49	08:26
	21:26	29	20:35 (2) / 20:27	22	19:43 (1) / 19:13		18:02	16:07	15:55
23	05:12		20:07 (2) / 06:04		19:21 (1) / 06:58		07:53	07:51	08:27
	21:24	29	20:36 (2) / 20:25	23	19:44 (1) / 19:11		18:00	16:06	15:55
24	05:14		20:07 (2) / 06:06		19:21 (1) / 07:00		07:54	07:52	08:27
	21:23	29	20:36 (2) / 20:23	23	19:44 (1) / 19:08		17:58	16:05	15:56
25	05:15		20:07 (2) / 06:08		19:20 (1) / 07:02		06:56	07:54	08:28
	21:21	28	20:35 (2) / 20:21	23	19:43 (1) / 19:06		16:56	16:04	15:57
26	05:17		20:07 (2) / 06:09		19:20 (1) / 07:03		06:58	07:56	08:28
	21:20	28	20:35 (2) / 20:18	23	19:43 (1) / 19:04		16:54	16:03	15:57
27	05:18		20:07 (2) / 06:11		19:21 (1) / 07:05		07:00	07:58	08:28
	21:18	27	20:34 (2) / 20:16	22	19:43 (1) / 19:01		16:52	16:02	15:58
28	05:20		20:08 (2) / 06:13		19:20 (1) / 07:07		07:02	07:59	08:28
	21:17	26	20:34 (2) / 20:14	21	19:41 (1) / 18:59		16:50	16:01	15:59
29	05:22		20:08 (2) / 06:15		19:21 (1) / 07:09		07:04	08:01	08:29
	21:15	25	20:33 (2) / 20:11	19	19:40 (1) / 18:56		16:48	16:00	16:00
30	05:23		20:10 (2) / 06:16		19:22 (1) / 07:11		07:06	08:02	08:29
	21:13	23	20:33 (2) / 20:09	17	19:39 (1) / 18:54		16:46	15:59	16:01
31	05:25		20:10 (2) / 06:18		19:23 (1)		07:08		08:29
	21:12	22	20:32 (2) / 20:07	13	19:36 (1)		16:44		16:02
Sonnenscheinstunden	510		459		382		329	260	235
astr.max.mögl.Beschattung		812		603		7			
Red.Sonnenscheinwahrsch.		0.45		0.49		0.40			
Reduktion Betriebsdauer		0.91		0.91		0.91			
Reduktion Windrichtung		0.66		0.67		0.67			
Gesamte Reduktion		0.27		0.30		0.25			
Met.wahrsch.Beschattung		217		179		2			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DB - IO106

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40		19:55 (3)	04:51		20:04 (2)
	16:03		16:54		17:49		19:46			20:41	16	20:11 (3)	21:30	30	20:34 (2)
2	08:28		07:57		07:00		06:46			05:38		19:54 (3)	04:50		20:05 (2)
	16:04		16:56		17:50		19:48			20:42	18	20:12 (3)	21:31	30	20:35 (2)
3	08:28		07:56		06:58		06:43			05:36		19:53 (3)	04:49		20:05 (2)
	16:05		16:57		17:52		19:50			20:44	19	20:12 (3)	21:32	29	20:34 (2)
4	08:28		07:54		06:55		06:41			05:34		19:53 (3)	04:48		20:05 (2)
	16:06		16:59		17:54		19:52			20:46	19	20:12 (3)	21:33	29	20:34 (2)
5	08:28		07:52		06:53		06:38			05:32		19:53 (3)	04:48		20:06 (2)
	16:08		17:01		17:56		19:53			20:48	20	20:13 (3)	21:34	29	20:35 (2)
6	08:27		07:50		06:51		06:36			05:30		19:53 (3)	04:47		20:06 (2)
	16:09		17:03		17:58		19:55			20:50	20	20:13 (3)	21:35	29	20:35 (2)
7	08:27		07:49		06:48		06:34			05:28		19:53 (3)	04:46		20:06 (2)
	16:10		17:05		18:00		19:57			20:51	20	20:13 (3)	21:36	28	20:34 (2)
8	08:26		07:47		06:46		06:31			05:26		19:53 (3)	04:46		20:06 (2)
	16:12		17:07		18:02		19:59			20:53	19	20:12 (3)	21:37	29	20:35 (2)
9	08:26		07:45		06:44		06:29			05:24		19:54 (3)	04:45		20:07 (2)
	16:13		17:09		18:04		20:01			20:55	18	20:12 (3)	21:38	28	20:35 (2)
10	08:25		07:43		06:41		06:27			05:22		19:54 (3)	04:45		20:07 (2)
	16:15		17:11		18:06		20:03			20:57	17	20:11 (3)	21:39	28	20:35 (2)
11	08:25		07:41		06:39		06:24			05:21		19:54 (3)	04:44		20:08 (2)
	16:16		17:13		18:07		20:04			20:58	16	20:10 (3)	21:40	27	20:35 (2)
12	08:24		07:39		06:37		06:22			05:19		19:56 (3)	04:44		20:08 (2)
	16:18		17:15		18:09		20:06			21:00	14	20:10 (3)	21:41	27	20:35 (2)
13	08:23		07:37		06:34		06:20			05:17		19:56 (3)	04:44		20:08 (2)
	16:19		17:17		18:11		20:08			21:02	14	20:19 (2)	21:41	27	20:35 (2)
14	08:22		07:35		06:32		06:17		19:31 (1)	05:15		19:59 (3)	04:43		20:08 (2)
	16:21		17:19		18:13		20:10	9	19:40 (1)	21:03	19	20:24 (2)	21:42	27	20:35 (2)
15	08:21		07:33		06:29		06:15		19:29 (1)	05:14		20:10 (2)	04:43		20:09 (2)
	16:22		17:21		18:15		20:12	13	19:42 (1)	21:05	15	20:25 (2)	21:43	26	20:35 (2)
16	08:20		07:31		06:27		06:13		19:27 (1)	05:12		20:09 (2)	04:43		20:09 (2)
	16:24		17:23		18:17		20:13	17	19:44 (1)	21:07	18	20:27 (2)	21:43	26	20:35 (2)
17	08:19		07:29		06:25		06:10		19:25 (1)	05:10		20:08 (2)	04:43		20:09 (2)
	16:26		17:25		18:19		20:15	19	19:44 (1)	21:08	20	20:28 (2)	21:44	27	20:36 (2)
18	08:18		07:27		06:22		06:08		19:24 (1)	05:09		20:07 (2)	04:43		20:10 (2)
	16:28		17:27		18:21		20:17	21	19:45 (1)	21:10	22	20:29 (2)	21:44	26	20:36 (2)
19	08:17		07:25		06:20		06:06		19:23 (1)	05:07		20:06 (2)	04:43		20:10 (2)
	16:29		17:29		18:22		20:19	22	19:45 (1)	21:11	24	20:30 (2)	21:44	26	20:36 (2)
20	08:16		07:22		06:17		06:03		19:23 (1)	05:06		20:06 (2)	04:43		20:10 (2)
	16:31		17:31		18:24		20:21	23	19:46 (1)	21:13	25	20:31 (2)	21:45	26	20:36 (2)
21	08:15		07:20		06:15		06:01		19:23 (1)	05:04		20:05 (2)	04:43		20:10 (2)
	16:33		17:33		18:26		20:23	23	19:46 (1)	21:15	26	20:31 (2)	21:45	26	20:36 (2)
22	08:14		07:18		06:12		05:59		19:22 (1)	05:03		20:04 (2)	04:43		20:11 (2)
	16:35		17:35		18:28		20:24	23	19:45 (1)	21:16	27	20:31 (2)	21:45	26	20:37 (2)
23	08:12		07:16		06:10		05:57		19:22 (1)	05:01		20:04 (2)	04:43		20:11 (2)
	16:36		17:37		18:30		20:26	22	19:44 (1)	21:18	28	20:32 (2)	21:45	26	20:37 (2)
24	08:11		07:14		06:08		05:55		19:22 (1)	05:00		20:04 (2)	04:44		20:11 (2)
	16:38		17:39		18:32		20:28	22	19:44 (1)	21:19	28	20:32 (2)	21:45	26	20:37 (2)
25	08:10		07:11		06:05		05:52		19:22 (1)	04:59		20:04 (2)	04:44		20:11 (2)
	16:40		17:41		18:33		20:30	21	19:43 (1)	21:21	29	20:33 (2)	21:45	27	20:38 (2)
26	08:08		07:09		06:03		05:50		19:23 (1)	04:58		20:04 (2)	04:44		20:11 (2)
	16:42		17:43		18:35		20:32	20	19:43 (1)	21:22	29	20:33 (2)	21:45	27	20:38 (2)
27	08:07		07:07		06:00		05:48		19:24 (1)	04:56		20:04 (2)	04:45		20:12 (2)
	16:44		17:45		18:37		20:33	17	19:41 (1)	21:23	29	20:33 (2)	21:45	26	20:38 (2)
28	08:05		07:05		05:58		05:46		19:25 (1)	04:55		20:04 (2)	04:45		20:11 (2)
	16:46		17:47		18:39		20:35	20	20:06 (3)	21:25	30	20:34 (2)	21:45	27	20:38 (2)
29	08:04				06:55		05:44		19:26 (1)	04:54		20:04 (2)	04:46		20:12 (2)
	16:48				19:41		20:37	22	20:08 (3)	21:26	30	20:34 (2)	21:45	27	20:39 (2)
30	08:02				06:53		05:42		19:29 (1)	04:53		20:04 (2)	04:47		20:11 (2)
	16:50				19:42		20:39	19	20:09 (3)	21:27	30	20:34 (2)	21:45	28	20:39 (2)
31	08:01				06:51					04:52		20:04 (2)			
	16:52				19:44					21:29	30	20:34 (2)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung							333				689			820	
Red.Sonnenscheinwahrsch.							0.41				0.51			0.45	
Reduktion Betriebsdauer							0.91				0.91			0.91	
Reduktion Windrichtung							0.67				0.66			0.65	
Gesamte Reduktion							0.25				0.31			0.27	
Met.wahrsch.Beschattung							83				211			223	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DB - IO106

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		Septembe	Oktober	November	Dezember
1	04:47		20:12 (2)	05:26		20:06 (3)	06:20	07:12	07:10	08:04
	21:45	27	20:39 (2)	21:10	15	20:21 (3)	20:04	18:51	16:42	15:58
2	04:48		20:12 (2)	05:28		20:04 (3)	06:22	07:14	07:12	08:05
	21:44	28	20:40 (2)	21:08	17	20:21 (3)	20:02	18:49	16:40	15:57
3	04:49		20:12 (2)	05:30		20:04 (3)	06:23	07:16	07:14	08:07
	21:44	27	20:39 (2)	21:06	18	20:22 (3)	20:00	18:47	16:38	15:57
4	04:50		20:12 (2)	05:31		20:03 (3)	06:25	07:18	07:15	08:08
	21:43	28	20:40 (2)	21:05	19	20:22 (3)	19:57	18:44	16:36	15:56
5	04:50		20:12 (2)	05:33		20:03 (3)	06:27	07:19	07:17	08:10
	21:43	28	20:40 (2)	21:03	19	20:22 (3)	19:55	18:42	16:34	15:55
6	04:51		20:12 (2)	05:35		20:02 (3)	06:29	07:21	07:19	08:11
	21:42	29	20:41 (2)	21:01	20	20:22 (3)	19:52	18:39	16:32	15:55
7	04:52		20:12 (2)	05:36		20:02 (3)	06:30	07:23	07:21	08:12
	21:41	29	20:41 (2)	20:59	20	20:22 (3)	19:50	18:37	16:30	15:54
8	04:53		20:13 (2)	05:38		20:03 (3)	06:32	07:25	07:23	08:14
	21:41	29	20:42 (2)	20:57	20	20:23 (3)	19:48	18:35	16:28	15:54
9	04:54		20:13 (2)	05:40		20:02 (3)	06:34	07:27	07:25	08:15
	21:40	29	20:42 (2)	20:55	20	20:22 (3)	19:45	18:32	16:27	15:54
10	04:55		20:13 (2)	05:42		20:03 (3)	06:36	07:28	07:27	08:16
	21:39	29	20:42 (2)	20:53	19	20:22 (3)	19:43	18:30	16:25	15:53
11	04:56		20:13 (2)	05:43		20:03 (3)	06:37	07:30	07:29	08:17
	21:38	29	20:42 (2)	20:51	17	20:20 (3)	19:40	18:27	16:23	15:53
12	04:58		20:13 (2)	05:45		20:04 (3)	06:39	07:32	07:31	08:18
	21:37	29	20:42 (2)	20:49	15	20:19 (3)	19:38	18:25	16:22	15:53
13	04:59		20:13 (2)	05:47		19:37 (1)	06:41	07:34	07:33	08:19
	21:37	29	20:42 (2)	20:47	20	20:17 (3)	19:35	18:23	16:20	15:53
14	05:00		20:13 (2)	05:48		19:33 (1)	06:42	07:36	07:34	08:20
	21:36	29	20:42 (2)	20:45	22	20:15 (3)	19:33	18:21	16:18	15:53
15	05:01		20:13 (2)	05:50		19:32 (1)	06:44	07:38	07:36	08:21
	21:34	29	20:42 (2)	20:43	18	20:12 (3)	19:30	18:18	16:17	15:53
16	05:03		20:13 (2)	05:52		19:31 (1)	06:46	07:39	07:38	08:22
	21:33	29	20:42 (2)	20:41	18	19:49 (1)	19:28	18:16	16:15	15:53
17	05:04		20:14 (2)	05:54		19:29 (1)	06:48	07:41	07:40	08:23
	21:32	29	20:43 (2)	20:38	20	19:49 (1)	19:26	18:14	16:14	15:53
18	05:05		20:14 (2)	05:55		19:29 (1)	06:49	07:43	07:42	08:24
	21:31	29	20:43 (2)	20:36	21	19:50 (1)	19:23	18:11	16:12	15:53
19	05:07		20:14 (2)	05:57		19:27 (1)	06:51	07:45	07:44	08:25
	21:30	28	20:42 (2)	20:34	23	19:50 (1)	19:21	18:09	16:11	15:54
20	05:08		20:14 (2)	05:59		19:27 (1)	06:53	07:47	07:45	08:25
	21:28	28	20:42 (2)	20:32	23	19:50 (1)	19:18	18:07	16:10	15:54
21	05:09		20:15 (2)	06:01		19:27 (1)	06:55	07:49	07:47	08:26
	21:27	27	20:42 (2)	20:30	23	19:50 (1)	19:16	18:05	16:08	15:54
22	05:11		20:15 (2)	06:02		19:26 (1)	06:56	07:51	07:49	08:26
	21:26	26	20:41 (2)	20:27	23	19:49 (1)	19:13	18:02	16:07	15:55
23	05:12		20:16 (2)	06:04		19:27 (1)	06:58	07:53	07:51	08:27
	21:24	26	20:42 (2)	20:25	22	19:49 (1)	19:11	18:00	16:06	15:55
24	05:14		20:16 (2)	06:06		19:27 (1)	07:00	07:54	07:52	08:27
	21:23	25	20:41 (2)	20:23	22	19:49 (1)	19:08	17:58	16:05	15:56
25	05:15		20:17 (2)	06:08		19:27 (1)	07:02	06:56	07:54	08:28
	21:21	23	20:40 (2)	20:21	20	19:47 (1)	19:06	16:56	16:04	15:57
26	05:17		20:18 (2)	06:09		19:28 (1)	07:03	06:58	07:56	08:28
	21:20	21	20:39 (2)	20:18	19	19:47 (1)	19:04	16:54	16:03	15:57
27	05:18		20:19 (2)	06:11		19:29 (1)	07:05	07:00	07:58	08:28
	21:18	19	20:38 (2)	20:16	17	19:46 (1)	19:01	16:52	16:02	15:58
28	05:20		20:20 (2)	06:13		19:30 (1)	07:07	07:02	07:59	08:28
	21:17	17	20:37 (2)	20:14	13	19:43 (1)	18:59	16:50	16:01	15:59
29	05:22		20:10 (3)	06:15		19:32 (1)	07:09	07:04	08:01	08:29
	21:15	18	20:35 (2)	20:11	8	19:40 (1)	18:56	16:48	16:00	16:00
30	05:23		20:08 (3)	06:16			07:11	07:06	08:02	08:29
	21:13	18	20:33 (2)	20:09			18:54	16:46	15:59	16:01
31	05:25		20:06 (3)	06:18				07:08		08:29
	21:12	13	20:19 (3)	20:07				16:44		16:02
Sonnenscheinstunden	510			459		382	329	260		235
astr.max.mögl.Beschattung		804			551					
Red.Sonnenscheinwahrsch.		0.45			0.49					
Reduktion Betriebsdauer		0.91			0.91					
Reduktion Windrichtung		0.65			0.66					
Gesamte Reduktion		0.27			0.30					
Met.wahrsch.Beschattung		214			163					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DC - IO107

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40			04:51		20:02 (2)
	16:03		16:54		17:49		19:46			20:41			21:30	23	20:25 (2)
2	08:28		07:57		07:00		06:46			05:38			04:50		20:04 (2)
	16:04		16:56		17:50		19:48			20:42			21:31	22	20:26 (2)
3	08:28		07:56		06:58		06:43			05:36			04:49		20:04 (2)
	16:05		16:57		17:52		19:50			20:44			21:32	21	20:25 (2)
4	08:28		07:54		06:55		06:41			05:34			04:48		20:04 (2)
	16:06		16:59		17:54		19:52			20:46			21:33	21	20:25 (2)
5	08:28		07:52		06:53		06:38			05:32			04:48		20:05 (2)
	16:08		17:01		17:56		19:53			20:48			21:34	20	20:25 (2)
6	08:27		07:50		06:51		06:36			05:30			04:47		20:06 (2)
	16:09		17:03		17:58		19:55			20:50			21:35	18	20:24 (2)
7	08:27		07:49		06:48		06:34			05:28			04:46		20:06 (2)
	16:10		17:05		18:00		19:57			20:51			21:36	17	20:23 (2)
8	08:26		07:47		06:46		06:31			05:26		20:11 (2)	04:46		20:07 (2)
	16:12		17:07		18:02		19:59			20:53	2	20:13 (2)	21:37	16	20:23 (2)
9	08:26		07:45		06:44		06:29			05:24		20:08 (2)	04:45		20:08 (2)
	16:13		17:09		18:04		20:01			20:55	11	20:19 (2)	21:38	16	20:24 (2)
10	08:25		07:43		06:41		06:27			05:22		20:05 (2)	04:45		20:08 (2)
	16:15		17:11		18:06		20:03			20:57	15	20:20 (2)	21:39	15	20:23 (2)
11	08:25		07:41		06:39		06:24			05:20		20:03 (2)	04:44		20:09 (2)
	16:16		17:13		18:07		20:04			20:58	18	20:21 (2)	21:40	14	20:23 (2)
12	08:24		07:39		06:37		06:22		19:33 (1)	05:19		20:03 (2)	04:44		20:11 (2)
	16:18		17:15		18:09		20:06	4	19:37 (1)	21:00	20	20:23 (2)	21:41	11	20:22 (2)
13	08:23		07:37		06:34		06:20		19:28 (1)	05:17		20:02 (2)	04:44		20:11 (2)
	16:19		17:17		18:11		20:08	12	19:40 (1)	21:02	21	20:23 (2)	21:41	10	20:21 (2)
14	08:22		07:35		06:32		06:17		19:26 (1)	05:15		20:01 (2)	04:43		20:11 (2)
	16:21		17:19		18:13		20:10	16	19:42 (1)	21:03	24	20:25 (2)	21:42	10	20:21 (2)
15	08:21		07:33		06:29		06:15		19:25 (1)	05:14		20:00 (2)	04:43		20:12 (2)
	16:22		17:21		18:15		20:12	18	19:43 (1)	21:05	25	20:25 (2)	21:43	9	20:21 (2)
16	08:20		07:31		06:27		06:13		19:24 (1)	05:12		20:00 (2)	04:43		20:13 (2)
	16:24		17:23		18:17		20:13	20	19:44 (1)	21:07	26	20:26 (2)	21:43	8	20:21 (2)
17	08:19		07:29		06:25		06:10		19:23 (1)	05:10		19:59 (2)	04:43		20:14 (2)
	16:26		17:25		18:19		20:15	20	19:43 (1)	21:08	27	20:26 (2)	21:44	6	20:20 (2)
18	08:18		07:27		06:22		06:08		19:22 (1)	05:09		20:00 (2)	04:43		20:15 (2)
	16:28		17:27		18:20		20:17	22	19:44 (1)	21:10	26	20:26 (2)	21:44	5	20:20 (2)
19	08:17		07:25		06:20		06:06		19:22 (1)	05:07		19:59 (2)	04:43		20:15 (2)
	16:29		17:29		18:22		20:19	22	19:44 (1)	21:11	27	20:26 (2)	21:44	5	20:20 (2)
20	08:16		07:22		06:17		06:03		19:22 (1)	05:06		19:59 (2)	04:43		20:16 (2)
	16:31		17:31		18:24		20:21	22	19:44 (1)	21:13	27	20:26 (2)	21:45	3	20:19 (2)
21	08:15		07:20		06:15		06:01		19:22 (1)	05:04		19:59 (2)	04:43		20:16 (2)
	16:33		17:33		18:26		20:23	21	19:43 (1)	21:15	28	20:27 (2)	21:45	3	20:19 (2)
22	08:14		07:18		06:12		05:59		19:22 (1)	05:03		19:59 (2)	04:43		20:17 (2)
	16:35		17:35		18:28		20:24	20	19:42 (1)	21:16	27	20:26 (2)	21:45	3	20:20 (2)
23	08:12		07:16		06:10		05:57		19:22 (1)	05:01		19:59 (2)	04:43		20:16 (2)
	16:36		17:37		18:30		20:26	19	19:41 (1)	21:18	27	20:26 (2)	21:45	5	20:21 (2)
24	08:11		07:14		06:08		05:55		19:23 (1)	05:00		19:59 (2)	04:44		20:16 (2)
	16:38		17:39		18:32		20:28	17	19:40 (1)	21:19	27	20:26 (2)	21:45	5	20:21 (2)
25	08:10		07:11		06:05		05:52		19:24 (1)	04:59		20:00 (2)	04:44		20:16 (2)
	16:40		17:41		18:33		20:30	15	19:39 (1)	21:21	27	20:27 (2)	21:45	6	20:22 (2)
26	08:08		07:09		06:03		05:50		19:25 (1)	04:58		20:00 (2)	04:44		20:16 (2)
	16:42		17:43		18:35		20:32	12	19:37 (1)	21:22	27	20:27 (2)	21:45	7	20:23 (2)
27	08:07		07:07		06:00		05:48		19:28 (1)	04:56		20:01 (2)	04:45		20:16 (2)
	16:44		17:45		18:37		20:33	6	19:34 (1)	21:23	26	20:27 (2)	21:45	8	20:24 (2)
28	08:05		07:05		05:58		05:46			04:55		20:01 (2)	04:45		20:15 (2)
	16:46		17:47		18:39		20:35			21:25	25	20:26 (2)	21:45	9	20:24 (2)
29	08:04				06:55		05:44			04:54		20:01 (2)	04:46		20:15 (2)
	16:48				19:41		20:37			21:26	25	20:26 (2)	21:45	10	20:25 (2)
30	08:02				06:53		05:42			04:53		20:02 (2)	04:47		20:14 (2)
	16:50				19:42		20:39			21:27	24	20:26 (2)	21:45	11	20:25 (2)
31	08:01				06:51					04:52		20:02 (2)			
	16:52				19:44					21:29	24	20:26 (2)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung								266			556			337	
Red.Sonnenscheinwahrsch.								0.41			0.51			0.45	
Reduktion Betriebsdauer								0.91			0.91			0.91	
Reduktion Windrichtung								0.67			0.66			0.66	
Gesamte Reduktion								0.25			0.31			0.27	
Met.wahrsch.Beschattung								67			171			92	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DC - IO107

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September	Oktober	November	Dezember
1	04:47		20:14 (2)	05:26	20:14 (2)	06:20	07:12	07:10	08:04
	21:45	13	20:27 (2)	21:10	19	20:33 (2)	20:04	18:51	16:42	15:58
2	04:48		20:14 (2)	05:28	20:14 (2)	06:22	07:14	07:12	08:05
	21:44	14	20:28 (2)	21:08	17	20:31 (2)	20:02	18:49	16:40	15:57
3	04:49		20:13 (2)	05:30	20:16 (2)	06:23	07:16	07:14	08:07
	21:44	15	20:28 (2)	21:06	14	20:30 (2)	20:00	18:47	16:38	15:57
4	04:50		20:13 (2)	05:31	20:18 (2)	06:25	07:18	07:15	08:08
	21:43	16	20:29 (2)	21:05	9	20:27 (2)	19:57	18:44	16:36	15:56
5	04:50		20:12 (2)	05:33			06:27	07:19	07:17	08:10
	21:43	17	20:29 (2)	21:03			19:55	18:42	16:34	15:55
6	04:51		20:12 (2)	05:35			06:29	07:21	07:19	08:11
	21:42	18	20:30 (2)	21:01			19:52	18:39	16:32	15:55
7	04:52		20:12 (2)	05:36			06:30	07:23	07:21	08:12
	21:41	19	20:31 (2)	20:59			19:50	18:37	16:30	15:54
8	04:53		20:12 (2)	05:38			06:32	07:25	07:23	08:14
	21:41	20	20:32 (2)	20:57			19:48	18:35	16:28	15:54
9	04:54		20:12 (2)	05:40			06:34	07:27	07:25	08:15
	21:40	20	20:32 (2)	20:55			19:45	18:32	16:27	15:54
10	04:55		20:11 (2)	05:42			06:36	07:28	07:27	08:16
	21:39	22	20:33 (2)	20:53			19:43	18:30	16:25	15:53
11	04:56		20:11 (2)	05:43			06:37	07:30	07:29	08:17
	21:38	22	20:33 (2)	20:51			19:40	18:27	16:23	15:53
12	04:58		20:11 (2)	05:45			06:39	07:32	07:31	08:18
	21:37	23	20:34 (2)	20:49			19:38	18:25	16:22	15:53
13	04:59		20:10 (2)	05:47			06:41	07:34	07:33	08:19
	21:37	24	20:34 (2)	20:47			19:35	18:23	16:20	15:53
14	05:00		20:10 (2)	05:48			06:42	07:36	07:34	08:20
	21:36	25	20:35 (2)	20:45			19:33	18:20	16:18	15:53
15	05:01		20:10 (2)	05:50			06:44	07:38	07:36	08:21
	21:34	25	20:35 (2)	20:43			19:30	18:18	16:17	15:53
16	05:03		20:09 (2)	05:52	19:35 (1)	06:46	07:39	07:38	08:22
	21:33	26	20:35 (2)	20:40	8	19:43 (1)	19:28	18:16	16:15	15:53
17	05:04		20:10 (2)	05:54		19:32 (1)	06:48	07:41	07:40	08:23
	21:32	26	20:36 (2)	20:38	12	19:44 (1)	19:26	18:14	16:14	15:53
18	05:05		20:09 (2)	05:55		19:30 (1)	06:49	07:43	07:42	08:24
	21:31	27	20:36 (2)	20:36	16	19:46 (1)	19:23	18:11	16:12	15:53
19	05:07		20:09 (2)	05:57		19:28 (1)	06:51	07:45	07:44	08:25
	21:30	27	20:36 (2)	20:34	18	19:46 (1)	19:21	18:09	16:11	15:54
20	05:08		20:09 (2)	05:59		19:28 (1)	06:53	07:47	07:45	08:25
	21:28	27	20:36 (2)	20:32	19	19:47 (1)	19:18	18:07	16:10	15:54
21	05:09		20:09 (2)	06:01		19:27 (1)	06:55	07:49	07:47	08:26
	21:27	28	20:37 (2)	20:30	21	19:48 (1)	19:16	18:05	16:08	15:54
22	05:11		20:09 (2)	06:02		19:26 (1)	06:56	07:51	07:49	08:26
	21:26	27	20:38 (2)	20:27	21	19:47 (1)	19:13	18:02	16:07	15:55
23	05:12		20:10 (2)	06:04		19:26 (1)	06:58	07:53	07:51	08:27
	21:24	27	20:37 (2)	20:25	21	19:47 (1)	19:11	18:00	16:06	15:55
24	05:14		20:10 (2)	06:06		19:26 (1)	07:00	07:54	07:52	08:27
	21:23	27	20:37 (2)	20:23	21	19:47 (1)	19:08	17:58	16:05	15:56
25	05:15		20:09 (2)	06:08		19:25 (1)	07:02	06:56	07:54	08:28
	21:21	27	20:36 (2)	20:21	21	19:46 (1)	19:06	16:56	16:04	15:57
26	05:17		20:10 (2)	06:09		19:26 (1)	07:03	06:58	07:56	08:28
	21:20	26	20:36 (2)	20:18	20	19:46 (1)	19:04	16:54	16:03	15:57
27	05:18		20:10 (2)	06:11		19:26 (1)	07:05	07:00	07:58	08:28
	21:18	26	20:36 (2)	20:16	19	19:45 (1)	19:01	16:52	16:02	15:58
28	05:20		20:11 (2)	06:13		19:26 (1)	07:07	07:02	07:59	08:28
	21:17	25	20:36 (2)	20:14	18	19:44 (1)	18:59	16:50	16:01	15:59
29	05:22		20:11 (2)	06:15		19:27 (1)	07:09	07:04	08:01	08:29
	21:15	24	20:35 (2)	20:11	15	19:42 (1)	18:56	16:48	16:00	16:00
30	05:23		20:12 (2)	06:16		19:29 (1)	07:11	07:06	08:02	08:29
	21:13	23	20:35 (2)	20:09	11	19:40 (1)	18:54	16:46	15:59	16:01
31	05:25		20:12 (2)	06:18		19:32 (1)		07:08		08:29
	21:12	22	20:34 (2)	20:07	3	19:35 (1)		16:44		16:02
Sonnenscheinstunden	510			459		382	329	260	235
astr.max.mögl.Beschattung		708			323					
Red.Sonnenscheinwahrsch.		0.45			0.49					
Reduktion Betriebsdauer		0.91			0.91					
Reduktion Windrichtung		0.66			0.67					
Gesamte Reduktion		0.27			0.30					
Met.wahrsch.Beschattung		189			96					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DD - IO108

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40		19:27 (1)	04:51		20:07 (2)
	16:03		16:54		17:49		19:46			20:41	24	20:11 (3)	21:30	31	20:38 (2)
2	08:28		07:57		07:00		06:46			05:38		19:31 (1)	04:50		20:08 (2)
	16:04		16:56		17:50		19:48			20:42	19	20:13 (3)	21:31	31	20:39 (2)
3	08:28		07:56		06:58		06:43			05:36		19:56 (3)	04:49		20:08 (2)
	16:05		16:57		17:52		19:50			20:44	17	20:13 (3)	21:32	31	20:39 (2)
4	08:28		07:54		06:55		06:41			05:34		19:55 (3)	04:48		20:08 (2)
	16:06		16:59		17:54		19:52			20:46	19	20:14 (3)	21:33	30	20:38 (2)
5	08:28		07:52		06:53		06:38			05:32		19:55 (3)	04:48		20:08 (2)
	16:08		17:01		17:56		19:53			20:48	20	20:15 (3)	21:34	31	20:39 (2)
6	08:27		07:50		06:51		06:36			05:30		19:54 (3)	04:47		20:08 (2)
	16:09		17:03		17:58		19:55			20:50	21	20:15 (3)	21:35	31	20:39 (2)
7	08:27		07:49		06:48		06:34			05:28		19:54 (3)	04:46		20:08 (2)
	16:10		17:05		18:00		19:57			20:51	21	20:15 (3)	21:36	31	20:39 (2)
8	08:26		07:47		06:46		06:31			05:26		19:54 (3)	04:46		20:08 (2)
	16:12		17:07		18:02		19:59			20:53	20	20:14 (3)	21:37	31	20:39 (2)
9	08:26		07:45		06:44		06:29			05:24		19:54 (3)	04:45		20:09 (2)
	16:13		17:09		18:04		20:01			20:55	21	20:15 (3)	21:38	31	20:40 (2)
10	08:25		07:43		06:41		06:27			05:22		19:54 (3)	04:45		20:09 (2)
	16:15		17:11		18:06		20:03			20:57	20	20:14 (3)	21:39	31	20:40 (2)
11	08:25		07:41		06:39		06:24			05:21		19:54 (3)	04:44		20:09 (2)
	16:16		17:13		18:07		20:04			20:58	20	20:14 (3)	21:40	31	20:40 (2)
12	08:24		07:39		06:37		06:22			05:19		19:55 (3)	04:44		20:10 (2)
	16:18		17:15		18:09		20:06			21:00	19	20:14 (3)	21:41	31	20:41 (2)
13	08:23		07:37		06:34		06:20			05:17		19:56 (3)	04:44		20:09 (2)
	16:19		17:17		18:11		20:08			21:02	17	20:13 (3)	21:41	31	20:40 (2)
14	08:22		07:35		06:32		06:17			05:15		19:57 (3)	04:43		20:10 (2)
	16:21		17:19		18:13		20:10			21:03	15	20:12 (3)	21:42	30	20:40 (2)
15	08:21		07:33		06:29		06:15		19:32 (1)	05:14		19:58 (3)	04:43		20:10 (2)
	16:22		17:21		18:15		20:12	9	19:41 (1)	21:05	13	20:11 (3)	21:43	31	20:41 (2)
16	08:20		07:31		06:27		06:13		19:29 (1)	05:12		19:59 (3)	04:43		20:10 (2)
	16:24		17:23		18:17		20:13	14	19:43 (1)	21:07	11	20:10 (3)	21:43	31	20:41 (2)
17	08:19		07:29		06:25		06:10		19:26 (1)	05:10		20:01 (3)	04:43		20:10 (2)
	16:26		17:25		18:19		20:15	18	19:44 (1)	21:08	14	20:25 (2)	21:44	31	20:41 (2)
18	08:18		07:27		06:22		06:08		19:25 (1)	05:09		20:15 (2)	04:43		20:11 (2)
	16:28		17:27		18:21		20:17	20	19:45 (1)	21:10	13	20:28 (2)	21:44	30	20:41 (2)
19	08:17		07:25		06:20		06:06		19:24 (1)	05:07		20:13 (2)	04:43		20:11 (2)
	16:29		17:29		18:22		20:19	22	19:46 (1)	21:11	16	20:29 (2)	21:44	30	20:41 (2)
20	08:16		07:22		06:17		06:03		19:24 (1)	05:06		20:12 (2)	04:43		20:11 (2)
	16:31		17:31		18:24		20:21	22	19:46 (1)	21:13	19	20:31 (2)	21:45	30	20:41 (2)
21	08:15		07:20		06:15		06:01		19:23 (1)	05:04		20:11 (2)	04:43		20:11 (2)
	16:33		17:33		18:26		20:23	24	19:47 (1)	21:15	21	20:32 (2)	21:45	31	20:42 (2)
22	08:14		07:18		06:12		05:59		19:22 (1)	05:03		20:10 (2)	04:43		20:12 (2)
	16:35		17:35		18:28		20:24	24	19:46 (1)	21:16	23	20:33 (2)	21:45	30	20:42 (2)
23	08:12		07:16		06:10		05:57		19:22 (1)	05:01		20:09 (2)	04:43		20:12 (2)
	16:36		17:37		18:30		20:26	24	19:46 (1)	21:18	25	20:34 (2)	21:45	30	20:42 (2)
24	08:11		07:14		06:08		05:55		19:22 (1)	05:00		20:09 (2)	04:44		20:12 (2)
	16:38		17:39		18:32		20:28	24	19:46 (1)	21:19	25	20:34 (2)	21:45	30	20:42 (2)
25	08:10		07:11		06:05		05:52		19:22 (1)	04:59		20:09 (2)	04:44		20:13 (2)
	16:40		17:41		18:33		20:30	23	19:45 (1)	21:21	26	20:35 (2)	21:45	30	20:43 (2)
26	08:08		07:09		06:03		05:50		19:22 (1)	04:58		20:08 (2)	04:44		20:12 (2)
	16:42		17:43		18:35		20:32	23	19:45 (1)	21:22	28	20:36 (2)	21:45	31	20:43 (2)
27	08:07		07:07		06:00		05:48		19:23 (1)	04:56		20:08 (2)	04:45		20:13 (2)
	16:44		17:45		18:37		20:33	21	19:44 (1)	21:23	28	20:36 (2)	21:45	31	20:44 (2)
28	08:05		07:05		05:58		05:46		19:23 (1)	04:55		20:08 (2)	04:45		20:13 (2)
	16:46		17:47		18:39		20:35	20	19:43 (1)	21:25	29	20:37 (2)	21:45	30	20:43 (2)
29	08:04				06:55		05:44		19:24 (1)	04:54		20:08 (2)	04:46		20:13 (2)
	16:48				19:41		20:37	18	19:42 (1)	21:26	29	20:37 (2)	21:45	31	20:44 (2)
30	08:02				06:53		05:42		19:25 (1)	04:53		20:08 (2)	04:47		20:13 (2)
	16:50				19:42		20:39	24	20:09 (3)	21:27	29	20:37 (2)	21:45	31	20:44 (2)
31	08:01				06:51					04:52		20:07 (2)			
	16:52				19:44					21:29	30	20:37 (2)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung							330			652			920		
Red.Sonnenscheinwahrsch.							0.41			0.51			0.45		
Reduktion Betriebsdauer							0.91			0.91			0.91		
Reduktion Windrichtung							0.66			0.66			0.65		
Gesamte Reduktion							0.25			0.31			0.27		
Met.wahrsch.Beschattung							82			200			249		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DD - IO108

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		Septembe	Oktober	November	Dezember
1	04:47		20:13 (2)	05:26		20:06 (3)	06:20	07:12	07:10	08:04
	21:45	31	20:44 (2)	21:10	18	20:24 (3)	20:04	18:51	16:42	15:58
2	04:48		20:14 (2)	05:28		20:05 (3)	06:22	07:14	07:12	08:05
	21:44	31	20:45 (2)	21:08	19	20:24 (3)	20:02	18:49	16:40	15:57
3	04:49		20:13 (2)	05:30		20:05 (3)	06:23	07:16	07:14	08:07
	21:44	31	20:44 (2)	21:06	20	20:25 (3)	20:00	18:47	16:38	15:57
4	04:50		20:14 (2)	05:31		20:04 (3)	06:25	07:18	07:15	08:08
	21:43	31	20:45 (2)	21:05	20	20:24 (3)	19:57	18:44	16:36	15:56
5	04:50		20:14 (2)	05:33		20:04 (3)	06:27	07:19	07:17	08:10
	21:43	31	20:45 (2)	21:03	21	20:25 (3)	19:55	18:42	16:34	15:55
6	04:51		20:14 (2)	05:35		20:03 (3)	06:29	07:21	07:19	08:11
	21:42	31	20:45 (2)	21:01	21	20:24 (3)	19:52	18:39	16:32	15:55
7	04:52		20:15 (2)	05:36		20:04 (3)	06:30	07:23	07:21	08:12
	21:41	31	20:46 (2)	20:59	20	20:24 (3)	19:50	18:37	16:30	15:54
8	04:53		20:15 (2)	05:38		20:05 (3)	06:32	07:25	07:23	08:14
	21:41	31	20:46 (2)	20:57	19	20:24 (3)	19:48	18:35	16:28	15:54
9	04:54		20:15 (2)	05:40		20:04 (3)	06:34	07:27	07:25	08:15
	21:40	31	20:46 (2)	20:55	19	20:23 (3)	19:45	18:32	16:27	15:54
10	04:55		20:15 (2)	05:42		20:05 (3)	06:36	07:28	07:27	08:16
	21:39	31	20:46 (2)	20:53	17	20:22 (3)	19:43	18:30	16:25	15:53
11	04:56		20:16 (2)	05:43		19:38 (1)	06:37	07:30	07:29	08:17
	21:38	30	20:46 (2)	20:51	21	20:21 (3)	19:40	18:27	16:23	15:53
12	04:58		20:16 (2)	05:45		19:35 (1)	06:39	07:32	07:31	08:18
	21:37	30	20:46 (2)	20:49	24	20:19 (3)	19:38	18:25	16:22	15:53
13	04:59		20:16 (2)	05:47		19:33 (1)	06:41	07:34	07:33	08:19
	21:37	30	20:46 (2)	20:47	23	20:17 (3)	19:35	18:23	16:20	15:53
14	05:00		20:16 (2)	05:48		19:31 (1)	06:42	07:36	07:34	08:20
	21:36	30	20:46 (2)	20:45	19	19:50 (1)	19:33	18:21	16:18	15:53
15	05:01		20:16 (2)	05:50		19:31 (1)	06:44	07:38	07:36	08:21
	21:34	29	20:45 (2)	20:43	20	19:51 (1)	19:30	18:18	16:17	15:53
16	05:03		20:17 (2)	05:52		19:30 (1)	06:46	07:39	07:38	08:22
	21:33	28	20:45 (2)	20:41	22	19:52 (1)	19:28	18:16	16:15	15:53
17	05:04		20:18 (2)	05:54		19:29 (1)	06:48	07:41	07:40	08:23
	21:32	28	20:46 (2)	20:38	22	19:51 (1)	19:26	18:14	16:14	15:53
18	05:05		20:18 (2)	05:55		19:28 (1)	06:49	07:43	07:42	08:24
	21:31	27	20:45 (2)	20:36	24	19:52 (1)	19:23	18:11	16:12	15:53
19	05:07		20:18 (2)	05:57		19:28 (1)	06:51	07:45	07:44	08:25
	21:30	26	20:44 (2)	20:34	24	19:52 (1)	19:21	18:09	16:11	15:54
20	05:08		20:19 (2)	05:59		19:27 (1)	06:53	07:47	07:45	08:25
	21:28	25	20:44 (2)	20:32	24	19:51 (1)	19:18	18:07	16:10	15:54
21	05:09		20:20 (2)	06:01		19:28 (1)	06:55	07:49	07:47	08:26
	21:27	24	20:44 (2)	20:30	23	19:51 (1)	19:16	18:05	16:08	15:54
22	05:11		20:20 (2)	06:02		19:27 (1)	06:56	07:51	07:49	08:26
	21:26	23	20:43 (2)	20:27	23	19:50 (1)	19:13	18:02	16:07	15:55
23	05:12		20:22 (2)	06:04		19:27 (1)	06:58	07:53	07:51	08:27
	21:24	20	20:42 (2)	20:25	23	19:50 (1)	19:11	18:00	16:06	15:55
24	05:14		20:23 (2)	06:06		19:28 (1)	07:00	07:54	07:52	08:27
	21:23	18	20:41 (2)	20:23	21	19:49 (1)	19:08	17:58	16:05	15:56
25	05:15		20:24 (2)	06:08		19:28 (1)	07:02	06:56	07:54	08:28
	21:21	15	20:39 (2)	20:21	20	19:48 (1)	19:06	16:56	16:04	15:57
26	05:17		20:26 (2)	06:09		19:29 (1)	07:03	06:58	07:56	08:28
	21:20	12	20:38 (2)	20:18	17	19:46 (1)	19:04	16:54	16:03	15:57
27	05:18		20:10 (3)	06:11		19:31 (1)	07:05	07:00	07:58	08:28
	21:18	13	20:34 (2)	20:16	14	19:45 (1)	19:01	16:52	16:02	15:58
28	05:20		20:09 (3)	06:13		19:33 (1)	07:07	07:02	07:59	08:28
	21:17	12	20:21 (3)	20:14	8	19:41 (1)	18:59	16:50	16:01	15:59
29	05:22		20:07 (3)	06:15			07:09	07:04	08:01	08:29
	21:15	15	20:22 (3)	20:11			18:56	16:48	16:00	16:00
30	05:23		20:07 (3)	06:16			07:11	07:06	08:02	08:29
	21:13	16	20:23 (3)	20:09			18:54	16:46	15:59	16:01
31	05:25		20:06 (3)	06:18				07:08		08:29
	21:12	17	20:23 (3)	20:07				16:44		16:02
Sonnenscheinstunden	510			459		382	329	260		235
astr.max.mögl.Beschattung		778			566					
Red.Sonnenscheinwahrsch.		0.45			0.49					
Reduktion Betriebsdauer		0.91			0.91					
Reduktion Windrichtung		0.65			0.66					
Gesamte Reduktion		0.27			0.29					
Met.wahrsch.Beschattung		206			167					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DE - IO109

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40		19:30 (1)	04:51		20:10 (2)
	16:03		16:54		17:49		19:46			20:41	14	19:44 (1)	21:30	29	20:39 (2)
2	08:28		07:57		07:00		06:46			05:38		19:32 (1)	04:50		20:11 (2)
	16:04		16:56		17:50		19:48			20:42	10	19:42 (1)	21:31	29	20:40 (2)
3	08:28		07:56		06:58		06:43			05:36			04:49		20:11 (2)
	16:05		16:57		17:52		19:50			20:44			21:32	29	20:40 (2)
4	08:28		07:54		06:55		06:41			05:34			04:48		20:11 (2)
	16:06		16:59		17:54		19:52			20:46			21:33	29	20:40 (2)
5	08:28		07:52		06:53		06:38			05:32			04:48		20:12 (2)
	16:08		17:01		17:56		19:53			20:48			21:34	28	20:40 (2)
6	08:27		07:50		06:51		06:36			05:30			04:47		20:11 (2)
	16:09		17:03		17:58		19:55			20:50			21:35	29	20:40 (2)
7	08:27		07:49		06:48		06:34			05:28			04:46		20:11 (2)
	16:10		17:05		18:00		19:57			20:51			21:36	29	20:40 (2)
8	08:26		07:47		06:46		06:31			05:26			04:46		20:12 (2)
	16:12		17:07		18:02		19:59			20:53			21:37	28	20:40 (2)
9	08:26		07:45		06:44		06:29			05:24			04:45		20:13 (2)
	16:13		17:09		18:04		20:01			20:55			21:38	28	20:41 (2)
10	08:25		07:43		06:41		06:27			05:22			04:45		20:12 (2)
	16:15		17:11		18:06		20:03			20:57			21:39	28	20:40 (2)
11	08:25		07:41		06:39		06:24			05:21			04:44		20:13 (2)
	16:16		17:13		18:07		20:04			20:58			21:40	28	20:41 (2)
12	08:24		07:39		06:37		06:22			05:19			04:44		20:13 (2)
	16:18		17:15		18:09		20:06			21:00			21:41	28	20:41 (2)
13	08:23		07:37		06:34		06:20			05:17			04:44		20:13 (2)
	16:19		17:17		18:11		20:08			21:02			21:41	28	20:41 (2)
14	08:22		07:35		06:32		06:17			05:15			04:43		20:13 (2)
	16:21		17:19		18:13		20:10			21:03			21:42	28	20:41 (2)
15	08:21		07:33		06:29		06:15			05:14			04:43		20:14 (2)
	16:22		17:21		18:15		20:12			21:05			21:43	27	20:41 (2)
16	08:20		07:31		06:27		06:13			05:12			04:43		20:14 (2)
	16:24		17:23		18:17		20:13			21:07			21:43	28	20:42 (2)
17	08:19		07:29		06:25		06:10		19:34 (1)	05:10		20:18 (2)	04:43		20:14 (2)
	16:26		17:25		18:19		20:15	11	19:45 (1)	21:08	10	20:28 (2)	21:44	28	20:42 (2)
18	08:18		07:27		06:22		06:08		19:32 (1)	05:09		20:17 (2)	04:43		20:14 (2)
	16:28		17:27		18:21		20:17	15	19:47 (1)	21:10	14	20:31 (2)	21:44	28	20:42 (2)
19	08:17		07:25		06:20		06:06		19:31 (1)	05:07		20:15 (2)	04:43		20:15 (2)
	16:29		17:29		18:22		20:19	18	19:49 (1)	21:11	17	20:32 (2)	21:44	27	20:42 (2)
20	08:16		07:22		06:17		06:03		19:30 (1)	05:06		20:14 (2)	04:43		20:15 (2)
	16:31		17:31		18:24		20:21	19	19:49 (1)	21:13	19	20:33 (2)	21:45	27	20:42 (2)
21	08:15		07:20		06:15		06:01		19:29 (1)	05:04		20:13 (2)	04:43		20:15 (2)
	16:33		17:33		18:26		20:23	21	19:50 (1)	21:15	21	20:34 (2)	21:45	27	20:42 (2)
22	08:14		07:18		06:12		05:59		19:27 (1)	05:03		20:12 (2)	04:43		20:16 (2)
	16:35		17:35		18:28		20:24	22	19:49 (1)	21:16	22	20:34 (2)	21:45	27	20:43 (2)
23	08:12		07:16		06:10		05:57		19:27 (1)	05:01		20:12 (2)	04:43		20:16 (2)
	16:36		17:37		18:30		20:26	23	19:50 (1)	21:18	23	20:35 (2)	21:45	27	20:43 (2)
24	08:11		07:14		06:08		05:55		19:27 (1)	05:00		20:11 (2)	04:44		20:15 (2)
	16:38		17:39		18:32		20:28	23	19:50 (1)	21:19	25	20:36 (2)	21:45	28	20:43 (2)
25	08:10		07:11		06:05		05:52		19:27 (1)	04:59		20:11 (2)	04:44		20:16 (2)
	16:40		17:41		18:33		20:30	22	19:49 (1)	21:21	26	20:37 (2)	21:45	28	20:44 (2)
26	08:08		07:09		06:03		05:50		19:27 (1)	04:58		20:11 (2)	04:44		20:16 (2)
	16:42		17:43		18:35		20:32	22	19:49 (1)	21:22	26	20:37 (2)	21:45	28	20:44 (2)
27	08:07		07:07		06:00		05:48		19:27 (1)	04:56		20:11 (2)	04:45		20:17 (2)
	16:44		17:45		18:37		20:33	22	19:49 (1)	21:23	27	20:38 (2)	21:45	27	20:44 (2)
28	08:05		07:05		05:58		05:46		19:28 (1)	04:55		20:11 (2)	04:45		20:16 (2)
	16:46		17:47		18:39		20:35	20	19:48 (1)	21:25	27	20:38 (2)	21:45	28	20:44 (2)
29	08:04				06:55		05:44		19:28 (1)	04:54		20:11 (2)	04:46		20:17 (2)
	16:48				19:41		20:37	19	19:47 (1)	21:26	27	20:38 (2)	21:45	28	20:45 (2)
30	08:02				06:53		05:42		19:29 (1)	04:53		20:11 (2)	04:47		20:16 (2)
	16:50				19:42		20:39	17	19:46 (1)	21:27	28	20:39 (2)	21:45	28	20:44 (2)
31	08:01				06:51					04:52		20:10 (2)			
	16:52				19:44					21:29	29	20:39 (2)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung							274			365			839		
Red.Sonnenscheinwahrsch.							0.41			0.51			0.45		
Reduktion Betriebsdauer							0.91			0.91			0.91		
Reduktion Windrichtung							0.66			0.65			0.65		
Gesamte Reduktion							0.25			0.30			0.27		
Met.wahrsch.Beschattung							68			111			227		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DE - IO109

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August			September	Oktober	November	Dezember
1	04:47		20:17 (2)	05:26		06:20	07:12	07:10	08:04
	21:45	28	20:45 (2)	21:10		20:04	18:51	16:42	15:58
2	04:48		20:17 (2)	05:28		06:22	07:14	07:12	08:05
	21:44	29	20:46 (2)	21:08		20:02	18:49	16:40	15:57
3	04:49		20:17 (2)	05:30		06:23	07:16	07:14	08:07
	21:44	28	20:45 (2)	21:06		20:00	18:47	16:38	15:57
4	04:50		20:17 (2)	05:31		06:25	07:18	07:15	08:08
	21:43	29	20:46 (2)	21:05		19:57	18:44	16:36	15:56
5	04:50		20:17 (2)	05:33		06:27	07:19	07:17	08:10
	21:43	29	20:46 (2)	21:03		19:55	18:42	16:34	15:55
6	04:51		20:18 (2)	05:35		06:29	07:21	07:19	08:11
	21:42	28	20:46 (2)	21:01		19:52	18:39	16:32	15:55
7	04:52		20:18 (2)	05:36		06:30	07:23	07:21	08:12
	21:41	29	20:47 (2)	20:59		19:50	18:37	16:30	15:54
8	04:53		20:18 (2)	05:38		06:32	07:25	07:23	08:14
	21:41	29	20:47 (2)	20:57		19:48	18:35	16:28	15:54
9	04:54		20:18 (2)	05:40		06:34	07:27	07:25	08:15
	21:40	29	20:47 (2)	20:55		19:45	18:32	16:27	15:54
10	04:55		20:19 (2)	05:42		19:44 (1)	06:36	07:28	07:27	08:16
	21:39	28	20:47 (2)	20:53	4	19:48 (1)	19:43	18:30	16:25	15:53
11	04:56		20:19 (2)	05:43		19:40 (1)	06:37	07:30	07:29	08:17
	21:38	28	20:47 (2)	20:51	11	19:51 (1)	19:40	18:27	16:23	15:53
12	04:58		20:19 (2)	05:45		19:39 (1)	06:39	07:32	07:31	08:18
	21:37	28	20:47 (2)	20:49	14	19:53 (1)	19:38	18:25	16:22	15:53
13	04:59		20:19 (2)	05:47		19:37 (1)	06:41	07:34	07:33	08:19
	21:37	28	20:47 (2)	20:47	17	19:54 (1)	19:35	18:23	16:20	15:53
14	05:00		20:19 (2)	05:48		19:36 (1)	06:42	07:36	07:34	08:20
	21:36	28	20:47 (2)	20:45	19	19:55 (1)	19:33	18:21	16:18	15:53
15	05:01		20:19 (2)	05:50		19:35 (1)	06:44	07:38	07:36	08:21
	21:34	28	20:47 (2)	20:43	21	19:56 (1)	19:30	18:18	16:17	15:53
16	05:03		20:19 (2)	05:52		19:35 (1)	06:46	07:39	07:38	08:22
	21:33	27	20:46 (2)	20:40	21	19:56 (1)	19:28	18:16	16:15	15:53
17	05:04		20:20 (2)	05:54		19:34 (1)	06:48	07:41	07:40	08:23
	21:32	27	20:47 (2)	20:38	22	19:56 (1)	19:26	18:14	16:14	15:53
18	05:05		20:21 (2)	05:55		19:33 (1)	06:49	07:43	07:42	08:24
	21:31	26	20:47 (2)	20:36	23	19:56 (1)	19:23	18:11	16:12	15:53
19	05:07		20:21 (2)	05:57		19:33 (1)	06:51	07:45	07:44	08:25
	21:30	25	20:46 (2)	20:34	22	19:55 (1)	19:21	18:09	16:11	15:54
20	05:08		20:21 (2)	05:59		19:33 (1)	06:53	07:47	07:45	08:25
	21:28	24	20:45 (2)	20:32	22	19:55 (1)	19:18	18:07	16:10	15:54
21	05:09		20:22 (2)	06:01		19:33 (1)	06:55	07:49	07:47	08:26
	21:27	24	20:46 (2)	20:30	22	19:55 (1)	19:16	18:05	16:08	15:54
22	05:11		20:23 (2)	06:02		19:33 (1)	06:56	07:51	07:49	08:26
	21:26	22	20:45 (2)	20:27	21	19:54 (1)	19:13	18:02	16:07	15:55
23	05:12		20:24 (2)	06:04		19:34 (1)	06:58	07:53	07:51	08:27
	21:24	20	20:44 (2)	20:25	19	19:53 (1)	19:11	18:00	16:06	15:55
24	05:14		20:25 (2)	06:06		19:35 (1)	07:00	07:54	07:52	08:27
	21:23	18	20:43 (2)	20:23	17	19:52 (1)	19:08	17:58	16:05	15:56
25	05:15		20:26 (2)	06:08		19:35 (1)	07:02	06:56	07:54	08:28
	21:21	15	20:41 (2)	20:21	15	19:50 (1)	19:06	16:56	16:04	15:57
26	05:17		20:28 (2)	06:09		19:37 (1)	07:03	06:58	07:56	08:28
	21:20	12	20:40 (2)	20:18	11	19:48 (1)	19:04	16:54	16:03	15:57
27	05:18		20:30 (2)	06:11			07:05	07:00	07:58	08:28
	21:18	7	20:37 (2)	20:16			19:01	16:52	16:02	15:58
28	05:20			06:13			07:07	07:02	07:59	08:28
	21:17			20:14			18:59	16:50	16:01	15:59
29	05:22			06:15			07:09	07:04	08:01	08:29
	21:15			20:11			18:56	16:48	16:00	16:00
30	05:23			06:16			07:11	07:06	08:02	08:29
	21:13			20:09			18:54	16:46	15:59	16:01
31	05:25			06:18				07:08		08:29
	21:12			20:07				16:44		16:02
Sonnenscheinstunden	510			459			382	329	260	235	
astr.max.mögl.Beschattung		673			301						
Red.Sonnenscheinwahrsch.		0.45			0.49						
Reduktion Betriebsdauer		0.91			0.91						
Reduktion Windrichtung		0.65			0.66						
Gesamte Reduktion		0.26			0.29						
Met.wahrsch.Beschattung		178			89						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DF - IO110

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April			Mai			Juni		
1	08:29	07:59	07:02	06:48			05:40		19:30 (1)	04:51		20:16 (2)
	16:03	16:54	17:49	19:46			20:41	20	19:50 (1)	21:30	27	20:43 (2)
2	08:28	07:57	07:00	06:46			05:38		19:31 (1)	04:50		20:17 (2)
	16:04	16:56	17:50	19:48			20:42	22	20:12 (3)	21:31	27	20:44 (2)
3	08:28	07:56	06:58	06:43			05:36		19:32 (1)	04:49		20:17 (2)
	16:05	16:57	17:52	19:50			20:44	24	20:14 (3)	21:32	27	20:44 (2)
4	08:28	07:54	06:55	06:41			05:34		19:33 (1)	04:48		20:16 (2)
	16:06	16:59	17:54	19:52			20:46	26	20:16 (3)	21:33	28	20:44 (2)
5	08:28	07:52	06:53	06:38			05:32		19:36 (1)	04:48		20:17 (2)
	16:08	17:01	17:56	19:53			20:48	24	20:18 (3)	21:34	28	20:45 (2)
6	08:27	07:50	06:51	06:36			05:30		20:01 (3)	04:47		20:17 (2)
	16:09	17:03	17:58	19:55			20:50	18	20:19 (3)	21:35	28	20:45 (2)
7	08:27	07:49	06:48	06:34			05:28		20:00 (3)	04:46		20:16 (2)
	16:10	17:05	18:00	19:57			20:51	19	20:19 (3)	21:36	29	20:45 (2)
8	08:26	07:47	06:46	06:31			05:26		20:00 (3)	04:46		20:17 (2)
	16:12	17:07	18:02	19:59			20:53	19	20:19 (3)	21:37	29	20:46 (2)
9	08:26	07:45	06:44	06:29			05:24		20:00 (3)	04:45		20:17 (2)
	16:13	17:09	18:04	20:01			20:55	20	20:20 (3)	21:38	29	20:46 (2)
10	08:25	07:43	06:41	06:27			05:22		20:00 (3)	04:45		20:17 (2)
	16:15	17:11	18:06	20:03			20:57	20	20:20 (3)	21:39	29	20:46 (2)
11	08:25	07:41	06:39	06:24			05:21		19:59 (3)	04:44		20:17 (2)
	16:16	17:13	18:07	20:04			20:58	20	20:19 (3)	21:40	30	20:47 (2)
12	08:24	07:39	06:37	06:22			05:19		20:00 (3)	04:44		20:18 (2)
	16:18	17:15	18:09	20:06			21:00	20	20:20 (3)	21:41	29	20:47 (2)
13	08:23	07:37	06:34	06:20			05:17		20:00 (3)	04:44		20:17 (2)
	16:19	17:17	18:11	20:08			21:02	19	20:19 (3)	21:41	30	20:47 (2)
14	08:22	07:35	06:32	06:17			05:15		20:01 (3)	04:43		20:17 (2)
	16:21	17:19	18:13	20:10			21:03	18	20:19 (3)	21:42	30	20:47 (2)
15	08:21	07:33	06:29	06:15			05:14		20:01 (3)	04:43		20:18 (2)
	16:22	17:21	18:15	20:12			21:05	17	20:18 (3)	21:43	29	20:47 (2)
16	08:20	07:31	06:27	06:13			05:12		20:02 (3)	04:43		20:18 (2)
	16:24	17:23	18:17	20:13			21:07	16	20:18 (3)	21:43	30	20:48 (2)
17	08:19	07:29	06:25	06:10			05:10		20:02 (3)	04:43		20:18 (2)
	16:26	17:25	18:19	20:15			21:08	15	20:17 (3)	21:44	30	20:48 (2)
18	08:18	07:27	06:22	06:08		19:40 (1)	05:09		20:04 (3)	04:43		20:18 (2)
	16:28	17:27	18:21	20:17	5	19:45 (1)	21:10	12	20:16 (3)	21:44	30	20:48 (2)
19	08:17	07:25	06:20	06:06		19:36 (1)	05:07		20:04 (3)	04:43		20:19 (2)
	16:29	17:29	18:22	20:19	12	19:48 (1)	21:11	11	20:15 (3)	21:44	29	20:48 (2)
20	08:16	07:22	06:17	06:03		19:34 (1)	05:06		20:07 (3)	04:43		20:19 (2)
	16:31	17:31	18:24	20:21	16	19:50 (1)	21:13	6	20:13 (3)	21:45	29	20:48 (2)
21	08:15	07:20	06:15	06:01		19:33 (1)	05:04		20:26 (2)	04:43		20:19 (2)
	16:33	17:33	18:26	20:23	18	19:51 (1)	21:15	6	20:32 (2)	21:45	29	20:48 (2)
22	08:14	07:18	06:12	05:59		19:31 (1)	05:03		20:23 (2)	04:43		20:20 (2)
	16:35	17:35	18:28	20:24	20	19:51 (1)	21:16	11	20:34 (2)	21:45	29	20:49 (2)
23	08:12	07:16	06:10	05:57		19:30 (1)	05:01		20:21 (2)	04:43		20:20 (2)
	16:36	17:37	18:30	20:26	22	19:52 (1)	21:18	15	20:36 (2)	21:45	29	20:49 (2)
24	08:11	07:14	06:08	05:55		19:30 (1)	05:00		20:20 (2)	04:44		20:19 (2)
	16:38	17:39	18:32	20:28	22	19:52 (1)	21:19	18	20:38 (2)	21:45	30	20:49 (2)
25	08:10	07:11	06:05	05:52		19:29 (1)	04:59		20:19 (2)	04:44		20:20 (2)
	16:40	17:41	18:33	20:30	23	19:52 (1)	21:21	20	20:39 (2)	21:45	30	20:50 (2)
26	08:08	07:09	06:03	05:50		19:29 (1)	04:58		20:19 (2)	04:44		20:20 (2)
	16:42	17:43	18:35	20:32	23	19:52 (1)	21:22	21	20:40 (2)	21:45	30	20:50 (2)
27	08:07	07:07	06:00	05:48		19:29 (1)	04:56		20:18 (2)	04:45		20:21 (2)
	16:44	17:45	18:37	20:33	23	19:52 (1)	21:23	23	20:41 (2)	21:45	29	20:50 (2)
28	08:05	07:05	05:58	05:46		19:29 (1)	04:55		20:18 (2)	04:45		20:21 (2)
	16:46	17:47	18:39	20:35	23	19:52 (1)	21:25	23	20:41 (2)	21:45	29	20:50 (2)
29	08:04		06:55	05:44		19:29 (1)	04:54		20:17 (2)	04:46		20:21 (2)
	16:48		19:41	20:37	22	19:51 (1)	21:26	25	20:42 (2)	21:45	30	20:51 (2)
30	08:02		06:53	05:42		19:30 (1)	04:53		20:17 (2)	04:47		20:21 (2)
	16:50		19:42	20:39	21	19:51 (1)	21:27	25	20:42 (2)	21:45	29	20:50 (2)
31	08:01		06:51				04:52		20:17 (2)			
	16:52		19:44				21:29	26	20:43 (2)			
Sonnenscheinstunden	252	274	367	419			492			508		
astr.max.mögl.Beschattung					250			579			671	
Red.Sonnenscheinwahrsch.					0.41			0.51			0.45	
Reduktion Betriebsdauer					0.91			0.91			0.91	
Reduktion Windrichtung					0.66			0.66			0.65	
Gesamte Reduktion					0.25			0.31			0.27	
Met.wahrsch.Beschattung					62			177			234	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang		(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende		(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DF - IO110

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		Septembe	Oktober	November	Dezember
1	04:47		20:21 (2)	05:26		20:10 (3)	06:20	07:12	07:10	08:04
	21:45	30	20:51 (2)	21:10	20	20:30 (3)	20:04	18:51	16:42	15:58
2	04:48		20:22 (2)	05:28		20:10 (3)	06:22	07:14	07:12	08:05
	21:44	29	20:51 (2)	21:08	20	20:30 (3)	20:02	18:49	16:40	15:57
3	04:49		20:21 (2)	05:30		20:10 (3)	06:23	07:16	07:14	08:07
	21:44	30	20:51 (2)	21:06	20	20:30 (3)	20:00	18:47	16:38	15:57
4	04:50		20:22 (2)	05:31		20:10 (3)	06:25	07:18	07:15	08:08
	21:43	29	20:51 (2)	21:05	19	20:29 (3)	19:57	18:44	16:36	15:56
5	04:50		20:22 (2)	05:33		20:10 (3)	06:27	07:19	07:17	08:10
	21:43	29	20:51 (2)	21:03	19	20:29 (3)	19:55	18:42	16:34	15:55
6	04:51		20:23 (2)	05:35		20:10 (3)	06:29	07:21	07:19	08:11
	21:42	29	20:52 (2)	21:01	18	20:28 (3)	19:52	18:39	16:32	15:55
7	04:52		20:23 (2)	05:36		20:11 (3)	06:30	07:23	07:21	08:12
	21:41	29	20:52 (2)	20:59	17	20:28 (3)	19:50	18:37	16:30	15:54
8	04:53		20:24 (2)	05:38		19:45 (1)	06:32	07:25	07:23	08:14
	21:41	28	20:52 (2)	20:57	24	20:27 (3)	19:48	18:35	16:28	15:54
9	04:54		20:24 (2)	05:40		19:42 (1)	06:34	07:27	07:25	08:15
	21:40	28	20:52 (2)	20:55	25	20:24 (3)	19:45	18:32	16:27	15:54
10	04:55		20:24 (2)	05:42		19:41 (1)	06:36	07:28	07:27	08:16
	21:39	28	20:52 (2)	20:53	24	20:23 (3)	19:43	18:30	16:25	15:53
11	04:56		20:25 (2)	05:43		19:39 (1)	06:37	07:30	07:29	08:17
	21:38	27	20:52 (2)	20:51	19	19:58 (1)	19:40	18:27	16:23	15:53
12	04:58		20:25 (2)	05:45		19:38 (1)	06:39	07:32	07:31	08:18
	21:37	26	20:51 (2)	20:49	21	19:59 (1)	19:38	18:25	16:22	15:53
13	04:59		20:25 (2)	05:47		19:38 (1)	06:41	07:34	07:33	08:19
	21:37	26	20:51 (2)	20:47	21	19:59 (1)	19:35	18:23	16:20	15:53
14	05:00		20:26 (2)	05:48		19:37 (1)	06:42	07:36	07:34	08:20
	21:36	25	20:51 (2)	20:45	22	19:59 (1)	19:33	18:21	16:18	15:53
15	05:01		20:26 (2)	05:50		19:37 (1)	06:44	07:38	07:36	08:21
	21:34	24	20:50 (2)	20:43	22	19:59 (1)	19:30	18:18	16:17	15:53
16	05:03		20:27 (2)	05:52		19:37 (1)	06:46	07:39	07:38	08:22
	21:33	23	20:50 (2)	20:41	23	20:00 (1)	19:28	18:16	16:15	15:53
17	05:04		20:28 (2)	05:54		19:36 (1)	06:48	07:41	07:40	08:23
	21:32	22	20:50 (2)	20:38	23	19:59 (1)	19:26	18:14	16:14	15:53
18	05:05		20:29 (2)	05:55		19:36 (1)	06:49	07:43	07:42	08:24
	21:31	20	20:49 (2)	20:36	23	19:59 (1)	19:23	18:11	16:12	15:53
19	05:07		20:29 (2)	05:57		19:36 (1)	06:51	07:45	07:44	08:25
	21:30	19	20:48 (2)	20:34	23	19:59 (1)	19:21	18:09	16:11	15:54
20	05:08		20:30 (2)	05:59		19:36 (1)	06:53	07:47	07:45	08:25
	21:28	17	20:47 (2)	20:32	21	19:57 (1)	19:18	18:07	16:10	15:54
21	05:09		20:32 (2)	06:01		19:37 (1)	06:55	07:49	07:47	08:26
	21:27	14	20:46 (2)	20:30	20	19:57 (1)	19:16	18:05	16:08	15:54
22	05:11		20:34 (2)	06:02		19:37 (1)	06:56	07:51	07:49	08:26
	21:26	10	20:44 (2)	20:27	18	19:55 (1)	19:13	18:02	16:07	15:55
23	05:12		20:20 (3)	06:04		19:38 (1)	06:58	07:53	07:51	08:27
	21:24	2	20:22 (3)	20:25	16	19:54 (1)	19:11	18:00	16:06	15:55
24	05:14		20:16 (3)	06:06		19:40 (1)	07:00	07:54	07:52	08:27
	21:23	8	20:24 (3)	20:23	12	19:52 (1)	19:08	17:58	16:05	15:56
25	05:15		20:14 (3)	06:08		19:44 (1)	07:02	06:56	07:54	08:28
	21:21	12	20:26 (3)	20:21	3	19:47 (1)	19:06	16:56	16:04	15:57
26	05:17		20:13 (3)	06:09			07:03	06:58	07:56	08:28
	21:20	14	20:27 (3)	20:18			19:04	16:54	16:03	15:57
27	05:18		20:12 (3)	06:11			07:05	07:00	07:58	08:28
	21:18	16	20:28 (3)	20:16			19:01	16:52	16:02	15:58
28	05:20		20:12 (3)	06:13			07:07	07:02	07:59	08:28
	21:17	17	20:29 (3)	20:14			18:59	16:50	16:01	15:59
29	05:22		20:11 (3)	06:15			07:09	07:04	08:01	08:29
	21:15	18	20:29 (3)	20:11			18:56	16:48	16:00	16:00
30	05:23		20:11 (3)	06:16			07:11	07:06	08:02	08:29
	21:13	19	20:30 (3)	20:09			18:54	16:46	15:59	16:01
31	05:25		20:10 (3)	06:18				07:08		08:29
	21:12	20	20:30 (3)	20:07				16:44		16:02
Sonnenscheinstunden	510			459		382	329	260		235
astr.max.mögl.Beschattung		668			493					
Red.Sonnenscheinwahrsch.		0.45			0.49					
Reduktion Betriebsdauer		0.91			0.91					
Reduktion Windrichtung		0.65			0.66					
Gesamte Reduktion		0.26			0.29					
Met.wahrsch.Beschattung		176			145					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DG - IO111

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März		April			Mai			Juni		
1	08:29	07:59		07:02		06:48			05:40		19:36 (1)	04:51		20:33 (2)
	16:03	16:54		17:49		19:46			20:41	24	20:00 (1)	21:30	14	20:47 (2)
2	08:28	07:57		07:00		06:46			05:38		19:36 (1)	04:50		20:33 (2)
	16:04	16:56		17:50		19:48			20:42	23	19:59 (1)	21:31	16	20:49 (2)
3	08:28	07:56		06:58		06:43			05:36		19:36 (1)	04:49		20:32 (2)
	16:05	16:57		17:52		19:50			20:44	23	19:59 (1)	21:32	18	20:50 (2)
4	08:28	07:54		06:55		06:41			05:34		19:36 (1)	04:48		20:31 (2)
	16:06	16:59		17:54		19:52			20:46	22	19:58 (1)	21:33	19	20:50 (2)
5	08:28	07:52		06:53		06:38			05:32		19:38 (1)	04:48		20:31 (2)
	16:08	17:01		17:56		19:53			20:48	21	19:59 (1)	21:34	20	20:51 (2)
6	08:27	07:50		06:51		06:36			05:30		19:38 (1)	04:47		20:30 (2)
	16:09	17:03		17:58		19:55			20:50	24	20:19 (3)	21:35	22	20:52 (2)
7	08:27	07:49		06:48		06:34			05:28		19:38 (1)	04:46		20:30 (2)
	16:10	17:05		18:00		19:57			20:51	28	20:21 (3)	21:36	22	20:52 (2)
8	08:26	07:47		06:46		06:31			05:26		19:39 (1)	04:46		20:30 (2)
	16:12	17:07		18:02		19:59			20:53	28	20:22 (3)	21:37	23	20:53 (2)
9	08:26	07:45		06:44		06:29			05:24		19:41 (1)	04:45		20:30 (2)
	16:13	17:09		18:04		20:01			20:55	29	20:24 (3)	21:38	24	20:54 (2)
10	08:25	07:43		06:41		06:27			05:22		19:43 (1)	04:45		20:30 (2)
	16:15	17:11		18:06		20:03			20:57	26	20:25 (3)	21:39	24	20:54 (2)
11	08:25	07:41		06:39		06:24			05:21		20:07 (3)	04:44		20:30 (2)
	16:16	17:13		18:07		20:04			20:58	18	20:25 (3)	21:40	24	20:54 (2)
12	08:24	07:39		06:37		06:22			05:19		20:07 (3)	04:44		20:30 (2)
	16:18	17:15		18:09		20:06			21:00	20	20:27 (3)	21:41	25	20:55 (2)
13	08:23	07:37		06:34		06:20			05:17		20:07 (3)	04:44		20:30 (2)
	16:19	17:17		18:11		20:08			21:02	19	20:26 (3)	21:41	25	20:55 (2)
14	08:22	07:35		06:32		06:17			05:15		20:07 (3)	04:43		20:30 (2)
	16:21	17:19		18:13		20:10			21:03	20	20:27 (3)	21:42	25	20:55 (2)
15	08:21	07:33		06:29		06:15			05:14		20:07 (3)	04:43		20:30 (2)
	16:22	17:21		18:15		20:12			21:05	20	20:27 (3)	21:43	26	20:56 (2)
16	08:20	07:31		06:27		06:13			05:12		20:07 (3)	04:43		20:30 (2)
	16:24	17:23		18:17		20:13			21:07	20	20:27 (3)	21:43	26	20:56 (2)
17	08:19	07:29		06:25		06:10			05:10		20:07 (3)	04:43		20:30 (2)
	16:26	17:25		18:19		20:15			21:08	19	20:26 (3)	21:44	26	20:56 (2)
18	08:18	07:27		06:22		06:08			05:09		20:07 (3)	04:43		20:30 (2)
	16:28	17:27		18:21		20:17			21:10	20	20:27 (3)	21:44	26	20:56 (2)
19	08:17	07:25		06:20		06:06			05:07		20:07 (3)	04:43		20:31 (2)
	16:29	17:29		18:22		20:19			21:11	19	20:26 (3)	21:44	26	20:57 (2)
20	08:16	07:22		06:17		06:03			05:06		20:08 (3)	04:43		20:31 (2)
	16:31	17:31		18:24		20:21			21:13	18	20:26 (3)	21:45	26	20:57 (2)
21	08:15	07:20		06:15		06:01			05:04		20:09 (3)	04:43		20:31 (2)
	16:33	17:33		18:26		20:23			21:15	16	20:25 (3)	21:45	26	20:57 (2)
22	08:14	07:18		06:12		05:59			05:03		20:09 (3)	04:43		20:32 (2)
	16:35	17:35		18:28		20:24			21:16	15	20:24 (3)	21:45	26	20:58 (2)
23	08:12	07:16		06:10		05:57		19:44 (1)	05:01		20:10 (3)	04:43		20:32 (2)
	16:36	17:37		18:30		20:26	10	19:54 (1)	21:18	14	20:24 (3)	21:45	26	20:58 (2)
24	08:11	07:14		06:08		05:55		19:42 (1)	05:00		20:11 (3)	04:44		20:31 (2)
	16:38	17:39		18:32		20:28	14	19:56 (1)	21:19	12	20:23 (3)	21:45	27	20:58 (2)
25	08:10	07:11		06:05		05:52		19:40 (1)	04:59		20:13 (3)	04:44		20:32 (2)
	16:40	17:41		18:33		20:30	18	19:58 (1)	21:21	9	20:22 (3)	21:45	26	20:58 (2)
26	08:08	07:09		06:03		05:50		19:39 (1)	04:58		20:15 (3)	04:44		20:32 (2)
	16:42	17:43		18:35		20:32	20	19:59 (1)	21:22	5	20:20 (3)	21:45	26	20:58 (2)
27	08:07	07:07		06:00		05:48		19:38 (1)	04:56			04:45		20:33 (2)
	16:44	17:45		18:37		20:33	21	19:59 (1)	21:23			21:45	26	20:59 (2)
28	08:05	07:05		05:58		05:46		19:37 (1)	04:55			04:45		20:33 (2)
	16:46	17:47		18:39		20:35	23	20:00 (1)	21:25			21:45	25	20:58 (2)
29	08:04			06:55		05:44		19:37 (1)	04:54			04:46		20:34 (2)
	16:48			19:41		20:37	23	20:00 (1)	21:26			21:45	25	20:59 (2)
30	08:02			06:53		05:42		19:37 (1)	04:53		20:36 (2)	04:47		20:33 (2)
	16:50			19:42		20:39	23	20:00 (1)	21:27	8	20:44 (2)	21:45	25	20:58 (2)
31	08:01			06:51					04:52		20:34 (2)			
	16:52			19:44					21:29	12	20:46 (2)			
Sonnenscheinstunden		252		274		367		419			492			508
astr.max.mögl.Beschattung								152			532			715
Red.Sonnenscheinwahrsch.								0.41			0.51			0.45
Reduktion Betriebsdauer								0.91			0.91			0.91
Reduktion Windrichtung								0.66			0.66			0.64
Gesamte Reduktion								0.25			0.31			0.26
Met.wahrsch.Beschattung								38			164			189

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DG - IO111

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		Septembe	Oktober	November	Dezember
1	04:47		20:34 (2)	05:26		20:18 (3)	06:20	07:12	07:10	08:04
	21:45	25	20:59 (2)	21:10	19	20:37 (3)	20:04	18:51	16:42	15:58
2	04:48		20:35 (2)	05:28		19:55 (1)	06:22	07:14	07:12	08:05
	21:44	24	20:59 (2)	21:08	23	20:36 (3)	20:02	18:49	16:40	15:57
3	04:49		20:35 (2)	05:30		19:52 (1)	06:23	07:16	07:14	08:07
	21:44	23	20:58 (2)	21:06	27	20:35 (3)	20:00	18:47	16:38	15:57
4	04:50		20:35 (2)	05:31		19:50 (1)	06:25	07:18	07:15	08:08
	21:43	23	20:58 (2)	21:05	29	20:33 (3)	19:57	18:44	16:36	15:56
5	04:50		20:36 (2)	05:33		19:49 (1)	06:27	07:19	07:17	08:10
	21:43	22	20:58 (2)	21:03	28	20:32 (3)	19:55	18:42	16:34	15:55
6	04:51		20:37 (2)	05:35		19:48 (1)	06:29	07:21	07:19	08:11
	21:42	21	20:58 (2)	21:01	26	20:30 (3)	19:52	18:39	16:32	15:55
7	04:52		20:37 (2)	05:36		19:47 (1)	06:30	07:23	07:21	08:12
	21:41	21	20:58 (2)	20:59	20	20:07 (1)	19:50	18:37	16:30	15:54
8	04:53		20:38 (2)	05:38		19:47 (1)	06:32	07:25	07:23	08:14
	21:41	20	20:58 (2)	20:57	21	20:06 (1)	19:48	18:35	16:28	15:54
9	04:54		20:39 (2)	05:40		19:46 (1)	06:34	07:27	07:25	08:15
	21:40	18	20:57 (2)	20:55	22	20:08 (1)	19:45	18:32	16:27	15:54
10	04:55		20:40 (2)	05:42		19:46 (1)	06:36	07:28	07:27	08:16
	21:39	17	20:57 (2)	20:53	23	20:09 (1)	19:43	18:30	16:25	15:53
11	04:56		20:41 (2)	05:43		19:45 (1)	06:37	07:30	07:29	08:17
	21:38	15	20:56 (2)	20:51	23	20:08 (1)	19:40	18:27	16:23	15:53
12	04:58		20:42 (2)	05:45		19:45 (1)	06:39	07:32	07:31	08:18
	21:37	13	20:55 (2)	20:49	23	20:08 (1)	19:38	18:25	16:22	15:53
13	04:59		20:43 (2)	05:47		19:45 (1)	06:41	07:34	07:33	08:19
	21:37	11	20:54 (2)	20:47	23	20:08 (1)	19:35	18:23	16:20	15:53
14	05:00		20:45 (2)	05:48		19:45 (1)	06:42	07:36	07:34	08:20
	21:36	7	20:52 (2)	20:45	22	20:07 (1)	19:33	18:21	16:18	15:53
15	05:01			05:50		19:45 (1)	06:44	07:38	07:36	08:21
	21:34			20:43	22	20:07 (1)	19:30	18:18	16:17	15:53
16	05:03			05:52		19:46 (1)	06:46	07:39	07:38	08:22
	21:33			20:41	21	20:07 (1)	19:28	18:16	16:15	15:53
17	05:04		20:26 (3)	05:54		19:46 (1)	06:48	07:41	07:40	08:23
	21:32	2	20:28 (3)	20:38	19	20:05 (1)	19:26	18:14	16:14	15:53
18	05:05		20:23 (3)	05:55		19:47 (1)	06:49	07:43	07:42	08:24
	21:31	8	20:31 (3)	20:36	17	20:04 (1)	19:23	18:11	16:12	15:53
19	05:07		20:21 (3)	05:57		19:49 (1)	06:51	07:45	07:44	08:25
	21:30	11	20:32 (3)	20:34	14	20:03 (1)	19:21	18:09	16:11	15:54
20	05:08		20:20 (3)	05:59		19:50 (1)	06:53	07:47	07:45	08:25
	21:28	13	20:33 (3)	20:32	10	20:00 (1)	19:18	18:07	16:10	15:54
21	05:09		20:20 (3)	06:01			06:55	07:49	07:47	08:26
	21:27	14	20:34 (3)	20:30			19:16	18:05	16:08	15:54
22	05:11		20:19 (3)	06:02			06:56	07:51	07:49	08:26
	21:26	16	20:35 (3)	20:27			19:13	18:02	16:07	15:55
23	05:12		20:19 (3)	06:04			06:58	07:53	07:51	08:27
	21:24	17	20:36 (3)	20:25			19:11	18:00	16:06	15:55
24	05:14		20:18 (3)	06:06			07:00	07:54	07:52	08:27
	21:23	18	20:36 (3)	20:23			19:08	17:58	16:05	15:56
25	05:15		20:17 (3)	06:08			07:02	06:56	07:54	08:28
	21:21	19	20:36 (3)	20:21			19:06	16:56	16:04	15:57
26	05:17		20:18 (3)	06:09			07:03	06:58	07:56	08:28
	21:20	19	20:37 (3)	20:18			19:04	16:54	16:03	15:57
27	05:18		20:17 (3)	06:11			07:05	07:00	07:58	08:28
	21:18	20	20:37 (3)	20:16			19:01	16:52	16:02	15:58
28	05:20		20:17 (3)	06:13			07:07	07:02	07:59	08:28
	21:17	20	20:37 (3)	20:14			18:59	16:50	16:01	15:59
29	05:22		20:17 (3)	06:15			07:09	07:04	08:01	08:29
	21:15	20	20:37 (3)	20:11			18:56	16:48	16:00	16:00
30	05:23		20:18 (3)	06:16			07:11	07:06	08:02	08:29
	21:13	19	20:37 (3)	20:09			18:54	16:46	15:59	16:01
31	05:25		20:17 (3)	06:18				07:08		08:29
	21:12	20	20:37 (3)	20:07				16:44		16:02
Sonnenscheinstunden	510			459		382	329	260		235
astr.max.mögl.Beschattung		496			432					
Red.Sonnenscheinwahrsch.		0.45			0.49					
Reduktion Betriebsdauer		0.91			0.91					
Reduktion Windrichtung		0.65			0.66					
Gesamte Reduktion		0.26			0.29					
Met.wahrsch.Beschattung		130			127					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DH - IO112

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März		April			Mai			Juni		
1	08:29	07:59		07:02		06:48			05:40		19:41 (1)	04:51		
	16:03	16:54		17:49		19:46			20:41	23	20:04 (1)	21:30		
2	08:28	07:57		07:00		06:46			05:38		19:41 (1)	04:50		
	16:04	16:56		17:50		19:48			20:42	23	20:04 (1)	21:31		
3	08:28	07:56		06:58		06:43			05:36		19:40 (1)	04:49		
	16:05	16:57		17:52		19:50			20:44	24	20:04 (1)	21:32		
4	08:28	07:54		06:55		06:41			05:34		19:40 (1)	04:48		20:43 (2)
	16:06	16:59		17:54		19:52			20:46	23	20:03 (1)	21:33	6	20:49 (2)
5	08:28	07:52		06:53		06:39			05:32		19:41 (1)	04:48		20:42 (2)
	16:08	17:01		17:56		19:53			20:48	23	20:04 (1)	21:34	10	20:52 (2)
6	08:27	07:50		06:51		06:36			05:30		19:41 (1)	04:47		20:40 (2)
	16:09	17:03		17:58		19:55			20:50	22	20:03 (1)	21:35	13	20:53 (2)
7	08:27	07:49		06:48		06:34			05:28		19:41 (1)	04:46		20:39 (2)
	16:10	17:05		18:00		19:57			20:51	22	20:03 (1)	21:36	14	20:53 (2)
8	08:26	07:47		06:46		06:31			05:26		19:41 (1)	04:46		20:39 (2)
	16:12	17:07		18:02		19:59			20:53	24	20:22 (3)	21:37	16	20:55 (2)
9	08:26	07:45		06:44		06:29			05:24		19:43 (1)	04:45		20:39 (2)
	16:13	17:09		18:04		20:01			20:55	27	20:24 (3)	21:38	17	20:56 (2)
10	08:25	07:43		06:41		06:27			05:22		19:43 (1)	04:45		20:38 (2)
	16:15	17:11		18:06		20:03			20:57	30	20:26 (3)	21:39	18	20:56 (2)
11	08:25	07:41		06:39		06:24			05:21		19:44 (1)	04:44		20:38 (2)
	16:16	17:13		18:07		20:04			20:58	29	20:27 (3)	21:40	19	20:57 (2)
12	08:24	07:39		06:37		06:22			05:19		19:46 (1)	04:44		20:39 (2)
	16:18	17:15		18:09		20:06			21:00	29	20:29 (3)	21:41	19	20:58 (2)
13	08:23	07:37		06:34		06:20			05:17		19:47 (1)	04:44		20:38 (2)
	16:19	17:17		18:11		20:08			21:02	27	20:29 (3)	21:41	19	20:57 (2)
14	08:22	07:35		06:32		06:17			05:15		20:11 (3)	04:43		20:38 (2)
	16:21	17:19		18:13		20:10			21:03	19	20:30 (3)	21:42	20	20:58 (2)
15	08:21	07:33		06:29		06:15			05:14		20:11 (3)	04:43		20:38 (2)
	16:22	17:21		18:15		20:12			21:05	19	20:30 (3)	21:43	21	20:59 (2)
16	08:20	07:31		06:27		06:13			05:12		20:11 (3)	04:43		20:38 (2)
	16:24	17:23		18:17		20:13			21:07	20	20:31 (3)	21:43	21	20:59 (2)
17	08:19	07:29		06:25		06:10			05:10		20:10 (3)	04:43		20:38 (2)
	16:26	17:25		18:19		20:15			21:08	20	20:30 (3)	21:44	21	20:59 (2)
18	08:18	07:27		06:22		06:08			05:09		20:11 (3)	04:43		20:38 (2)
	16:28	17:27		18:21		20:17			21:10	20	20:31 (3)	21:44	22	21:00 (2)
19	08:17	07:25		06:20		06:06			05:07		20:10 (3)	04:43		20:38 (2)
	16:29	17:29		18:22		20:19			21:11	20	20:30 (3)	21:44	22	21:00 (2)
20	08:16	07:22		06:17		06:03			05:06		20:11 (3)	04:43		20:38 (2)
	16:31	17:31		18:24		20:21			21:13	19	20:30 (3)	21:45	22	21:00 (2)
21	08:15	07:20		06:15		06:01			05:04		20:11 (3)	04:43		20:38 (2)
	16:33	17:33		18:26		20:23			21:15	19	20:30 (3)	21:45	22	21:00 (2)
22	08:14	07:18		06:12		05:59			05:03		20:11 (3)	04:43		20:39 (2)
	16:35	17:35		18:28		20:24			21:16	18	20:29 (3)	21:45	22	21:01 (2)
23	08:12	07:16		06:10		05:57			05:01		20:12 (3)	04:43		20:39 (2)
	16:36	17:37		18:30		20:26			21:18	17	20:29 (3)	21:45	22	21:01 (2)
24	08:11	07:14		06:08		05:55			05:00		20:12 (3)	04:44		20:39 (2)
	16:38	17:39		18:32		20:28			21:19	17	20:29 (3)	21:45	22	21:01 (2)
25	08:10	07:11		06:05		05:52		19:49 (1)	04:59		20:13 (3)	04:44		20:40 (2)
	16:40	17:41		18:33		20:30	9	19:58 (1)	21:21	16	20:29 (3)	21:45	21	21:01 (2)
26	08:08	07:09		06:03		05:50		19:46 (1)	04:58		20:14 (3)	04:44		20:40 (2)
	16:42	17:43		18:35		20:32	14	20:00 (1)	21:22	14	20:28 (3)	21:45	21	21:01 (2)
27	08:07	07:07		06:00		05:48		19:45 (1)	04:56		20:15 (3)	04:45		20:41 (2)
	16:44	17:45		18:37		20:33	17	20:02 (1)	21:23	12	20:27 (3)	21:45	21	21:02 (2)
28	08:05	07:05		05:58		05:46		19:43 (1)	04:55		20:16 (3)	04:45		20:41 (2)
	16:46	17:47		18:39		20:35	19	20:02 (1)	21:25	10	20:26 (3)	21:45	20	21:01 (2)
29	08:04			06:55		05:44		19:42 (1)	04:54		20:18 (3)	04:46		20:42 (2)
	16:48			19:41		20:37	21	20:03 (1)	21:26	7	20:25 (3)	21:45	20	21:02 (2)
30	08:02			06:53		05:42		19:42 (1)	04:53		20:21 (3)	04:47		20:42 (2)
	16:50			19:42		20:39	21	20:03 (1)	21:27	1	20:22 (3)	21:45	19	21:01 (2)
31	08:01			06:51					04:52					
	16:52			19:44					21:29					
Sonnenscheinstunden	252	274		367		419			492			508		
astr.max.mögl.Beschattung						101				594			510	
Red.Sonnenscheinwahrsch.						0.41				0.51			0.45	
Reduktion Betriebsdauer						0.91				0.91			0.91	
Reduktion Windrichtung						0.66				0.66			0.63	
Gesamte Reduktion						0.25				0.31			0.26	
Met.wahrsch.Beschattung						25				183			134	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DH - IO112

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli			August			September	Oktober	November	Dezember
1	04:47		20:42 (2)	05:26		19:56 (1)	06:20	07:12	07:10	08:04
	21:45	19	21:01 (2)	21:10	29	20:39 (3)	20:04	18:51	16:42	15:58
2	04:48		20:43 (2)	05:28		19:54 (1)	06:22	07:14	07:12	08:05
	21:44	18	21:01 (2)	21:08	30	20:37 (3)	20:02	18:49	16:40	15:57
3	04:49		20:43 (2)	05:30		19:53 (1)	06:23	07:16	07:14	08:07
	21:44	17	21:00 (2)	21:06	29	20:36 (3)	20:00	18:47	16:38	15:57
4	04:50		20:44 (2)	05:31		19:52 (1)	06:25	07:18	07:15	08:08
	21:43	16	21:00 (2)	21:05	27	20:33 (3)	19:57	18:44	16:36	15:56
5	04:50		20:45 (2)	05:33		19:51 (1)	06:27	07:19	07:17	08:10
	21:43	15	21:00 (2)	21:03	22	20:13 (1)	19:55	18:42	16:34	15:55
6	04:51		20:46 (2)	05:35		19:50 (1)	06:29	07:21	07:19	08:11
	21:42	13	20:59 (2)	21:01	22	20:12 (1)	19:52	18:39	16:32	15:55
7	04:52		20:48 (2)	05:36		19:50 (1)	06:30	07:23	07:21	08:12
	21:41	11	20:59 (2)	20:59	23	20:13 (1)	19:50	18:37	16:30	15:54
8	04:53		20:49 (2)	05:38		19:50 (1)	06:32	07:25	07:23	08:14
	21:41	9	20:58 (2)	20:57	23	20:13 (1)	19:48	18:35	16:28	15:54
9	04:54		20:52 (2)	05:40		19:49 (1)	06:34	07:27	07:25	08:15
	21:40	3	20:55 (2)	20:55	24	20:13 (1)	19:45	18:32	16:27	15:54
10	04:55			05:42		19:50 (1)	06:36	07:28	07:27	08:16
	21:39			20:53	23	20:13 (1)	19:43	18:30	16:25	15:53
11	04:56			05:43		19:49 (1)	06:37	07:30	07:29	08:17
	21:38			20:51	23	20:12 (1)	19:40	18:27	16:23	15:53
12	04:58			05:45		19:50 (1)	06:39	07:32	07:31	08:18
	21:37			20:49	22	20:12 (1)	19:38	18:25	16:22	15:53
13	04:59			05:47		19:50 (1)	06:41	07:34	07:33	08:19
	21:37			20:47	22	20:12 (1)	19:35	18:23	16:20	15:53
14	05:00		20:27 (3)	05:48		19:50 (1)	06:42	07:36	07:34	08:20
	21:36	6	20:33 (3)	20:45	20	20:10 (1)	19:33	18:21	16:18	15:53
15	05:01		20:25 (3)	05:50		19:51 (1)	06:44	07:38	07:36	08:21
	21:34	9	20:34 (3)	20:43	19	20:10 (1)	19:30	18:18	16:17	15:53
16	05:03		20:24 (3)	05:52		19:52 (1)	06:46	07:39	07:38	08:22
	21:33	11	20:35 (3)	20:41	17	20:09 (1)	19:28	18:16	16:15	15:53
17	05:04		20:24 (3)	05:54		19:53 (1)	06:48	07:41	07:40	08:23
	21:32	13	20:37 (3)	20:38	13	20:06 (1)	19:26	18:14	16:14	15:53
18	05:05		20:23 (3)	05:55		19:56 (1)	06:49	07:43	07:42	08:24
	21:31	15	20:38 (3)	20:36	8	20:04 (1)	19:23	18:11	16:12	15:53
19	05:07		20:22 (3)	05:57			06:51	07:45	07:44	08:25
	21:30	16	20:38 (3)	20:34			19:21	18:09	16:11	15:54
20	05:08		20:22 (3)	05:59			06:53	07:47	07:45	08:25
	21:28	17	20:39 (3)	20:32			19:18	18:07	16:10	15:54
21	05:09		20:22 (3)	06:01			06:55	07:49	07:47	08:26
	21:27	18	20:40 (3)	20:30			19:16	18:05	16:08	15:54
22	05:11		20:21 (3)	06:02			06:56	07:51	07:49	08:26
	21:26	19	20:40 (3)	20:27			19:13	18:02	16:07	15:55
23	05:12		20:22 (3)	06:04			06:58	07:53	07:51	08:27
	21:24	19	20:41 (3)	20:25			19:11	18:00	16:06	15:55
24	05:14		20:21 (3)	06:06			07:00	07:54	07:52	08:27
	21:23	20	20:41 (3)	20:23			19:08	17:58	16:05	15:56
25	05:15		20:21 (3)	06:08			07:02	06:56	07:54	08:28
	21:21	19	20:40 (3)	20:21			19:06	16:56	16:04	15:57
26	05:17		20:21 (3)	06:09			07:03	06:58	07:56	08:28
	21:20	20	20:41 (3)	20:18			19:04	16:54	16:03	15:57
27	05:18		20:21 (3)	06:11			07:05	07:00	07:58	08:28
	21:18	20	20:41 (3)	20:16			19:01	16:52	16:02	15:58
28	05:20		20:21 (3)	06:13			07:07	07:02	07:59	08:28
	21:17	20	20:41 (3)	20:14			18:59	16:50	16:01	15:59
29	05:22		20:21 (3)	06:15			07:09	07:04	08:01	08:29
	21:15	19	20:40 (3)	20:11			18:56	16:48	16:00	16:00
30	05:23		20:00 (1)	06:16			07:11	07:06	08:02	08:29
	21:13	23	20:40 (3)	20:09			18:54	16:46	15:59	16:01
31	05:25		19:57 (1)	06:18				07:08		08:29
	21:12	27	20:39 (3)	20:07				16:44		16:02
Sonnenscheinstunden	510			459			382	329	260	235
astr.max.mögl.Beschattung		432			396					
Red.Sonnenscheinwahrsch.		0.45			0.49					
Reduktion Betriebsdauer		0.91			0.91					
Reduktion Windrichtung		0.65			0.66					
Gesamte Reduktion		0.26			0.29					
Met.wahrsch.Beschattung		114			117					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DI - IO113

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40			04:51		
	16:03		16:54		17:49		19:46			20:41	28	19:58 (1)	21:30	28	20:39 (3)
2	08:28		07:57		07:00		06:46			05:38		19:29 (1)	04:50		20:12 (3)
	16:04		16:56		17:50		19:48			20:42	29	19:58 (1)	21:31	27	20:39 (3)
3	08:28		07:56		06:58		06:43			05:36		19:29 (1)	04:49		20:12 (3)
	16:05		16:58		17:52		19:50			20:44	30	19:59 (1)	21:32	27	20:39 (3)
4	08:28		07:54		06:55		06:41			05:34		19:29 (1)	04:49		20:12 (3)
	16:06		16:59		17:54		19:52			20:46	31	20:00 (1)	21:33	27	20:39 (3)
5	08:28		07:52		06:53		06:39			05:32		19:28 (1)	04:48		20:13 (3)
	16:08		17:01		17:56		19:53			20:48	32	20:00 (1)	21:34	27	20:40 (3)
6	08:27		07:50		06:51		06:36			05:30		19:27 (1)	04:47		20:13 (3)
	16:09		17:03		17:58		19:55			20:50	33	20:00 (1)	21:35	26	20:39 (3)
7	08:27		07:49		06:48		06:34			05:28		19:27 (1)	04:46		20:13 (3)
	16:10		17:05		18:00		19:57			20:51	33	20:00 (1)	21:36	26	20:39 (3)
8	08:26		07:47		06:46		06:31			05:26		19:26 (1)	04:46		20:13 (3)
	16:12		17:07		18:02		19:59			20:53	34	20:00 (1)	21:37	31	21:02 (4)
9	08:26		07:45		06:44		06:29			05:24		19:27 (1)	04:45		20:14 (3)
	16:13		17:09		18:04		20:01			20:55	34	20:01 (1)	21:38	33	21:04 (4)
10	08:25		07:43		06:41		06:27			05:22		19:27 (1)	04:45		20:14 (3)
	16:15		17:11		18:06		20:03			20:57	33	20:00 (1)	21:39	34	21:04 (4)
11	08:25		07:41		06:39		06:24			05:21		19:26 (1)	04:44		20:14 (3)
	16:16		17:13		18:08		20:04			20:58	34	20:00 (1)	21:40	36	21:05 (4)
12	08:24		07:39		06:37		06:22			05:19		19:27 (1)	04:44		20:15 (3)
	16:18		17:15		18:09		20:06			21:00	33	20:00 (1)	21:41	36	21:06 (4)
13	08:23		07:37		06:34		06:20			05:17		19:27 (1)	04:44		20:15 (3)
	16:19		17:17		18:11		20:08			21:02	33	20:00 (1)	21:41	37	21:06 (4)
14	08:22		07:35		06:32		06:17			05:15		19:28 (1)	04:43		20:15 (3)
	16:21		17:19		18:13		20:10			21:03	32	20:00 (1)	21:42	37	21:06 (4)
15	08:21		07:33		06:29		06:15			05:14		19:28 (1)	04:43		20:15 (3)
	16:22		17:21		18:15		20:12			21:05	35	20:26 (3)	21:43	38	21:07 (4)
16	08:20		07:31		06:27		06:13			05:12		19:29 (1)	04:43		20:16 (3)
	16:24		17:23		18:17		20:14			21:07	41	20:30 (3)	21:43	37	21:08 (4)
17	08:19		07:29		06:25		06:10			05:10		19:29 (1)	04:43		20:16 (3)
	16:26		17:25		18:19		20:15			21:08	44	20:31 (3)	21:44	37	21:08 (4)
18	08:18		07:27		06:22		06:08			05:09		19:30 (1)	04:43		20:16 (3)
	16:28		17:27		18:21		20:17			21:10	45	20:33 (3)	21:44	38	21:08 (4)
19	08:17		07:25		06:20		06:06			05:07		19:30 (1)	04:43		20:17 (3)
	16:29		17:29		18:22		20:19			21:11	46	20:33 (3)	21:44	38	21:09 (4)
20	08:16		07:22		06:17		06:04			05:06		19:31 (1)	04:43		20:17 (3)
	16:31		17:31		18:24		20:21			21:13	46	20:34 (3)	21:45	38	21:09 (4)
21	08:15		07:20		06:15		06:01			05:04		19:32 (1)	04:43		20:17 (3)
	16:33		17:33		18:26		20:23			21:15	46	20:35 (3)	21:45	38	21:09 (4)
22	08:14		07:18		06:12		05:59			05:03		19:32 (1)	04:43		20:18 (3)
	16:35		17:35		18:28		20:24			21:16	46	20:35 (3)	21:45	38	21:10 (4)
23	08:12		07:16		06:10		05:57			05:02		19:33 (1)	04:43		20:18 (3)
	16:36		17:37		18:30		20:26			21:18	45	20:36 (3)	21:45	38	21:10 (4)
24	08:11		07:14		06:08		05:55			05:00		19:35 (1)	04:44		20:17 (3)
	16:38		17:39		18:32		20:28			21:19	43	20:37 (3)	21:45	39	21:10 (4)
25	08:10		07:11		06:05		05:52			04:59		19:36 (1)	04:44		20:18 (3)
	16:40		17:41		18:33		20:30			21:21	41	20:37 (3)	21:46	38	21:10 (4)
26	08:08		07:09		06:03		05:50		19:42 (1)	04:58		19:38 (1)	04:44		20:18 (3)
	16:42		17:43		18:35		20:32	6	19:48 (1)	21:22	39	20:38 (3)	21:45	37	21:10 (4)
27	08:07		07:07		06:00		05:48		19:37 (1)	04:56		19:40 (1)	04:45		20:19 (3)
	16:44		17:45		18:37		20:33	15	19:52 (1)	21:23	36	20:38 (3)	21:45	37	21:10 (4)
28	08:05		07:05		05:58		05:46		19:35 (1)	04:55		20:11 (3)	04:45		20:18 (3)
	16:46		17:47		18:39		20:35	19	19:54 (1)	21:25	27	20:38 (3)	21:45	38	21:10 (4)
29	08:04				06:55		05:44		19:33 (1)	04:54		20:11 (3)	04:46		20:19 (3)
	16:48				19:41		20:37	23	19:56 (1)	21:26	27	20:38 (3)	21:45	37	21:10 (4)
30	08:02				06:53		05:42		19:32 (1)	04:53		20:11 (3)	04:47		20:18 (3)
	16:50				19:43		20:39	25	19:57 (1)	21:27	28	20:39 (3)	21:45	36	21:09 (4)
31	08:01				06:51					04:52		20:11 (3)			
	16:52				19:44					21:29	28	20:39 (3)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung								88			1112			1034	
Red.Sonnenscheinwahrsch.								0.41			0.51			0.45	
Reduktion Betriebsdauer								0.91			0.91			0.91	
Reduktion Windrichtung								0.66			0.66			0.64	
Gesamte Reduktion								0.25			0.31			0.27	
Met.wahrsch.Beschattung								22			342			276	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DI - IO113

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September	Oktober	November	Dezember
1	04:47		20:19 (3) | 05:26		19:37 (1) | 06:20	07:12	07:10	08:04
	21:45	35	21:09 (4) | 21:10	34	20:11 (1) | 20:04	18:51	16:42	15:58
2	04:48		20:19 (3) | 05:28		19:37 (1) | 06:22	07:14	07:12	08:05
	21:44	35	21:09 (4) | 21:08	33	20:10 (1) | 20:02	18:49	16:40	15:57
3	04:49		20:18 (3) | 05:30		19:37 (1) | 06:23	07:16	07:14	08:07
	21:44	33	21:08 (4) | 21:06	34	20:11 (1) | 20:00	18:47	16:38	15:57
4	04:50		20:19 (3) | 05:31		19:36 (1) | 06:25	07:18	07:15	08:08
	21:43	32	21:08 (4) | 21:05	34	20:10 (1) | 19:57	18:44	16:36	15:56
5	04:50		20:19 (3) | 05:33		19:37 (1) | 06:27	07:19	07:17	08:10
	21:43	26	20:45 (3) | 21:03	33	20:10 (1) | 19:55	18:42	16:34	15:55
6	04:51		20:19 (3) | 05:35		19:37 (1) | 06:29	07:21	07:19	08:11
	21:42	27	20:46 (3) | 21:01	33	20:10 (1) | 19:52	18:39	16:32	15:55
7	04:52		20:19 (3) | 05:37		19:37 (1) | 06:30	07:23	07:21	08:12
	21:42	27	20:46 (3) | 20:59	33	20:10 (1) | 19:50	18:37	16:30	15:54
8	04:53		20:19 (3) | 05:38		19:38 (1) | 06:32	07:25	07:23	08:14
	21:41	27	20:46 (3) | 20:57	31	20:09 (1) | 19:48	18:35	16:28	15:54
9	04:54		20:20 (3) | 05:40		19:37 (1) | 06:34	07:27	07:25	08:15
	21:40	27	20:47 (3) | 20:55	31	20:08 (1) | 19:45	18:32	16:27	15:54
10	04:55		20:20 (3) | 05:42		19:38 (1) | 06:36	07:29	07:27	08:16
	21:39	27	20:47 (3) | 20:53	30	20:08 (1) | 19:43	18:30	16:25	15:53
11	04:57		20:20 (3) | 05:43		19:38 (1) | 06:37	07:30	07:29	08:17
	21:38	27	20:47 (3) | 20:51	28	20:06 (1) | 19:40	18:28	16:23	15:53
12	04:58		20:20 (3) | 05:45		19:39 (1) | 06:39	07:32	07:31	08:18
	21:38	27	20:47 (3) | 20:49	27	20:06 (1) | 19:38	18:25	16:22	15:53
13	04:59		20:20 (3) | 05:47		19:41 (1) | 06:41	07:34	07:33	08:19
	21:37	27	20:47 (3) | 20:47	24	20:05 (1) | 19:35	18:23	16:20	15:53
14	05:00		20:20 (3) | 05:49		19:41 (1) | 06:43	07:36	07:34	08:20
	21:36	27	20:47 (3) | 20:45	22	20:03 (1) | 19:33	18:21	16:18	15:53
15	05:01		20:20 (3) | 05:50		19:43 (1) | 06:44	07:38	07:36	08:21
	21:34	27	20:47 (3) | 20:43	18	20:01 (1) | 19:30	18:18	16:17	15:53
16	05:03		19:51 (1) | 05:52		19:46 (1) | 06:46	07:40	07:38	08:22
	21:33	32	20:47 (3) | 20:41	13	19:59 (1) | 19:28	18:16	16:15	15:53
17	05:04		19:49 (1) | 05:54		19:50 (1) | 06:48	07:41	07:40	08:23
	21:32	36	20:47 (3) | 20:38	3	19:53 (1) | 19:26	18:14	16:14	15:53
18	05:05		19:47 (1) | 05:55		| 06:49	07:43	07:42	08:24
	21:31	40	20:47 (3) | 20:36		| 19:23	18:11	16:12	15:53
19	05:07		19:45 (1) | 05:57		| 06:51	07:45	07:44	08:25
	21:30	42	20:46 (3) | 20:34		| 19:21	18:09	16:11	15:54
20	05:08		19:45 (1) | 05:59		| 06:53	07:47	07:45	08:25
	21:28	44	20:47 (3) | 20:32		| 19:18	18:07	16:10	15:54
21	05:09		19:43 (1) | 06:01		| 06:55	07:49	07:47	08:26
	21:27	46	20:46 (3) | 20:30		| 19:16	18:05	16:08	15:54
22	05:11		19:42 (1) | 06:02		| 06:56	07:51	07:49	08:26
	21:26	46	20:45 (3) | 20:27		| 19:13	18:03	16:07	15:55
23	05:12		19:42 (1) | 06:04		| 06:58	07:53	07:51	08:27
	21:24	47	20:46 (3) | 20:25		| 19:11	18:00	16:06	15:55
24	05:14		19:41 (1) | 06:06		| 07:00	07:54	07:53	08:27
	21:23	46	20:44 (3) | 20:23		| 19:08	17:58	16:05	15:56
25	05:15		19:40 (1) | 06:08		| 07:02	06:56	07:54	08:28
	21:21	46	20:43 (3) | 20:21		| 19:06	16:56	16:04	15:57
26	05:17		19:40 (1) | 06:09		| 07:03	06:58	07:56	08:28
	21:20	46	20:43 (3) | 20:18		| 19:04	16:54	16:03	15:57
27	05:18		19:39 (1) | 06:11		| 07:05	07:00	07:58	08:28
	21:18	43	20:41 (3) | 20:16		| 19:01	16:52	16:02	15:58
28	05:20		19:39 (1) | 06:13		| 07:07	07:02	07:59	08:28
	21:17	40	20:39 (3) | 20:14		| 18:59	16:50	16:01	15:59
29	05:22		19:38 (1) | 06:15		| 07:09	07:04	08:01	08:29
	21:15	32	20:10 (1) | 20:11		| 18:56	16:48	16:00	16:00
30	05:23		19:38 (1) | 06:16		| 07:11	07:06	08:02	08:29
	21:13	32	20:10 (1) | 20:09		| 18:54	16:46	15:59	16:01
31	05:25		19:37 (1) | 06:18			07:08		08:29
	21:12	33	20:10 (1) | 20:07			16:44		16:02
Sonnenscheinstunden	510		459		382	329	260	235
astr.max.mögl.Beschattung		1082		461				
Red.Sonnenscheinwahrsch.		0.45		0.49				
Reduktion Betriebsdauer		0.91		0.91				
Reduktion Windrichtung		0.66		0.66				
Gesamte Reduktion		0.27		0.29				
Met.wahrsch.Beschattung		288		136				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DJ - IO114

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April		Mai			Juni		
1	08:29		07:59		07:02		06:48		05:40			04:51		19:41 (1)
	16:03		16:54		17:49		19:46		20:41			21:30	51	20:46 (3)
2	08:28		07:57		07:00		06:46		05:38		19:48 (1)	04:50		19:42 (1)
	16:04		16:56		17:50		19:48		20:42	10	19:58 (1)	21:31	50	20:47 (3)
3	08:28		07:56		06:58		06:43		05:36		19:44 (1)	04:49		19:42 (1)
	16:05		16:58		17:52		19:50		20:44	17	20:01 (1)	21:32	52	20:48 (3)
4	08:28		07:54		06:55		06:41		05:34		19:43 (1)	04:49		19:43 (1)
	16:06		16:59		17:54		19:52		20:46	21	20:04 (1)	21:33	50	20:48 (3)
5	08:28		07:52		06:53		06:39		05:32		19:41 (1)	04:48		19:44 (1)
	16:08		17:01		17:56		19:53		20:48	24	20:05 (1)	21:34	49	20:49 (3)
6	08:27		07:50		06:51		06:36		05:30		19:40 (1)	04:47		19:45 (1)
	16:09		17:03		17:58		19:55		20:50	26	20:06 (1)	21:35	48	20:48 (3)
7	08:27		07:49		06:48		06:34		05:28		19:39 (1)	04:46		19:45 (1)
	16:10		17:05		18:00		19:57		20:51	28	20:07 (1)	21:36	47	20:48 (3)
8	08:26		07:47		06:46		06:31		05:26		19:38 (1)	04:46		19:46 (1)
	16:12		17:07		18:02		19:59		20:53	29	20:07 (1)	21:37	47	20:49 (3)
9	08:26		07:45		06:44		06:29		05:24		19:38 (1)	04:45		19:47 (1)
	16:13		17:09		18:04		20:01		20:55	30	20:08 (1)	21:38	46	20:50 (3)
10	08:25		07:43		06:41		06:27		05:22		19:37 (1)	04:45		19:48 (1)
	16:15		17:11		18:06		20:03		20:57	32	20:09 (1)	21:39	44	20:49 (3)
11	08:25		07:41		06:39		06:24		05:21		19:36 (1)	04:44		19:49 (1)
	16:16		17:13		18:08		20:04		20:58	33	20:09 (1)	21:40	42	20:50 (3)
12	08:24		07:39		06:37		06:22		05:19		19:36 (1)	04:44		19:50 (1)
	16:18		17:15		18:09		20:06		21:00	34	20:10 (1)	21:41	41	20:50 (3)
13	08:23		07:37		06:34		06:20		05:17		19:35 (1)	04:44		19:50 (1)
	16:19		17:17		18:11		20:08		21:02	35	20:10 (1)	21:41	40	20:50 (3)
14	08:22		07:35		06:32		06:17		05:15		19:36 (1)	04:43		19:51 (1)
	16:21		17:19		18:13		20:10		21:03	34	20:10 (1)	21:42	39	20:50 (3)
15	08:21		07:33		06:29		06:15		05:14		19:35 (1)	04:43		19:52 (1)
	16:22		17:21		18:15		20:12		21:05	35	20:10 (1)	21:43	37	20:50 (3)
16	08:20		07:31		06:27		06:13		05:12		19:35 (1)	04:43		19:53 (1)
	16:24		17:23		18:17		20:14		21:07	36	20:11 (1)	21:43	36	20:51 (3)
17	08:19		07:29		06:25		06:10		05:10		19:35 (1)	04:43		19:54 (1)
	16:26		17:25		18:19		20:15		21:08	35	20:10 (1)	21:44	34	20:51 (3)
18	08:18		07:27		06:22		06:08		05:09		19:35 (1)	04:43		19:55 (1)
	16:28		17:27		18:21		20:17		21:10	36	20:11 (1)	21:44	33	20:51 (3)
19	08:17		07:25		06:20		06:06		05:07		19:35 (1)	04:43		19:56 (1)
	16:29		17:29		18:22		20:19		21:11	35	20:10 (1)	21:44	31	20:51 (3)
20	08:16		07:22		06:17		06:04		05:06		19:35 (1)	04:43		19:56 (1)
	16:31		17:31		18:24		20:21		21:13	35	20:10 (1)	21:45	31	20:51 (3)
21	08:15		07:20		06:15		06:01		05:04		19:36 (1)	04:43		19:57 (1)
	16:33		17:33		18:26		20:23		21:15	34	20:10 (1)	21:45	30	20:51 (3)
22	08:14		07:18		06:12		05:59		05:03		19:35 (1)	04:43		19:58 (1)
	16:35		17:35		18:28		20:24		21:16	43	20:37 (3)	21:45	30	20:52 (3)
23	08:12		07:16		06:10		05:57		05:02		19:36 (1)	04:43		19:57 (1)
	16:36		17:37		18:30		20:26		21:18	47	20:39 (3)	21:45	31	20:52 (3)
24	08:11		07:14		06:08		05:55		05:00		19:36 (1)	04:44		19:56 (1)
	16:38		17:39		18:32		20:28		21:19	50	20:41 (3)	21:45	33	20:52 (3)
25	08:10		07:11		06:05		05:52		04:59		19:37 (1)	04:44		19:57 (1)
	16:40		17:41		18:33		20:30		21:21	50	20:42 (3)	21:46	33	20:53 (3)
26	08:08		07:09		06:03		05:50		04:58		19:37 (1)	04:44		19:56 (1)
	16:42		17:43		18:35		20:32		21:22	51	20:43 (3)	21:45	35	20:53 (3)
27	08:07		07:07		06:00		05:48		04:56		19:38 (1)	04:45		19:56 (1)
	16:44		17:45		18:37		20:33		21:23	52	20:44 (3)	21:45	36	20:54 (3)
28	08:05		07:05		05:58		05:46		04:55		19:39 (1)	04:45		19:55 (1)
	16:46		17:47		18:39		20:35		21:25	52	20:45 (3)	21:45	38	20:53 (3)
29	08:04				06:55		05:44		04:54		19:39 (1)	04:46		19:55 (1)
	16:48				19:41		20:37		21:26	52	20:45 (3)	21:45	39	20:54 (3)
30	08:02				06:53		05:42		04:53		19:40 (1)	04:47		19:54 (1)
	16:50				19:43		20:39		21:27	52	20:46 (3)	21:45	39	20:53 (3)
31	08:01				06:51				04:52		19:40 (1)			
	16:52				19:44				21:29	53	20:46 (3)			
Sonnenscheinstunden	252		274		367		419		492			508		
astr.max.mögl.Beschattung										1101			1192	
Red.Sonnenscheinwahrsch.										0.51			0.45	
Reduktion Betriebsdauer										0.91			0.91	
Reduktion Windrichtung										0.66			0.65	
Gesamte Reduktion										0.31			0.27	
Met.wahrsch.Beschattung										339			322	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DJ - IO114

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September	Oktober	November	Dezember
1	04:47		19:53 (1)	05:26		19:46 (1)	06:20	07:12	07:10	08:04
	21:45	42	20:54 (3)	21:10	34	20:20 (1)	20:04	18:51	16:42	15:58
2	04:48		19:53 (1)	05:28		19:46 (1)	06:22	07:14	07:12	08:05
	21:44	43	20:54 (3)	21:08	33	20:19 (1)	20:02	18:49	16:40	15:57
3	04:49		19:52 (1)	05:30		19:47 (1)	06:23	07:16	07:14	08:07
	21:44	45	20:54 (3)	21:06	32	20:19 (1)	20:00	18:47	16:38	15:57
4	04:50		19:52 (1)	05:31		19:47 (1)	06:25	07:18	07:15	08:08
	21:43	45	20:54 (3)	21:05	31	20:18 (1)	19:57	18:44	16:36	15:56
5	04:50		19:51 (1)	05:33		19:48 (1)	06:27	07:19	07:17	08:10
	21:43	48	20:55 (3)	21:03	29	20:17 (1)	19:55	18:42	16:34	15:55
6	04:51		19:51 (1)	05:35		19:49 (1)	06:29	07:21	07:19	08:11
	21:42	49	20:55 (3)	21:01	28	20:17 (1)	19:52	18:39	16:32	15:55
7	04:52		19:51 (1)	05:37		19:50 (1)	06:30	07:23	07:21	08:12
	21:42	48	20:55 (3)	20:59	25	20:15 (1)	19:50	18:37	16:30	15:54
8	04:53		19:50 (1)	05:38		19:51 (1)	06:32	07:25	07:23	08:14
	21:41	50	20:55 (3)	20:57	23	20:14 (1)	19:48	18:35	16:28	15:54
9	04:54		19:50 (1)	05:40		19:52 (1)	06:34	07:27	07:25	08:15
	21:40	50	20:55 (3)	20:55	20	20:12 (1)	19:45	18:32	16:27	15:54
10	04:55		19:50 (1)	05:42		19:55 (1)	06:36	07:29	07:27	08:16
	21:39	51	20:55 (3)	20:53	15	20:10 (1)	19:43	18:30	16:25	15:53
11	04:57		19:49 (1)	05:43		19:57 (1)	06:37	07:30	07:29	08:17
	21:38	52	20:55 (3)	20:51	9	20:06 (1)	19:40	18:28	16:23	15:53
12	04:58		19:49 (1)	05:45			06:39	07:32	07:31	08:18
	21:38	52	20:55 (3)	20:49			19:38	18:25	16:22	15:53
13	04:59		19:48 (1)	05:47			06:41	07:34	07:33	08:19
	21:37	52	20:54 (3)	20:47			19:35	18:23	16:20	15:53
14	05:00		19:48 (1)	05:49			06:43	07:36	07:34	08:20
	21:36	53	20:54 (3)	20:45			19:33	18:21	16:18	15:53
15	05:01		19:47 (1)	05:50			06:44	07:38	07:36	08:21
	21:34	52	20:53 (3)	20:43			19:30	18:18	16:17	15:53
16	05:03		19:47 (1)	05:52			06:46	07:40	07:38	08:22
	21:33	52	20:53 (3)	20:41			19:28	18:16	16:15	15:53
17	05:04		19:47 (1)	05:54			06:48	07:41	07:40	08:23
	21:32	52	20:53 (3)	20:38			19:26	18:14	16:14	15:53
18	05:05		19:47 (1)	05:55			06:49	07:43	07:42	08:24
	21:31	51	20:52 (3)	20:36			19:23	18:11	16:12	15:53
19	05:07		19:46 (1)	05:57			06:51	07:45	07:44	08:25
	21:30	50	20:51 (3)	20:34			19:21	18:09	16:11	15:54
20	05:08		19:47 (1)	05:59			06:53	07:47	07:45	08:25
	21:28	47	20:50 (3)	20:32			19:18	18:07	16:10	15:54
21	05:09		19:46 (1)	06:01			06:55	07:49	07:47	08:26
	21:27	46	20:49 (3)	20:30			19:16	18:05	16:08	15:54
22	05:11		19:46 (1)	06:02			06:56	07:51	07:49	08:26
	21:26	40	20:46 (3)	20:27			19:13	18:03	16:07	15:55
23	05:12		19:46 (1)	06:04			06:58	07:53	07:51	08:27
	21:24	35	20:21 (1)	20:25			19:11	18:00	16:06	15:55
24	05:14		19:46 (1)	06:06			07:00	07:54	07:53	08:27
	21:23	35	20:21 (1)	20:23			19:08	17:58	16:05	15:56
25	05:15		19:45 (1)	06:08			07:02	06:56	07:54	08:28
	21:21	35	20:20 (1)	20:21			19:06	16:56	16:04	15:57
26	05:17		19:46 (1)	06:09			07:03	06:58	07:56	08:28
	21:20	35	20:21 (1)	20:18			19:04	16:54	16:03	15:57
27	05:18		19:45 (1)	06:11			07:05	07:00	07:58	08:28
	21:18	35	20:20 (1)	20:16			19:01	16:52	16:02	15:58
28	05:20		19:46 (1)	06:13			07:07	07:02	07:59	08:28
	21:17	35	20:21 (1)	20:14			18:59	16:50	16:01	15:59
29	05:22		19:45 (1)	06:15			07:09	07:04	08:01	08:29
	21:15	35	20:20 (1)	20:11			18:56	16:48	16:00	16:00
30	05:23		19:46 (1)	06:16			07:11	07:06	08:02	08:29
	21:13	35	20:21 (1)	20:09			18:54	16:46	15:59	16:01
31	05:25		19:46 (1)	06:18				07:08		08:29
	21:12	34	20:20 (1)	20:07				16:44		16:02
Sonnenscheinstunden	510			459		382	329	260		235
astr.max.mögl.Beschattung		1384			279					
Red.Sonnenscheinwahrsch.		0.45			0.49					
Reduktion Betriebsdauer		0.91			0.91					
Reduktion Windrichtung		0.66			0.66					
Gesamte Reduktion		0.27			0.29					
Met.wahrsch.Beschattung		369			82					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DK - IO115

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April		Mai			Juni			
1	08:29		07:59		07:02		06:48		05:40			19:49 (1)	04:51		19:48 (1)
	16:03		16:54		17:49		19:46		20:41		11	20:00 (1)	21:30	40	20:45 (3)
2	08:28		07:57		07:00		06:46		05:38			19:46 (1)	04:50		19:50 (1)
	16:04		16:56		17:50		19:48		20:42		16	20:02 (1)	21:31	38	20:46 (3)
3	08:28		07:56		06:58		06:43		05:36			19:44 (1)	04:49		19:51 (1)
	16:05		16:58		17:52		19:50		20:44		20	20:04 (1)	21:32	35	20:46 (3)
4	08:28		07:54		06:55		06:41		05:34			19:43 (1)	04:49		19:54 (1)
	16:06		16:59		17:54		19:52		20:46		23	20:06 (1)	21:33	31	20:46 (3)
5	08:28		07:52		06:53		06:39		05:32			19:42 (1)	04:48		20:20 (3)
	16:08		17:01		17:56		19:53		20:48		25	20:07 (1)	21:34	26	20:46 (3)
6	08:27		07:50		06:51		06:36		05:30			19:41 (1)	04:47		20:20 (3)
	16:09		17:03		17:58		19:55		20:50		26	20:07 (1)	21:35	26	20:46 (3)
7	08:27		07:49		06:48		06:34		05:28			19:40 (1)	04:46		20:20 (3)
	16:10		17:05		18:00		19:57		20:51		28	20:08 (1)	21:36	26	20:46 (3)
8	08:26		07:47		06:46		06:31		05:26			19:39 (1)	04:46		20:20 (3)
	16:12		17:07		18:02		19:59		20:53		29	20:08 (1)	21:37	26	20:46 (3)
9	08:26		07:45		06:44		06:29		05:24			19:39 (1)	04:45		20:21 (3)
	16:13		17:09		18:04		20:01		20:55		30	20:09 (1)	21:38	26	20:47 (3)
10	08:25		07:43		06:41		06:27		05:22			19:38 (1)	04:45		20:21 (3)
	16:15		17:11		18:06		20:03		20:57		31	20:09 (1)	21:39	26	20:47 (3)
11	08:25		07:41		06:39		06:24		05:21			19:38 (1)	04:44		20:21 (3)
	16:16		17:13		18:08		20:04		20:58		31	20:09 (1)	21:40	26	20:47 (3)
12	08:24		07:39		06:37		06:22		05:19			19:38 (1)	04:44		20:22 (3)
	16:18		17:15		18:09		20:06		21:00		32	20:10 (1)	21:41	26	20:48 (3)
13	08:23		07:37		06:34		06:20		05:17			19:37 (1)	04:44		20:21 (3)
	16:19		17:17		18:11		20:08		21:02		33	20:10 (1)	21:41	26	20:47 (3)
14	08:22		07:35		06:32		06:17		05:15			19:38 (1)	04:43		20:22 (3)
	16:21		17:19		18:13		20:10		21:03		32	20:10 (1)	21:42	26	21:06 (4)
15	08:21		07:33		06:29		06:15		05:14			19:37 (1)	04:43		20:22 (3)
	16:22		17:21		18:15		20:12		21:05		33	20:10 (1)	21:43	29	21:07 (4)
16	08:20		07:31		06:27		06:13		05:12			19:38 (1)	04:43		20:22 (3)
	16:24		17:23		18:17		20:13		21:07		32	20:10 (1)	21:43	31	21:08 (4)
17	08:19		07:29		06:25		06:10		05:10			19:38 (1)	04:43		20:22 (3)
	16:26		17:25		18:19		20:15		21:08		32	20:10 (1)	21:44	31	21:08 (4)
18	08:18		07:27		06:22		06:08		05:09			19:38 (1)	04:43		20:23 (3)
	16:28		17:27		18:21		20:17		21:10		32	20:10 (1)	21:44	30	21:08 (4)
19	08:17		07:25		06:20		06:06		05:07			19:38 (1)	04:43		20:23 (3)
	16:29		17:29		18:22		20:19		21:11		38	20:34 (3)	21:44	31	21:09 (4)
20	08:16		07:22		06:17		06:04		05:06			19:39 (1)	04:43		20:23 (3)
	16:31		17:31		18:24		20:21		21:13		42	20:37 (3)	21:45	31	21:09 (4)
21	08:15		07:20		06:15		06:01		05:04			19:39 (1)	04:43		20:23 (3)
	16:33		17:33		18:26		20:23		21:15		45	20:39 (3)	21:45	31	21:09 (4)
22	08:14		07:18		06:12		05:59		05:03			19:39 (1)	04:43		20:24 (3)
	16:35		17:35		18:28		20:24		21:16		46	20:39 (3)	21:45	31	21:10 (4)
23	08:12		07:16		06:10		05:57		05:02			19:40 (1)	04:43		20:24 (3)
	16:36		17:37		18:30		20:26		21:18		47	20:40 (3)	21:45	31	21:10 (4)
24	08:11		07:14		06:08		05:55		05:00			19:41 (1)	04:44		20:24 (3)
	16:38		17:39		18:32		20:28		21:19		47	20:41 (3)	21:45	31	21:10 (4)
25	08:10		07:11		06:05		05:52		04:59			19:41 (1)	04:44		20:25 (3)
	16:40		17:41		18:33		20:30		21:21		47	20:42 (3)	21:46	30	21:10 (4)
26	08:08		07:09		06:03		05:50		04:58			19:42 (1)	04:44		20:24 (3)
	16:42		17:43		18:35		20:32		21:22		48	20:43 (3)	21:45	31	21:10 (4)
27	08:07		07:07		06:00		05:48		04:56			19:43 (1)	04:45		20:25 (3)
	16:44		17:45		18:37		20:33		21:23		46	20:43 (3)	21:45	30	21:10 (4)
28	08:05		07:05		05:58		05:46		04:55			19:44 (1)	04:45		20:25 (3)
	16:46		17:47		18:39		20:35		21:25		46	20:44 (3)	21:45	28	21:10 (4)
29	08:04				06:55		05:44		04:54			19:45 (1)	04:46		20:25 (3)
	16:48				19:41		20:37		21:26		44	20:44 (3)	21:45	26	20:51 (3)
30	08:02				06:53		05:42		04:53			19:46 (1)	04:47		20:25 (3)
	16:50				19:43		20:39		21:27		43	20:44 (3)	21:45	26	20:51 (3)
31	08:01				06:51				04:52			19:47 (1)			
	16:52				19:44				21:29		42	20:45 (3)			
Sonnenscheinstunden	252		274		367		419		492			508			
astr.max.mögl.Beschattung										1077				882	
Red.Sonnenscheinwahrsch.										0.51				0.45	
Reduktion Betriebsdauer										0.91				0.91	
Reduktion Windrichtung										0.66				0.65	
Gesamte Reduktion										0.31				0.27	
Met.wahrsch.Beschattung										331				236	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DK - IO115

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September	Oktober	November	Dezember
1 | 04:47		20:25 (3) | 05:26		19:48 (1) | 06:20	| 07:12	| 07:10	| 08:04
| 21:45	26	20:51 (3) | 21:10	32	20:20 (1) | 20:04	| 18:51	| 16:42	| 15:58
2 | 04:48		20:26 (3) | 05:28		19:48 (1) | 06:22	| 07:14	| 07:12	| 08:05
| 21:44	26	20:52 (3) | 21:08	31	20:19 (1) | 20:02	| 18:49	| 16:40	| 15:57
3 | 04:49		20:25 (3) | 05:30		19:49 (1) | 06:23	| 07:16	| 07:14	| 08:07
| 21:44	26	20:51 (3) | 21:06	31	20:20 (1) | 20:00	| 18:47	| 16:38	| 15:57
4 | 04:50		20:26 (3) | 05:31		19:48 (1) | 06:25	| 07:18	| 07:15	| 08:08
| 21:43	26	20:52 (3) | 21:05	31	20:19 (1) | 19:57	| 18:44	| 16:36	| 15:56
5 | 04:50		20:26 (3) | 05:33		19:49 (1) | 06:27	| 07:19	| 07:17	| 08:10
| 21:43	26	20:52 (3) | 21:03	29	20:18 (1) | 19:55	| 18:42	| 16:34	| 15:55
6 | 04:51		20:26 (3) | 05:35		19:50 (1) | 06:29	| 07:21	| 07:19	| 08:11
| 21:42	26	20:52 (3) | 21:01	28	20:18 (1) | 19:52	| 18:39	| 16:32	| 15:55
7 | 04:52		20:27 (3) | 05:37		19:50 (1) | 06:30	| 07:23	| 07:21	| 08:12
| 21:42	26	20:53 (3) | 20:59	27	20:17 (1) | 19:50	| 18:37	| 16:30	| 15:54
8 | 04:53		20:27 (3) | 05:38		19:52 (1) | 06:32	| 07:25	| 07:23	| 08:14
| 21:41	26	20:53 (3) | 20:57	24	20:16 (1) | 19:48	| 18:35	| 16:28	| 15:54
9 | 04:54		20:00 (1) | 05:40		19:52 (1) | 06:34	| 07:27	| 07:25	| 08:15
| 21:40	33	20:53 (3) | 20:55	22	20:14 (1) | 19:45	| 18:32	| 16:27	| 15:54
10 | 04:55		19:58 (1) | 05:42		19:54 (1) | 06:36	| 07:29	| 07:27	| 08:16
| 21:39	37	20:53 (3) | 20:53	19	20:13 (1) | 19:43	| 18:30	| 16:25	| 15:53
11 | 04:57		19:57 (1) | 05:43		19:55 (1) | 06:37	| 07:30	| 07:29	| 08:17
| 21:38	39	20:53 (3) | 20:51	15	20:10 (1) | 19:40	| 18:28	| 16:23	| 15:53
12 | 04:58		19:55 (1) | 05:45		19:58 (1) | 06:39	| 07:32	| 07:31	| 08:18
| 21:38	41	20:53 (3) | 20:49	9	20:07 (1) | 19:38	| 18:25	| 16:22	| 15:53
13 | 04:59		19:55 (1) | 05:47		| 06:41	| 07:34	| 07:33	| 08:19
| 21:37	42	20:53 (3) | 20:47		| 19:35	| 18:23	| 16:20	| 15:53
14 | 05:00		19:54 (1) | 05:49		| 06:43	| 07:36	| 07:34	| 08:20
| 21:36	44	20:53 (3) | 20:45		| 19:33	| 18:21	| 16:18	| 15:53
15 | 05:01		19:53 (1) | 05:50		| 06:44	| 07:38	| 07:36	| 08:21
| 21:34	45	20:52 (3) | 20:43		| 19:30	| 18:18	| 16:17	| 15:53
16 | 05:03		19:52 (1) | 05:52		| 06:46	| 07:40	| 07:38	| 08:22
| 21:33	47	20:52 (3) | 20:41		| 19:28	| 18:16	| 16:15	| 15:53
17 | 05:04		19:52 (1) | 05:54		| 06:48	| 07:41	| 07:40	| 08:23
| 21:32	47	20:53 (3) | 20:38		| 19:26	| 18:14	| 16:14	| 15:53
18 | 05:05		19:51 (1) | 05:55		| 06:49	| 07:43	| 07:42	| 08:24
| 21:31	48	20:52 (3) | 20:36		| 19:23	| 18:11	| 16:12	| 15:53
19 | 05:07		19:50 (1) | 05:57		| 06:51	| 07:45	| 07:44	| 08:25
| 21:30	48	20:51 (3) | 20:34		| 19:21	| 18:09	| 16:11	| 15:54
20 | 05:08		19:51 (1) | 05:59		| 06:53	| 07:47	| 07:45	| 08:25
| 21:28	46	20:51 (3) | 20:32		| 19:18	| 18:07	| 16:10	| 15:54
21 | 05:09		19:50 (1) | 06:01		| 06:55	| 07:49	| 07:47	| 08:26
| 21:27	46	20:50 (3) | 20:30		| 19:16	| 18:05	| 16:08	| 15:54
22 | 05:11		19:49 (1) | 06:02		| 06:56	| 07:51	| 07:49	| 08:26
| 21:26	46	20:49 (3) | 20:27		| 19:13	| 18:03	| 16:07	| 15:55
23 | 05:12		19:50 (1) | 06:04		| 06:58	| 07:53	| 07:51	| 08:27
| 21:24	43	20:48 (3) | 20:25		| 19:11	| 18:00	| 16:06	| 15:55
24 | 05:14		19:49 (1) | 06:06		| 07:00	| 07:54	| 07:53	| 08:27
| 21:23	41	20:46 (3) | 20:23		| 19:08	| 17:58	| 16:05	| 15:56
25 | 05:15		19:48 (1) | 06:08		| 07:02	| 06:56	| 07:54	| 08:28
| 21:21	35	20:43 (3) | 20:21		| 19:06	| 16:56	| 16:04	| 15:57
26 | 05:17		19:49 (1) | 06:09		| 07:03	| 06:58	| 07:56	| 08:28
| 21:20	31	20:20 (1) | 20:18		| 19:04	| 16:54	| 16:03	| 15:57
27 | 05:18		19:48 (1) | 06:11		| 07:05	| 07:00	| 07:58	| 08:28
| 21:18	32	20:20 (1) | 20:16		| 19:01	| 16:52	| 16:02	| 15:58
28 | 05:20		19:48 (1) | 06:13		| 07:07	| 07:02	| 07:59	| 08:28
| 21:17	33	20:21 (1) | 20:14		| 18:59	| 16:50	| 16:01	| 15:59
29 | 05:22		19:48 (1) | 06:15		| 07:09	| 07:04	| 08:01	| 08:29
| 21:15	32	20:20 (1) | 20:11		| 18:56	| 16:48	| 16:00	| 16:00
30 | 05:23		19:48 (1) | 06:16		| 07:11	| 07:06	| 08:02	| 08:29
| 21:13	33	20:21 (1) | 20:09		| 18:54	| 16:46	| 15:59	| 16:01
31 | 05:25		19:48 (1) | 06:18			| 07:08		| 08:29
| 21:12	32	20:20 (1) | 20:07			| 16:44		| 16:02
Sonnenscheinstunden	510	| 459		| 382	| 329	| 260	| 235
astr.max.mögl.Beschattung	| 1129		| 298				
Red.Sonnenscheinwahrsch.	| 0.45		| 0.49				
Reduktion Betriebsdauer	| 0.91		| 0.91				
Reduktion Windrichtung	| 0.66		| 0.66				
Gesamte Reduktion	| 0.27		| 0.29				
Met.wahrsch.Beschattung	| 300		| 88				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DL - IO116

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April		Mai			Juni		
1	08:29		07:59		07:02		06:48		05:40			04:51		19:51 (1)
	16:03		16:54		17:49		19:46		20:41			21:30	48	20:51 (3)
2	08:28		07:57		07:00		06:46		05:38			04:50		19:52 (1)
	16:04		16:56		17:50		19:48		20:42			21:31	50	20:53 (3)
3	08:28		07:56		06:58		06:43		05:36			04:49		19:52 (1)
	16:05		16:58		17:52		19:50		20:44			21:32	51	20:54 (3)
4	08:28		07:54		06:55		06:41		05:34			04:49		19:52 (1)
	16:06		16:59		17:54		19:52		20:46			21:33	52	20:54 (3)
5	08:28		07:52		06:53		06:39		05:32			04:48		19:53 (1)
	16:08		17:01		17:56		19:53		20:48			21:34	52	20:55 (3)
6	08:27		07:50		06:51		06:36		05:30			04:47		19:53 (1)
	16:09		17:03		17:58		19:55		20:50			21:35	53	20:55 (3)
7	08:27		07:49		06:48		06:34		05:28			04:46		19:53 (1)
	16:10		17:05		18:00		19:57		20:51			21:36	52	20:55 (3)
8	08:26		07:47		06:46		06:31		05:26			04:46		19:53 (1)
	16:12		17:07		18:02		19:59		20:53			21:37	54	20:56 (3)
9	08:26		07:45		06:44		06:29		05:24		20:03 (1)	04:45		19:54 (1)
	16:13		17:09		18:04		20:01		20:55	8	20:11 (1)	21:38	53	20:57 (3)
10	08:25		07:43		06:41		06:27		05:22		19:59 (1)	04:45		19:54 (1)
	16:15		17:11		18:06		20:03		20:57	15	20:14 (1)	21:39	54	20:57 (3)
11	08:25		07:41		06:39		06:24		05:21		19:57 (1)	04:44		19:55 (1)
	16:16		17:13		18:08		20:04		20:58	19	20:16 (1)	21:40	54	20:58 (3)
12	08:24		07:39		06:37		06:22		05:19		19:56 (1)	04:44		19:55 (1)
	16:18		17:15		18:09		20:06		21:00	22	20:18 (1)	21:41	53	20:58 (3)
13	08:23		07:37		06:34		06:20		05:17		19:54 (1)	04:44		19:55 (1)
	16:19		17:17		18:11		20:08		21:02	24	20:18 (1)	21:41	54	20:58 (3)
14	08:22		07:35		06:32		06:17		05:15		19:54 (1)	04:43		19:55 (1)
	16:21		17:19		18:13		20:10		21:03	26	20:20 (1)	21:42	54	20:58 (3)
15	08:21		07:33		06:29		06:15		05:14		19:53 (1)	04:43		19:56 (1)
	16:22		17:21		18:15		20:12		21:05	27	20:20 (1)	21:43	54	20:59 (3)
16	08:20		07:31		06:27		06:13		05:12		19:52 (1)	04:43		19:56 (1)
	16:24		17:23		18:17		20:14		21:07	29	20:21 (1)	21:43	53	20:59 (3)
17	08:19		07:29		06:25		06:10		05:10		19:51 (1)	04:43		19:57 (1)
	16:26		17:25		18:19		20:15		21:08	30	20:21 (1)	21:44	54	21:00 (3)
18	08:18		07:27		06:22		06:08		05:09		19:51 (1)	04:43		19:57 (1)
	16:28		17:27		18:21		20:17		21:10	31	20:22 (1)	21:44	54	21:00 (3)
19	08:17		07:25		06:20		06:06		05:07		19:50 (1)	04:43		19:57 (1)
	16:29		17:29		18:22		20:19		21:11	32	20:22 (1)	21:44	54	21:00 (3)
20	08:16		07:22		06:17		06:04		05:06		19:50 (1)	04:43		19:57 (1)
	16:31		17:31		18:24		20:21		21:13	33	20:23 (1)	21:45	54	21:00 (3)
21	08:15		07:20		06:15		06:01		05:04		19:50 (1)	04:43		19:57 (1)
	16:33		17:33		18:26		20:23		21:15	34	20:24 (1)	21:45	54	21:00 (3)
22	08:14		07:18		06:12		05:59		05:03		19:50 (1)	04:43		19:58 (1)
	16:35		17:35		18:28		20:24		21:16	33	20:23 (1)	21:45	54	21:01 (3)
23	08:12		07:16		06:10		05:57		05:02		19:50 (1)	04:43		19:58 (1)
	16:36		17:37		18:30		20:26		21:18	34	20:24 (1)	21:45	54	21:01 (3)
24	08:11		07:14		06:08		05:55		05:00		19:50 (1)	04:44		19:58 (1)
	16:38		17:39		18:32		20:28		21:19	34	20:24 (1)	21:45	54	21:01 (3)
25	08:10		07:11		06:05		05:52		04:59		19:50 (1)	04:44		19:59 (1)
	16:40		17:41		18:33		20:30		21:21	34	20:24 (1)	21:46	54	21:02 (3)
26	08:08		07:09		06:03		05:50		04:58		19:50 (1)	04:44		19:58 (1)
	16:42		17:43		18:35		20:32		21:22	34	20:24 (1)	21:45	53	21:01 (3)
27	08:07		07:07		06:00		05:48		04:56		19:50 (1)	04:45		19:59 (1)
	16:44		17:45		18:37		20:33		21:23	35	20:25 (1)	21:45	54	21:02 (3)
28	08:05		07:05		05:58		05:46		04:55		19:50 (1)	04:45		19:59 (1)
	16:46		17:47		18:39		20:35		21:25	35	20:25 (1)	21:45	54	21:02 (3)
29	08:04				06:55		05:44		04:54		19:51 (1)	04:46		19:59 (1)
	16:48				19:41		20:37		21:26	40	20:47 (3)	21:45	54	21:02 (3)
30	08:02				06:53		05:42		04:53		19:51 (1)	04:47		19:59 (1)
	16:50				19:43		20:39		21:27	44	20:49 (3)	21:45	54	21:02 (3)
31	08:01				06:51				04:52		19:51 (1)			
	16:52				19:44				21:29	47	20:50 (3)			
Sonnenscheinstunden	252		274		367		419		492			508		
astr.max.mögl.Beschattung										700			1596	
Red.Sonnenscheinwahrsch.										0.51			0.45	
Reduktion Betriebsdauer										0.91			0.91	
Reduktion Windrichtung										0.66			0.65	
Gesamte Reduktion										0.31			0.27	
Met.wahrsch.Beschattung										215			430	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DL - IO116

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September	Oktober	November	Dezember
1	04:47		19:59 (1)	05:26		20:07 (1)	06:20	07:12	07:10	08:04
	21:45	54	21:02 (3)	21:10	20	20:27 (1)	20:04	18:51	16:42	15:58
2	04:48		19:59 (1)	05:28		20:08 (1)	06:22	07:14	07:12	08:05
	21:44	54	21:02 (3)	21:08	17	20:25 (1)	20:02	18:49	16:40	15:57
3	04:49		19:59 (1)	05:30		20:11 (1)	06:23	07:16	07:14	08:07
	21:44	54	21:02 (3)	21:06	12	20:23 (1)	20:00	18:47	16:38	15:57
4	04:50		19:59 (1)	05:31		20:15 (1)	06:25	07:18	07:15	08:08
	21:43	54	21:02 (3)	21:05	3	20:18 (1)	19:57	18:44	16:36	15:56
5	04:50		19:59 (1)	05:33			06:27	07:19	07:17	08:10
	21:43	54	21:02 (3)	21:03			19:55	18:42	16:34	15:55
6	04:51		19:59 (1)	05:35			06:29	07:21	07:19	08:11
	21:42	53	21:02 (3)	21:01			19:52	18:39	16:32	15:55
7	04:52		19:59 (1)	05:37			06:30	07:23	07:21	08:12
	21:42	54	21:02 (3)	20:59			19:50	18:37	16:30	15:54
8	04:53		19:59 (1)	05:38			06:32	07:25	07:23	08:14
	21:41	53	21:02 (3)	20:57			19:48	18:35	16:29	15:54
9	04:54		19:59 (1)	05:40			06:34	07:27	07:25	08:15
	21:40	51	21:01 (3)	20:55			19:45	18:32	16:27	15:54
10	04:55		19:59 (1)	05:42			06:36	07:29	07:27	08:16
	21:39	52	21:01 (3)	20:53			19:43	18:30	16:25	15:53
11	04:57		19:59 (1)	05:43			06:37	07:30	07:29	08:17
	21:38	50	21:00 (3)	20:51			19:40	18:28	16:23	15:53
12	04:58		19:59 (1)	05:45			06:39	07:32	07:31	08:18
	21:38	48	20:59 (3)	20:49			19:38	18:25	16:22	15:53
13	04:59		19:59 (1)	05:47			06:41	07:34	07:33	08:19
	21:37	46	20:58 (3)	20:47			19:35	18:23	16:20	15:53
14	05:00		19:59 (1)	05:49			06:43	07:36	07:34	08:20
	21:36	43	20:57 (3)	20:45			19:33	18:21	16:18	15:53
15	05:01		19:59 (1)	05:50			06:44	07:38	07:36	08:21
	21:34	36	20:53 (3)	20:43			19:30	18:18	16:17	15:53
16	05:03		19:59 (1)	05:52			06:46	07:40	07:38	08:22
	21:33	34	20:33 (1)	20:41			19:28	18:16	16:15	15:53
17	05:04		20:00 (1)	05:54			06:48	07:41	07:40	08:23
	21:32	34	20:34 (1)	20:38			19:26	18:14	16:14	15:53
18	05:05		20:00 (1)	05:55			06:49	07:43	07:42	08:24
	21:31	34	20:34 (1)	20:36			19:23	18:11	16:12	15:53
19	05:07		19:59 (1)	05:57			06:51	07:45	07:44	08:25
	21:30	35	20:34 (1)	20:34			19:21	18:09	16:11	15:54
20	05:08		20:00 (1)	05:59			06:53	07:47	07:45	08:25
	21:28	34	20:34 (1)	20:32			19:18	18:07	16:10	15:54
21	05:09		20:00 (1)	06:01			06:55	07:49	07:47	08:26
	21:27	34	20:34 (1)	20:30			19:16	18:05	16:08	15:54
22	05:11		20:00 (1)	06:02			06:56	07:51	07:49	08:26
	21:26	33	20:33 (1)	20:27			19:13	18:03	16:07	15:55
23	05:12		20:01 (1)	06:04			06:58	07:53	07:51	08:27
	21:24	33	20:34 (1)	20:25			19:11	18:00	16:06	15:55
24	05:14		20:01 (1)	06:06			07:00	07:54	07:53	08:27
	21:23	32	20:33 (1)	20:23			19:08	17:58	16:05	15:56
25	05:15		20:01 (1)	06:08			07:02	06:56	07:54	08:28
	21:21	31	20:32 (1)	20:21			19:06	16:56	16:04	15:57
26	05:17		20:02 (1)	06:09			07:03	06:58	07:56	08:28
	21:20	31	20:33 (1)	20:18			19:04	16:54	16:03	15:57
27	05:18		20:02 (1)	06:11			07:05	07:00	07:58	08:28
	21:18	30	20:32 (1)	20:16			19:01	16:52	16:02	15:58
28	05:20		20:03 (1)	06:13			07:07	07:02	07:59	08:28
	21:17	28	20:31 (1)	20:14			18:59	16:50	16:01	15:59
29	05:22		20:03 (1)	06:15			07:09	07:04	08:01	08:29
	21:15	27	20:30 (1)	20:11			18:56	16:48	16:00	16:00
30	05:23		20:05 (1)	06:16			07:11	07:06	08:02	08:29
	21:13	25	20:30 (1)	20:09			18:54	16:46	15:59	16:01
31	05:25		20:05 (1)	06:18				07:08		08:29
	21:12	23	20:28 (1)	20:07				16:44		16:02
Sonnenscheinstunden	510			459		382	329	260		235
astr.max.mögl.Beschattung		1254			52					
Red.Sonnenscheinwahrsch.		0.45			0.49					
Reduktion Betriebsdauer		0.91			0.91					
Reduktion Windrichtung		0.65			0.66					
Gesamte Reduktion		0.27			0.29					
Met.wahrsch.Beschattung		333			15					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DM - IO117

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April			Mai			Juni		
1	08:29	07:59	07:02	06:48			05:40		19:40 (1)	04:51		20:15 (3)
	16:03	16:54	17:49	19:46			20:41	22	20:02 (1)	21:30	24	20:39 (3)
2	08:28	07:57	07:00	06:46			05:38		19:39 (1)	04:50		20:16 (3)
	16:04	16:56	17:50	19:48			20:42	24	20:03 (1)	21:31	24	20:40 (3)
3	08:28	07:56	06:58	06:43			05:36		19:38 (1)	04:49		20:16 (3)
	16:05	16:58	17:52	19:50			20:44	25	20:03 (1)	21:32	24	20:40 (3)
4	08:28	07:54	06:55	06:41			05:34		19:38 (1)	04:49		20:16 (3)
	16:06	16:59	17:54	19:52			20:46	27	20:05 (1)	21:33	23	20:39 (3)
5	08:28	07:52	06:53	06:39			05:32		19:37 (1)	04:48		20:17 (3)
	16:08	17:01	17:56	19:53			20:48	28	20:05 (1)	21:34	23	20:40 (3)
6	08:27	07:50	06:51	06:36			05:30		19:36 (1)	04:47		20:17 (3)
	16:09	17:03	17:58	19:55			20:50	29	20:05 (1)	21:35	23	20:40 (3)
7	08:27	07:49	06:48	06:34			05:28		19:36 (1)	04:46		20:17 (3)
	16:10	17:05	18:00	19:57			20:51	29	20:05 (1)	21:36	22	20:39 (3)
8	08:26	07:47	06:46	06:31			05:26		19:35 (1)	04:46		20:17 (3)
	16:12	17:07	18:02	19:59			20:53	30	20:05 (1)	21:37	23	20:40 (3)
9	08:26	07:45	06:44	06:29			05:24		19:36 (1)	04:45		20:18 (3)
	16:13	17:09	18:04	20:01			20:55	30	20:06 (1)	21:38	22	20:40 (3)
10	08:25	07:43	06:41	06:27			05:22		19:35 (1)	04:45		20:18 (3)
	16:15	17:11	18:06	20:03			20:57	30	20:05 (1)	21:39	21	20:39 (3)
11	08:25	07:41	06:39	06:24			05:21		19:35 (1)	04:44		20:19 (3)
	16:16	17:13	18:08	20:04			20:58	30	20:05 (1)	21:40	21	20:40 (3)
12	08:24	07:39	06:37	06:22			05:19		19:36 (1)	04:44		20:19 (3)
	16:18	17:15	18:09	20:06			21:00	29	20:05 (1)	21:41	21	20:40 (3)
13	08:23	07:37	06:34	06:20			05:17		19:36 (1)	04:44		20:19 (3)
	16:19	17:17	18:11	20:08			21:02	29	20:05 (1)	21:41	20	20:39 (3)
14	08:22	07:35	06:32	06:17			05:15		19:36 (1)	04:43		20:19 (3)
	16:21	17:19	18:13	20:10			21:03	29	20:05 (1)	21:42	20	20:39 (3)
15	08:21	07:33	06:29	06:15			05:14		19:36 (1)	04:43		20:20 (3)
	16:22	17:21	18:15	20:12			21:05	36	20:30 (3)	21:43	20	20:40 (3)
16	08:20	07:31	06:27	06:13			05:12		19:37 (1)	04:43		20:20 (3)
	16:24	17:23	18:17	20:13			21:07	40	20:33 (3)	21:43	20	20:40 (3)
17	08:19	07:29	06:25	06:10			05:10		19:37 (1)	04:43		20:21 (3)
	16:26	17:25	18:19	20:15			21:08	41	20:33 (3)	21:44	19	20:40 (3)
18	08:18	07:27	06:22	06:08			05:09		19:38 (1)	04:43		20:21 (3)
	16:28	17:27	18:21	20:17			21:10	42	20:35 (3)	21:44	19	20:40 (3)
19	08:17	07:25	06:20	06:06			05:07		19:39 (1)	04:43		20:21 (3)
	16:29	17:29	18:22	20:19			21:11	42	20:35 (3)	21:44	19	20:40 (3)
20	08:16	07:22	06:17	06:04			05:06		19:40 (1)	04:43		20:21 (3)
	16:31	17:31	18:24	20:21			21:13	41	20:36 (3)	21:45	19	20:40 (3)
21	08:15	07:20	06:15	06:01			05:04		19:41 (1)	04:43		20:21 (3)
	16:33	17:33	18:26	20:23			21:15	41	20:37 (3)	21:45	19	20:40 (3)
22	08:14	07:18	06:12	05:59			05:03		19:41 (1)	04:43		20:22 (3)
	16:35	17:35	18:28	20:24			21:16	41	20:37 (3)	21:45	19	20:41 (3)
23	08:12	07:16	06:10	05:57			05:02		19:43 (1)	04:43		20:22 (3)
	16:36	17:37	18:30	20:26			21:18	38	20:37 (3)	21:45	19	20:41 (3)
24	08:11	07:14	06:08	05:55			05:00		19:45 (1)	04:44		20:22 (3)
	16:38	17:39	18:32	20:28			21:19	36	20:38 (3)	21:45	19	20:41 (3)
25	08:10	07:11	06:05	05:52			04:59		19:47 (1)	04:44		20:23 (3)
	16:40	17:41	18:33	20:30			21:21	32	20:38 (3)	21:45	19	20:42 (3)
26	08:08	07:09	06:03	05:50			04:58		20:14 (3)	04:44		20:23 (3)
	16:42	17:43	18:35	20:32			21:22	25	20:39 (3)	21:45	19	20:42 (3)
27	08:07	07:07	06:00	05:48			04:56		20:14 (3)	04:45		20:23 (3)
	16:44	17:45	18:37	20:33			21:23	25	20:39 (3)	21:45	20	20:43 (3)
28	08:05	07:05	05:58	05:46		19:46 (1)	04:55		20:15 (3)	04:45		20:23 (3)
	16:46	17:47	18:39	20:35	11	19:57 (1)	21:25	24	20:39 (3)	21:45	20	20:43 (3)
29	08:04		06:55	05:44		19:43 (1)	04:54		20:15 (3)	04:46		20:23 (3)
	16:48		19:41	20:37	16	19:59 (1)	21:26	24	20:39 (3)	21:45	20	20:43 (3)
30	08:02		06:53	05:42		19:41 (1)	04:53		20:15 (3)	04:47		20:23 (3)
	16:50		19:43	20:39	20	20:01 (1)	21:27	24	20:39 (3)	21:45	20	20:43 (3)
31	08:01		06:51				04:52		20:15 (3)			
	16:52		19:44				21:29	24	20:39 (3)			
Sonnenscheinstunden	252	274	367	419			492			508		
astr.max.mögl.Beschattung					47			967			621	
Red.Sonnenscheinwahrsch.					0.41			0.51			0.45	
Reduktion Betriebsdauer					0.91			0.91			0.91	
Reduktion Windrichtung					0.66			0.66			0.65	
Gesamte Reduktion					0.25			0.31			0.27	
Met.wahrsch.Beschattung					12			297			168	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DM - IO117

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September	Oktober	November	Dezember
1	04:47		20:23 (3)	05:26		19:46 (1)	06:20	07:12	07:10	08:04
	21:45	21	20:44 (3)	21:10	30	20:16 (1)	20:04	18:51	16:42	15:58
2	04:48		20:23 (3)	05:28		19:45 (1)	06:22	07:14	07:12	08:05
	21:44	22	20:45 (3)	21:08	30	20:15 (1)	20:02	18:49	16:40	15:57
3	04:49		20:23 (3)	05:30		19:46 (1)	06:23	07:16	07:14	08:07
	21:44	21	20:44 (3)	21:06	30	20:16 (1)	20:00	18:47	16:38	15:57
4	04:50		20:23 (3)	05:31		19:45 (1)	06:25	07:18	07:15	08:08
	21:43	22	20:45 (3)	21:05	30	20:15 (1)	19:57	18:44	16:36	15:56
5	04:50		20:23 (3)	05:33		19:46 (1)	06:27	07:19	07:17	08:10
	21:43	22	20:45 (3)	21:03	29	20:15 (1)	19:55	18:42	16:34	15:55
6	04:51		20:23 (3)	05:35		19:45 (1)	06:29	07:21	07:19	08:11
	21:42	23	20:46 (3)	21:01	29	20:14 (1)	19:52	18:39	16:32	15:55
7	04:52		20:23 (3)	05:37		19:46 (1)	06:30	07:23	07:21	08:12
	21:42	23	20:46 (3)	20:59	28	20:14 (1)	19:50	18:37	16:30	15:54
8	04:53		20:23 (3)	05:38		19:47 (1)	06:32	07:25	07:23	08:14
	21:41	24	20:47 (3)	20:57	27	20:14 (1)	19:48	18:35	16:28	15:54
9	04:54		20:23 (3)	05:40		19:46 (1)	06:34	07:27	07:25	08:15
	21:40	24	20:47 (3)	20:55	27	20:13 (1)	19:45	18:32	16:27	15:54
10	04:55		20:23 (3)	05:42		19:47 (1)	06:36	07:29	07:27	08:16
	21:39	24	20:47 (3)	20:53	26	20:13 (1)	19:43	18:30	16:25	15:53
11	04:56		20:23 (3)	05:43		19:47 (1)	06:37	07:30	07:29	08:17
	21:38	24	20:47 (3)	20:51	24	20:11 (1)	19:40	18:28	16:23	15:53
12	04:58		20:23 (3)	05:45		19:49 (1)	06:39	07:32	07:31	08:18
	21:37	25	20:48 (3)	20:49	21	20:10 (1)	19:38	18:25	16:22	15:53
13	04:59		20:23 (3)	05:47		19:50 (1)	06:41	07:34	07:33	08:19
	21:37	25	20:48 (3)	20:47	19	20:09 (1)	19:35	18:23	16:20	15:53
14	05:00		20:23 (3)	05:49		19:52 (1)	06:42	07:36	07:34	08:20
	21:36	25	20:48 (3)	20:45	14	20:06 (1)	19:33	18:21	16:18	15:53
15	05:01		20:23 (3)	05:50		19:55 (1)	06:44	07:38	07:36	08:21
	21:34	25	20:48 (3)	20:43	8	20:03 (1)	19:30	18:18	16:17	15:53
16	05:03		20:23 (3)	05:52			06:46	07:40	07:38	08:22
	21:33	25	20:48 (3)	20:41			19:28	18:16	16:15	15:53
17	05:04		20:24 (3)	05:54			06:48	07:41	07:40	08:23
	21:32	24	20:48 (3)	20:38			19:26	18:14	16:14	15:53
18	05:05		19:59 (1)	05:55			06:49	07:43	07:42	08:24
	21:31	27	20:48 (3)	20:36			19:23	18:11	16:12	15:53
19	05:07		19:56 (1)	05:57			06:51	07:45	07:44	08:25
	21:30	33	20:48 (3)	20:34			19:21	18:09	16:11	15:54
20	05:08		19:54 (1)	05:59			06:53	07:47	07:45	08:25
	21:28	37	20:48 (3)	20:32			19:18	18:07	16:10	15:54
21	05:09		19:53 (1)	06:01			06:55	07:49	07:47	08:26
	21:27	39	20:48 (3)	20:30			19:16	18:05	16:08	15:54
22	05:11		19:51 (1)	06:02			06:56	07:51	07:49	08:26
	21:26	41	20:47 (3)	20:27			19:13	18:03	16:07	15:55
23	05:12		19:51 (1)	06:04			06:58	07:53	07:51	08:27
	21:24	42	20:47 (3)	20:25			19:11	18:00	16:06	15:55
24	05:14		19:50 (1)	06:06			07:00	07:54	07:53	08:27
	21:23	42	20:46 (3)	20:23			19:08	17:58	16:05	15:56
25	05:15		19:49 (1)	06:08			07:02	06:56	07:54	08:28
	21:21	41	20:45 (3)	20:21			19:06	16:56	16:04	15:57
26	05:17		19:48 (1)	06:09			07:03	06:58	07:56	08:28
	21:20	43	20:45 (3)	20:18			19:04	16:54	16:03	15:57
27	05:18		19:47 (1)	06:11			07:05	07:00	07:58	08:28
	21:18	41	20:43 (3)	20:16			19:01	16:52	16:02	15:58
28	05:20		19:48 (1)	06:13			07:07	07:02	07:59	08:28
	21:17	38	20:42 (3)	20:14			18:59	16:50	16:01	15:59
29	05:22		19:47 (1)	06:15			07:09	07:04	08:01	08:29
	21:15	33	20:39 (3)	20:11			18:56	16:48	16:00	16:00
30	05:23		19:47 (1)	06:16			07:11	07:06	08:02	08:29
	21:13	29	20:16 (1)	20:09			18:54	16:46	15:59	16:01
31	05:25		19:46 (1)	06:18				07:08		08:29
	21:12	29	20:15 (1)	20:07				16:44		16:02
Sonnenscheinstunden	510			459		382	329	260		235
astr.max.mögl.Beschattung		914			372					
Red.Sonnenscheinwahrsch.		0.45			0.49					
Reduktion Betriebsdauer		0.91			0.91					
Reduktion Windrichtung		0.66			0.66					
Gesamte Reduktion		0.27			0.29					
Met.wahrsch.Beschattung		243			110					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DN - IO118

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		
1	08:29	07:59	07:02	06:48	05:40		04:51		19:53 (1)
	16:03	16:54	17:49	19:46	20:41		21:30	47	20:50 (3)
2	08:28	07:57	07:00	06:46	05:38		04:50		19:54 (1)
	16:04	16:56	17:50	19:48	20:42		21:31	47	20:51 (3)
3	08:28	07:56	06:58	06:43	05:36		04:49		19:55 (1)
	16:05	16:58	17:52	19:50	20:44		21:32	46	20:51 (3)
4	08:28	07:54	06:55	06:41	05:34		04:49		19:55 (1)
	16:06	16:59	17:54	19:52	20:46		21:33	46	20:51 (3)
5	08:28	07:52	06:53	06:39	05:32		04:48		19:56 (1)
	16:08	17:01	17:56	19:53	20:48		21:34	45	20:52 (3)
6	08:27	07:50	06:51	06:36	05:30		20:01 (1)	04:47	19:56 (1)
	16:09	17:03	17:58	19:55	20:50	8	20:09 (1)	21:35	45 20:52 (3)
7	08:27	07:49	06:48	06:34	05:28		19:58 (1)	04:46	19:57 (1)
	16:10	17:05	18:00	19:57	20:51	14	20:12 (1)	21:36	44 20:52 (3)
8	08:26	07:47	06:46	06:31	05:26		19:55 (1)	04:46	19:58 (1)
	16:12	17:07	18:02	19:59	20:53	18	20:13 (1)	21:37	44 20:53 (3)
9	08:26	07:45	06:44	06:29	05:24		19:55 (1)	04:45	19:59 (1)
	16:13	17:09	18:04	20:01	20:55	20	20:15 (1)	21:38	43 20:54 (3)
10	08:25	07:43	06:41	06:27	05:22		19:53 (1)	04:45	19:59 (1)
	16:15	17:11	18:06	20:03	20:57	23	20:16 (1)	21:39	42 20:53 (3)
11	08:25	07:41	06:39	06:24	05:21		19:52 (1)	04:44	20:00 (1)
	16:16	17:13	18:08	20:04	20:58	25	20:17 (1)	21:40	41 20:54 (3)
12	08:24	07:39	06:37	06:22	05:19		19:52 (1)	04:44	20:01 (1)
	16:18	17:15	18:09	20:06	21:00	26	20:18 (1)	21:41	40 20:54 (3)
13	08:23	07:37	06:34	06:20	05:17		19:51 (1)	04:44	20:01 (1)
	16:19	17:17	18:11	20:08	21:02	27	20:18 (1)	21:41	39 20:54 (3)
14	08:22	07:35	06:32	06:17	05:15		19:51 (1)	04:43	20:02 (1)
	16:21	17:19	18:13	20:10	21:03	28	20:19 (1)	21:42	38 20:54 (3)
15	08:21	07:33	06:29	06:15	05:14		19:50 (1)	04:43	20:02 (1)
	16:22	17:21	18:15	20:12	21:05	29	20:19 (1)	21:43	38 20:54 (3)
16	08:20	07:31	06:27	06:13	05:12		19:50 (1)	04:43	20:03 (1)
	16:24	17:23	18:17	20:13	21:07	30	20:20 (1)	21:43	37 20:55 (3)
17	08:19	07:29	06:25	06:10	05:10		19:49 (1)	04:43	20:04 (1)
	16:26	17:25	18:19	20:15	21:08	31	20:20 (1)	21:44	36 20:55 (3)
18	08:18	07:27	06:22	06:08	05:09		19:50 (1)	04:43	20:04 (1)
	16:28	17:27	18:21	20:17	21:10	30	20:20 (1)	21:44	35 20:55 (3)
19	08:17	07:25	06:20	06:06	05:07		19:49 (1)	04:43	20:05 (1)
	16:29	17:29	18:22	20:19	21:11	31	20:20 (1)	21:44	34 20:55 (3)
20	08:16	07:22	06:17	06:04	05:06		19:49 (1)	04:43	20:05 (1)
	16:31	17:31	18:24	20:21	21:13	31	20:20 (1)	21:45	34 20:55 (3)
21	08:15	07:20	06:15	06:01	05:04		19:50 (1)	04:43	20:05 (1)
	16:33	17:33	18:26	20:23	21:15	30	20:20 (1)	21:45	34 20:55 (3)
22	08:14	07:18	06:12	05:59	05:03		19:49 (1)	04:43	20:06 (1)
	16:35	17:35	18:28	20:24	21:16	31	20:20 (1)	21:45	34 20:56 (3)
23	08:12	07:16	06:10	05:57	05:02		19:49 (1)	04:43	20:06 (1)
	16:36	17:37	18:30	20:26	21:18	31	20:20 (1)	21:45	34 20:56 (3)
24	08:11	07:14	06:08	05:55	05:00		19:50 (1)	04:44	20:05 (1)
	16:38	17:39	18:32	20:28	21:19	39	20:43 (3)	21:45	35 20:56 (3)
25	08:10	07:11	06:05	05:52	04:59		19:50 (1)	04:44	20:06 (1)
	16:40	17:41	18:33	20:30	21:21	42	20:45 (3)	21:45	35 20:57 (3)
26	08:08	07:09	06:03	05:50	04:58		19:51 (1)	04:44	20:05 (1)
	16:42	17:43	18:35	20:32	21:22	43	20:46 (3)	21:45	37 20:57 (3)
27	08:07	07:07	06:00	05:48	04:56		19:51 (1)	04:45	20:06 (1)
	16:44	17:45	18:37	20:33	21:23	45	20:47 (3)	21:45	37 20:58 (3)
28	08:05	07:05	05:58	05:46	04:55		19:51 (1)	04:45	20:05 (1)
	16:46	17:47	18:39	20:35	21:25	47	20:48 (3)	21:45	38 20:57 (3)
29	08:04		06:55	05:44	04:54		19:52 (1)	04:46	20:05 (1)
	16:48		19:41	20:37	21:26	46	20:49 (3)	21:45	39 20:58 (3)
30	08:02		06:53	05:42	04:53		19:52 (1)	04:47	20:04 (1)
	16:50		19:43	20:39	21:27	47	20:49 (3)	21:45	39 20:57 (3)
31	08:01		06:51		04:52		19:53 (1)		
	16:52		19:44		21:29	47	20:50 (3)		
Sonnenscheinstunden	252	274	367	419	492		508		
astr.max.mögl.Beschattung						819		1183	
Red.Sonnenscheinwahrsch.						0.51		0.45	
Reduktion Betriebsdauer						0.91		0.91	
Reduktion Windrichtung						0.66		0.65	
Gesamte Reduktion						0.31		0.27	
Met.wahrsch.Beschattung						251		318	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang		(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende		(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DN - IO118

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September	Oktober	November	Dezember
1	04:47		20:04 (1) / 05:26		20:02 (1) / 06:20	07:12	07:10	08:04
	21:45	41	20:58 (3) / 21:10	26	20:28 (1) / 20:04	18:51	16:42	15:58
2	04:48		20:04 (1) / 05:28		20:03 (1) / 06:22	07:14	07:12	08:05
	21:44	41	20:58 (3) / 21:08	24	20:27 (1) / 20:02	18:49	16:40	15:57
3	04:49		20:03 (1) / 05:30		20:04 (1) / 06:23	07:16	07:14	08:07
	21:44	43	20:58 (3) / 21:06	22	20:26 (1) / 20:00	18:47	16:38	15:57
4	04:50		20:03 (1) / 05:31		20:04 (1) / 06:25	07:18	07:15	08:08
	21:43	43	20:58 (3) / 21:05	20	20:24 (1) / 19:57	18:44	16:36	15:56
5	04:50		20:03 (1) / 05:33		20:06 (1) / 06:27	07:19	07:17	08:10
	21:43	44	20:58 (3) / 21:03	17	20:23 (1) / 19:55	18:42	16:34	15:55
6	04:51		20:03 (1) / 05:35		20:09 (1) / 06:29	07:21	07:19	08:11
	21:42	45	20:59 (3) / 21:01	12	20:21 (1) / 19:52	18:39	16:32	15:55
7	04:52		20:03 (1) / 05:37		20:12 (1) / 06:30	07:23	07:21	08:12
	21:42	45	20:59 (3) / 20:59	5	20:17 (1) / 19:50	18:37	16:30	15:54
8	04:53		20:02 (1) / 05:38		06:32	07:25	07:23	08:14
	21:41	47	20:59 (3) / 20:57		19:48	18:35	16:28	15:54
9	04:54		20:02 (1) / 05:40		06:34	07:27	07:25	08:15
	21:40	47	20:59 (3) / 20:55		19:45	18:32	16:27	15:54
10	04:55		20:02 (1) / 05:42		06:36	07:29	07:27	08:16
	21:39	47	20:59 (3) / 20:53		19:43	18:30	16:25	15:53
11	04:57		20:02 (1) / 05:43		06:37	07:30	07:29	08:17
	21:38	47	20:59 (3) / 20:51		19:40	18:28	16:23	15:53
12	04:58		20:01 (1) / 05:45		06:39	07:32	07:31	08:18
	21:37	47	20:58 (3) / 20:49		19:38	18:25	16:22	15:53
13	04:59		20:01 (1) / 05:47		06:41	07:34	07:33	08:19
	21:37	47	20:58 (3) / 20:47		19:35	18:23	16:20	15:53
14	05:00		20:00 (1) / 05:49		06:42	07:36	07:34	08:20
	21:36	47	20:57 (3) / 20:45		19:33	18:21	16:18	15:53
15	05:01		20:00 (1) / 05:50		06:44	07:38	07:36	08:21
	21:34	47	20:57 (3) / 20:43		19:30	18:18	16:17	15:53
16	05:03		20:00 (1) / 05:52		06:46	07:40	07:38	08:22
	21:33	45	20:56 (3) / 20:41		19:28	18:16	16:15	15:53
17	05:04		20:00 (1) / 05:54		06:48	07:41	07:40	08:23
	21:32	44	20:56 (3) / 20:38		19:26	18:14	16:14	15:53
18	05:05		20:00 (1) / 05:55		06:49	07:43	07:42	08:24
	21:31	43	20:55 (3) / 20:36		19:23	18:11	16:12	15:53
19	05:07		20:00 (1) / 05:57		06:51	07:45	07:44	08:25
	21:30	39	20:53 (3) / 20:34		19:21	18:09	16:11	15:54
20	05:08		20:00 (1) / 05:59		06:53	07:47	07:45	08:25
	21:28	36	20:52 (3) / 20:32		19:18	18:07	16:10	15:54
21	05:09		20:00 (1) / 06:01		06:55	07:49	07:47	08:26
	21:27	30	20:30 (1) / 20:30		19:16	18:05	16:08	15:54
22	05:11		19:59 (1) / 06:02		06:56	07:51	07:49	08:26
	21:26	31	20:30 (1) / 20:27		19:13	18:03	16:07	15:55
23	05:12		20:00 (1) / 06:04		06:58	07:53	07:51	08:27
	21:24	31	20:31 (1) / 20:25		19:11	18:00	16:06	15:55
24	05:14		20:00 (1) / 06:06		07:00	07:54	07:53	08:27
	21:23	30	20:30 (1) / 20:23		19:08	17:58	16:05	15:56
25	05:15		19:59 (1) / 06:08		07:02	06:56	07:54	08:28
	21:21	31	20:30 (1) / 20:21		19:06	16:56	16:04	15:57
26	05:17		20:00 (1) / 06:09		07:03	06:58	07:56	08:28
	21:20	30	20:30 (1) / 20:18		19:04	16:54	16:03	15:57
27	05:18		20:00 (1) / 06:11		07:05	07:00	07:58	08:28
	21:18	30	20:30 (1) / 20:16		19:01	16:52	16:02	15:58
28	05:20		20:01 (1) / 06:13		07:07	07:02	07:59	08:28
	21:17	29	20:30 (1) / 20:14		18:59	16:50	16:01	15:59
29	05:22		20:00 (1) / 06:15		07:09	07:04	08:01	08:29
	21:15	29	20:29 (1) / 20:11		18:56	16:48	16:00	16:00
30	05:23		20:01 (1) / 06:16		07:11	07:06	08:02	08:29
	21:13	28	20:29 (1) / 20:09		18:54	16:46	15:59	16:01
31	05:25		20:01 (1) / 06:18			07:08		08:29
	21:12	27	20:28 (1) / 20:07			16:44		16:02
Sonnenscheinstunden	510		459		382	329	260	235
astr.max.mögl.Beschattung		1211		126				
Red.Sonnenscheinwahrsch.		0.45		0.49				
Reduktion Betriebsdauer		0.91		0.91				
Reduktion Windrichtung		0.65		0.66				
Gesamte Reduktion		0.27		0.29				
Met.wahrsch.Beschattung		322		37				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DO - IO119

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni			Juli			August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51			20:11 (1)	04:47		20:16 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41			21:30	30		20:41 (1)	21:45	42	21:07 (3)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38			04:50			20:12 (1)	04:48		20:17 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42			21:31	30		20:42 (1)	21:44	39	21:07 (3)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36			04:49			20:11 (1)	04:49		20:16 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44			21:32	31		20:42 (1)	21:44	38	21:05 (3)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34			04:49			20:11 (1)	04:50		20:17 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46			21:33	31		20:42 (1)	21:43	31	20:48 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32			04:48			20:12 (1)	04:50		20:17 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48			21:34	31		20:43 (1)	21:43	31	20:48 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30			04:47			20:11 (1)	04:51		20:18 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50			21:35	31		20:42 (1)	21:42	31	20:48 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28			04:46			20:11 (1)	04:52		20:18 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51			21:36	31		20:42 (1)	21:42	31	20:48 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26			04:46			20:12 (1)	04:53		20:18 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53			21:37	31		20:43 (1)	21:41	31	20:49 (1)	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24			04:45			20:12 (1)	04:54		20:19 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55			21:38	30		21:08 (3)	21:40	30	20:49 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22			04:45			20:12 (1)	04:55		20:19 (1)	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57			21:39	30		21:01 (3)	21:39	30	20:49 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21			04:44			20:12 (1)	04:57		20:19 (1)	05:43	06:37	07:30	07:29	08:17
	16:18	17:13	18:08	20:04	20:58			21:40	42		21:03 (3)	21:38	30	20:48 (1)	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19			04:44			20:13 (1)	04:58		20:19 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00			21:41	42		21:04 (3)	21:37	30	20:49 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17			04:44			20:12 (1)	04:59		20:20 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02			21:41	44		21:04 (3)	21:37	29	20:49 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15			04:43			20:13 (1)	05:00		20:20 (1)	05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03			21:42	43		21:04 (3)	21:36	28	20:48 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14			04:43			20:13 (1)	05:01		20:20 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05			21:43	44		21:05 (3)	21:34	28	20:48 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12			04:43			20:13 (1)	05:03		20:21 (1)	05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07			21:43	46		21:06 (3)	21:33	27	20:48 (1)	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10			04:43			20:13 (1)	05:04		20:22 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08			21:44	46		21:06 (3)	21:32	26	20:48 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09			04:43			20:14 (1)	05:05		20:22 (1)	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10			21:44	45		21:06 (3)	21:31	25	20:47 (1)	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		20:10 (1)	04:43			20:14 (1)	05:07		20:23 (1)	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	9	20:29 (1)	21:44	46		21:07 (3)	21:30	24	20:47 (1)	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		20:18 (1)	04:43			20:14 (1)	05:08		20:24 (1)	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	14	20:32 (1)	21:45	46		21:07 (3)	21:28	23	20:47 (1)	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		20:17 (1)	04:43			20:14 (1)	05:09		20:25 (1)	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	17	20:34 (1)	21:45	46		21:07 (3)	21:27	20	20:45 (1)	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		20:15 (1)	04:43			20:15 (1)	05:11		20:26 (1)	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	19	20:34 (1)	21:45	46		21:08 (3)	21:26	18	20:44 (1)	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		20:14 (1)	04:43			20:15 (1)	05:12		20:28 (1)	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21	20:35 (1)	21:45	46		21:08 (3)	21:24	15	20:43 (1)	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		20:13 (1)	04:44			20:15 (1)	05:14		20:29 (1)	06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19	24	20:37 (1)	21:45	46		21:08 (3)	21:23	12	20:41 (1)	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		20:13 (1)	04:44			20:15 (1)	05:15		20:32 (1)	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	24	20:37 (1)	21:45	46		21:08 (3)	21:21	6	20:38 (1)	20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58		20:13 (1)	04:45			20:15 (1)	05:17			06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	25	20:38 (1)	21:45	46		21:08 (3)	21:20			20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		20:12 (1)	04:45			20:16 (1)	05:18			06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	27	20:38 (1)	21:45	44		21:08 (3)	21:18			20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		20:12 (1)	04:45			20:16 (1)	05:20			06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	27	20:39 (1)	21:45	44		21:08 (3)	21:17			20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54		20:12 (1)	04:46			20:16 (1)	05:22			06:15	07:09	07:04	08:01	08:28
	16:48		19:41	20:37	21:26	28	20:40 (1)	21:45	44		21:08 (3)	21:15			20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		20:11 (1)	04:47			20:16 (1)	05:23			06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	29	20:40 (1)	21:45	42		21:07 (3)	21:13			20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:11 (1)					05:25			06:18		07:08		08:29
	16:52		19:44		21:29	29	20:40 (1)					21:12			20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508				510			459	382	329	260	231
astr.max.mögl.Beschattung						293			1214				675						
Red.Sonnenscheinwahrsch.						0.51			0.45				0.45						
Reduktion Betriebsdauer						0.91			0.91				0.91						
Reduktion Windrichtung						0.65			0.64				0.65						
Gesamte Reduktion						0.30			0.27				0.26						
Mat.wahrsch.Beschattung						88			324				178						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DP - IO120

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	Septembe	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		20:27 (1)	04:47	20:30 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	31	20:48 (1)	21:45	20:57 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		20:27 (1)	04:48	20:31 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	22	20:49 (1)	21:44	20:58 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		20:27 (1)	04:49	20:30 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	23	20:50 (1)	21:44	20:57 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		20:26 (1)	04:50	20:31 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46		21:33	24	20:50 (1)	21:43	20:57 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		20:26 (1)	04:50	20:31 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	25	20:51 (1)	21:43	20:57 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		20:26 (1)	04:51	20:32 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	25	20:51 (1)	21:42	20:58 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		20:25 (1)	04:52	20:33 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	26	20:51 (1)	21:41	20:57 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		20:26 (1)	04:53	20:33 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	26	20:52 (1)	21:41	20:57 (1)	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		20:26 (1)	04:54	20:34 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	27	20:53 (1)	21:40	20:57 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		20:26 (1)	04:55	20:34 (1)	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	27	20:53 (1)	21:39	20:57 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		20:26 (1)	04:57	20:35 (1)	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58		21:40	27	20:53 (1)	21:38	20:58 (1)	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		20:26 (1)	04:58	20:36 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	28	20:54 (1)	21:37	20:56 (1)	20:48	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		20:26 (1)	04:59	20:36 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	27	20:53 (1)	21:37	20:55 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		20:26 (1)	05:00	20:37 (1)	05:48	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	28	20:54 (1)	21:36	20:54 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		20:26 (1)	05:01	20:38 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	28	20:54 (1)	21:34	20:53 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		20:26 (1)	05:03	20:40 (1)	05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07		21:43	28	20:55 (1)	21:33	20:52 (1)	20:41	19:28	18:16	16:15	15:52
17	08:19	07:29	06:25	06:10	05:10		04:43		20:26 (1)	05:04	20:42 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	29	20:55 (1)	21:32	20:51 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		20:27 (1)	05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	28	20:55 (1)	21:31		20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		04:43		20:27 (1)	05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11		21:44	28	20:55 (1)	21:30		20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		04:43		20:27 (1)	05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13		21:45	28	20:55 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		04:43		20:27 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15		21:45	28	20:55 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		04:43		20:28 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16		21:45	28	20:56 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		04:43		20:28 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18		21:45	28	20:56 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		04:44		20:28 (1)	05:14		06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19		21:45	28	20:56 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		04:44		20:29 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21		21:45	28	20:57 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:24 (1)	04:45		20:28 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	8 20:40 (1)	21:45	29	20:57 (1)	21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:32 (1)	04:45		20:29 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	10 20:42 (1)	21:45	28	20:57 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:30 (1)	04:45		20:29 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	14 20:44 (1)	21:45	28	20:57 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		08:55	05:44	04:54	20:29 (1)	04:46		20:30 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	16 20:45 (1)	21:45	28	20:58 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:28 (1)	04:47		20:29 (1)	05:23		06:18	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	18 20:46 (1)	21:45	28	20:57 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:28 (1)				05:25		06:18		07:08		08:29
	16:52		19:44		21:29	19 20:47 (1)				21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492		508			510		459	382	329	260	235
astr.max.mögl.Beschattung						83		807		366						
Red.Sonnenscheinwahrsch.						0.51		0.45		0.45						
Reduktion Betriebsdauer						0.91		0.91		0.91						
Reduktion Windrichtung						0.84		0.84		0.84						
Gesamte Reduktion						0.30		0.27		0.26						
Mat.wahrsch.Beschattung						25		219		95						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DQ - IO121

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51		04:47		20:51 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	18:46	20:41	21:30		21:45	13	21:04 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50		04:48		20:52 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	18:48	20:42	21:31		21:44	12	21:04 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49		04:49		20:52 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32		21:44	11	21:03 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49		04:50		20:53 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	21:33		21:43	9	21:02 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48		04:50		20:55 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34		21:43	6	21:01 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47		04:51			05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35		21:42			21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46		20:49 (1)	04:52		05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	5	20:54 (1)	21:41		20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46		20:48 (1)	04:53		05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	9	20:57 (1)	21:41		20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45		20:48 (1)	04:54		05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	10	20:58 (1)	21:40		20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45		20:47 (1)	04:55		05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	12	20:59 (1)	21:39		20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44		20:47 (1)	04:57		05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	13	21:00 (1)	21:38		20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44		20:47 (1)	04:58		05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	14	21:01 (1)	21:37		20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44		20:46 (1)	04:59		05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	15	21:01 (1)	21:37		20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43		20:46 (1)	05:00		05:49	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	15	21:01 (1)	21:36		20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43		20:46 (1)	05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	16	21:02 (1)	21:34		20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43		20:46 (1)	05:03		05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	16	21:02 (1)	21:33		20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43		20:46 (1)	05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	17	21:03 (1)	21:32		20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43		20:46 (1)	05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	17	21:03 (1)	21:31		20:36	19:23	18:11	16:12	15:53
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	16:31	17:31	18:24	20:21	21:13	21:45	18	21:04 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43		20:46 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	18	21:04 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43		20:47 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	18	21:05 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43		20:47 (1)	05:12		06:04	06:58	07:53	07:51	08:27
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24	08:11	07:14	06:08	05:55	05:00	04:44		20:47 (1)	05:14		06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	17	21:04 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44		20:48 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	17	21:05 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45		20:48 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	17	21:05 (1)	21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45		20:49 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	16	21:05 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45		20:49 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	16	21:05 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46		20:50 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	15	21:05 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47		20:50 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45	14	21:04 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52				05:25		06:18		07:08		08:29
	16:52		19:44		21:29				21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508			510		459	382	329	260	235
astr.max.mögl.Beschattung							359		51						
Red.Sonnenscheinwahrsch.							0.45		0.45						
Reduktion Betriebsdauer							0.91		0.91						
Reduktion Windrichtung							0.63		0.63						
Gesamte Reduktion							0.26		0.26						
Met.wahrsch.Beschattung							94		13						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DR - IO122

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30	21:44	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31	21:44	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	21:44	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	04:50	05:31	06:25	07:18	07:15	08:08
	16:07	16:59	17:54	19:52	20:46	21:33	21:43	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	21:43	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	21:42	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	04:52	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	21:41	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	21:41	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	04:57	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	21:38	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	21:37	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	04:59	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	21:37	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	05:00	05:49	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	21:36	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	21:34	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	05:03	05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	21:33	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	21:32	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	21:30	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	05:08	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	21:28	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	21:26	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	05:12	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	21:24	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	21:23	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	21:21	20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45	05:17	06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	21:20	20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	21:18	20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45	21:13	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		05:25	06:18		07:08		08:29
	16:52		19:44		21:29		21:12	20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508	510	459	382	329	260	235
astr.max.mögl.Beschattung												
Red.Sonnenscheinwahrsch.												
Reduktion Betriebsdauer												
Reduktion Windrichtung												
Gesamte Reduktion												
Met.wahrsch.Beschattung												

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DS - IO123

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51		04:47		20:40 (1) 05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30		21:45	21	21:01 (1) 21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50		20:42 (1) 04:48		20:41 (1) 05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31	6	20:48 (1) 21:44	21	21:02 (1) 21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49		20:40 (1) 04:49		20:41 (1) 05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	10	20:50 (1) 21:44	20	21:01 (1) 21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49		20:39 (1) 04:50		20:42 (1) 05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	21:33	12	20:51 (1) 21:43	19	21:01 (1) 21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48		20:38 (1) 04:50		20:42 (1) 05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	15	20:53 (1) 21:43	18	21:00 (1) 21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47		20:37 (1) 04:51		20:43 (1) 05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	17	20:54 (1) 21:42	17	21:00 (1) 21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46		20:36 (1) 04:52		20:44 (1) 05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	18	20:54 (1) 21:41	16	21:00 (1) 20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46		20:36 (1) 04:53		20:45 (1) 05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	19	20:55 (1) 21:41	14	20:59 (1) 20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45		20:37 (1) 04:54		20:47 (1) 05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	19	20:56 (1) 21:40	11	20:58 (1) 20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45		20:36 (1) 04:55		20:48 (1) 05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	20	20:56 (1) 21:39	9	20:57 (1) 20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44		20:36 (1) 04:57		20:52 (1) 05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	21	20:57 (1) 21:38	2	20:54 (1) 20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44		20:36 (1) 04:58		05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	22	20:58 (1) 21:37		20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44		20:35 (1) 04:59		05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	22	20:57 (1) 21:37		20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43		20:35 (1) 05:00		05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	23	20:58 (1) 21:36		20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43		20:36 (1) 05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	23	20:59 (1) 21:34		20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43		20:36 (1) 05:03		05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	23	20:59 (1) 21:33		20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43		20:36 (1) 05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	23	20:59 (1) 21:32		20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43		20:36 (1) 05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	24	21:00 (1) 21:31		20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43		20:36 (1) 05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	24	21:00 (1) 21:30		20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43		20:36 (1) 05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	24	21:00 (1) 21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43		20:36 (1) 05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	24	21:00 (1) 21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43		20:37 (1) 05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	24	21:01 (1) 21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43		20:37 (1) 05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	24	21:01 (1) 21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44		20:37 (1) 05:14		06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	24	21:01 (1) 21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44		20:38 (1) 05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	23	21:01 (1) 21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45		20:38 (1) 05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	23	21:01 (1) 21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45		20:39 (1) 05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	23	21:02 (1) 21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45		20:39 (1) 05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	22	21:01 (1) 21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46		20:39 (1) 05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	23	21:02 (1) 21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47		20:39 (1) 05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45	22	21:01 (1) 21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52			05:25		06:18		07:08		08:29
	16:52		19:44		21:29			21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508		510		459	382	329	260	235
astr.max.mögl.Beschattung							597		168					
Red.Sonnenscheinwahrsch.							0.45		0.45					
Reduktion Betriebsdauer							0.91		0.91					
Reduktion Windrichtung							0.64		0.64					
Gesamte Reduktion							0.26		0.26					
Met.wahrsch.Beschattung							157		43					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DT - IO124

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51		04:47		20:43 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30		21:45	19	21:02 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50		04:48		20:44 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31		21:44	18	21:02 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49		04:49		20:44 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32		21:44	17	21:01 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:44 (1)	04:50		20:45 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	21:33	6 20:50 (1)	21:43	16	21:01 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:43 (1)	04:50		20:46 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	9 20:52 (1)	21:43	15	21:01 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:42 (1)	04:51		20:47 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	11 20:53 (1)	21:42	13	21:00 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:40 (1)	04:52		20:49 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	14 20:54 (1)	21:41	10	20:59 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:40 (1)	04:53		20:51 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	15 20:55 (1)	21:41	7	20:58 (1)	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:40 (1)	04:54			05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	17 20:57 (1)	21:40			20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:39 (1)	04:55			05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	18 20:57 (1)	21:39			20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:39 (1)	04:57			05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	19 20:58 (1)	21:38			20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:39 (1)	04:58			05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	19 20:58 (1)	21:37			20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:39 (1)	04:59			05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	19 20:58 (1)	21:37			20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:39 (1)	05:00			05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	20 20:59 (1)	21:36			20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:39 (1)	05:01			05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	20 20:59 (1)	21:34			20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:39 (1)	05:03			05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	21 21:00 (1)	21:33			20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	20:39 (1)	05:04			05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	21 21:00 (1)	21:32			20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:39 (1)	05:05			05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	22 21:01 (1)	21:31			20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:39 (1)	05:07			05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	22 21:01 (1)	21:30			20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:39 (1)	05:08			05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	22 21:01 (1)	21:28			20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:39 (1)	05:09			06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	22 21:01 (1)	21:27			20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:40 (1)	05:11			06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	22 21:02 (1)	21:26			20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	20:40 (1)	05:12			06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	22 21:02 (1)	21:24			20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	20:40 (1)	05:14			06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	22 21:02 (1)	21:23			20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	20:41 (1)	05:15			06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	21 21:02 (1)	21:21			20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45	20:41 (1)	05:17			06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	21 21:02 (1)	21:20			20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	20:42 (1)	05:18			06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	21 21:03 (1)	21:18			20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45	20:42 (1)	05:20			06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	20 21:02 (1)	21:17			20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	20:43 (1)	05:22			06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	19 21:02 (1)	21:15			20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	20:42 (1)	05:23			06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45	20 21:02 (1)	21:13			20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52			05:25			06:18		07:08		08:29
	16:52		19:44		21:29			21:12			20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508		510		459	382	329	260	235	
astr.max.mögl.Beschattung							505		115						
Red.Sonnenscheinwahrsch.							0.45		0.45						
Reduktion Betriebsdauer							0.91		0.91						
Reduktion Windrichtung							0.63		0.63						
Gesamte Reduktion							0.26		0.26						
Met.wahrsch.Beschattung							133		30						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DU - IO125

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51		04:47		20:50 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	18:46	20:41	21:30		21:45	13	21:03 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50		04:48		20:52 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	18:48	20:42	21:31		21:44	10	21:02 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49		04:49		20:52 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32		21:44	9	21:01 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49		04:50		20:54 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	21:33		21:43	6	21:00 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48		04:50			05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34		21:43			21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47		04:51			05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35		21:42			21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46		04:52			05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36		21:41			20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:49 (1)	04:53			05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	5 20:54 (1)	21:41			20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:48 (1)	04:54			05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	8 20:56 (1)	21:40			20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:47 (1)	04:55			05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	10 20:57 (1)	21:39			20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:46 (1)	04:57			05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	12 20:58 (1)	21:38			20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:46 (1)	04:58			05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	13 20:59 (1)	21:37			20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:45 (1)	04:59			05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	14 20:59 (1)	21:37			20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:45 (1)	05:00			05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	15 21:00 (1)	21:36			20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:45 (1)	05:01			05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	16 21:01 (1)	21:34			20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:45 (1)	05:03			05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	16 21:01 (1)	21:33			20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	20:45 (1)	05:04			05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	17 21:02 (1)	21:32			20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:45 (1)	05:05			05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	17 21:02 (1)	21:31			20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:45 (1)	05:07			05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	17 21:02 (1)	21:30			20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:45 (1)	05:08			05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	17 21:02 (1)	21:28			20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:45 (1)	05:09			06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	17 21:02 (1)	21:27			20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:46 (1)	05:11			06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	17 21:03 (1)	21:26			20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	20:46 (1)	05:12			06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	17 21:03 (1)	21:24			20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	20:46 (1)	05:14			06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	17 21:03 (1)	21:23			20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	20:47 (1)	05:15			06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	17 21:04 (1)	21:21			20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45	20:47 (1)	05:17			06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	16 21:03 (1)	21:20			20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	20:48 (1)	05:18			06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	16 21:04 (1)	21:18			20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45	20:48 (1)	05:20			06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	15 21:03 (1)	21:17			20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	20:49 (1)	05:22			06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	15 21:04 (1)	21:15			20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	20:49 (1)	05:23			06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45	14 21:03 (1)	21:13			20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52			05:25			06:18		07:08		08:29
	16:52		19:44		21:29			21:12			20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508		510		459	382	329	260	235
astr.max.mögl.Beschattung							338		38					
Red.Sonnenscheinwahrsch.							0.45		0.45					
Reduktion Betriebsdauer							0.91		0.91					
Reduktion Windrichtung							0.63		0.63					
Gesamte Reduktion							0.26		0.26					
Met.wahrsch.Beschattung							88		10					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DV - IO126

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:48	04:51		04:47	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30		21:45	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50		04:48	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31		21:44	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49		04:49	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32		21:44	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49		04:50	05:31	06:25	07:18	07:15	08:08
	16:07	16:59	17:54	19:52	20:46	21:33		21:43	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48		04:50	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34		21:43	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47		04:51	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35		21:42	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46		04:52	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36		21:41	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46		04:53	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37		21:41	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45		04:54	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38		21:40	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45		04:55	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39		21:39	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44		04:57	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40		21:38	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44		04:58	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41		21:37	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44		04:59	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41		21:37	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43		05:00	05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42		21:36	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43		05:01	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43		21:34	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43		05:03	05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43		21:33	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	20:57 (1)	05:04	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	2 20:59 (1)	21:32	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:56 (1)	05:05	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	4 21:00 (1)	21:31	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:56 (1)	05:07	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	5 21:01 (1)	21:30	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:55 (1)	05:08	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	6 21:01 (1)	21:28	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:55 (1)	05:09	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	6 21:01 (1)	21:27	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:56 (1)	05:11	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	6 21:02 (1)	21:26	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	20:57 (1)	05:12	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	5 21:02 (1)	21:24	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	20:57 (1)	05:14	06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	4 21:01 (1)	21:23	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	20:58 (1)	05:15	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	3 21:01 (1)	21:21	20:21	19:06	16:36	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45		05:17	06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45		21:20	20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45		05:18	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45		21:18	20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45		05:20	06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45		21:17	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46		05:22	06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45		21:15	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47		05:23	06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45		21:13	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52			05:25	06:18		07:08		08:29
	16:52		19:44		21:29			21:12	20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508		510	459	382	329	260	235
astr.max.mögl.Beschattung							41						
Red.Sonnenscheinwahrsch.							0.45						
Reduktion Betriebsdauer							0.91						
Reduktion Windrichtung							0.63						
Gesamte Reduktion							0.26						
Met.wahrsch.Beschattung							11						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DW - IO127

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31	21:44	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	21:44	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	04:50	05:31	06:25	07:18	07:15	08:08
	16:07	16:59	17:54	19:52	20:46	21:33	21:43	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	21:43	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	21:42	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	04:52	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	21:41	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	21:41	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	04:57	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	21:38	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	21:37	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	04:59	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	21:37	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	05:00	05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	21:36	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	21:34	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	05:03	05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	21:33	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	21:32	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	21:30	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	05:08	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	21:28	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	21:26	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	05:12	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	21:24	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	21:23	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	21:21	20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45	05:17	06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	21:20	20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	21:18	20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45	21:13	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		05:25	06:18		07:08		08:29
	16:52		19:44		21:29		21:12	20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508	510	459	382	329	260	235
astr.max.mögl.Beschattung												
Red.Sonnenscheinwahrsch.												
Reduktion Betriebsdauer												
Reduktion Windrichtung												
Gesamte Reduktion												
Met.wahrsch.Beschattung												

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DX - IO128

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51		04:47	20:51 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	18:46	20:41	21:30		21:45	10 21:01 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50		04:48	20:53 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	18:48	20:42	21:31		21:44	8 21:01 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49		04:49	20:54 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32		21:44	5 20:39 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49		04:50		05:31	06:25	07:18	07:15	08:08
	16:07	17:00	17:54	19:52	20:46	21:33		21:43		21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48		04:50		05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34		21:43		21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47		04:51		05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35		21:42		21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46		04:52		05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36		21:41		20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46		04:53		05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37		21:41		20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45		20:51 (1)	04:54	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	3	20:54 (1)	21:40	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45		20:48 (1)	04:55	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	7	20:55 (1)	21:39	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44		20:48 (1)	04:57	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	9	20:57 (1)	21:38	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44		20:47 (1)	04:58	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	11	20:58 (1)	21:37	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44		20:46 (1)	04:59	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	12	20:58 (1)	21:37	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43		20:46 (1)	05:00	05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	13	20:59 (1)	21:36	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43		20:46 (1)	05:01	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	14	21:00 (1)	21:34	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43		20:46 (1)	05:03	05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	14	21:00 (1)	21:33	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43		20:46 (1)	05:04	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	15	21:01 (1)	21:32	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43		20:46 (1)	05:05	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	15	21:01 (1)	21:31	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43		20:46 (1)	05:07	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	16	21:02 (1)	21:30	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43		20:46 (1)	05:08	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	16	21:02 (1)	21:28	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43		20:46 (1)	05:09	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	16	21:02 (1)	21:27	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43		20:47 (1)	05:11	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	16	21:03 (1)	21:26	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43		20:47 (1)	05:12	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	16	21:03 (1)	21:24	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44		20:47 (1)	05:14	06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	15	21:02 (1)	21:23	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44		20:48 (1)	05:15	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	15	21:03 (1)	21:21	20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45		20:48 (1)	05:17	06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	15	21:03 (1)	21:20	20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45		20:49 (1)	05:18	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	14	21:03 (1)	21:18	20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45		20:49 (1)	05:20	06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	13	21:02 (1)	21:17	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46		20:50 (1)	05:22	06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	13	21:03 (1)	21:15	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47		20:50 (1)	05:23	06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45	12	21:02 (1)	21:13	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52				05:25	06:18		07:08		08:29
	16:52		19:44		21:29				21:12	20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508			510	459	382	329	260	235
astr.max.mögl.Beschattung							290		23					
Red.Sonnenscheinwahrsch.							0.45		0.45					
Reduktion Betriebsdauer							0.91		0.91					
Reduktion Windrichtung							0.63		0.63					
Gesamte Reduktion							0.26		0.26					
Met.wahrsch.Beschattung							76		6					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DY - IO129

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:48	04:51		04:47	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30		21:45	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50		04:48	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31		21:44	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49		04:49	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32		21:44	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49		04:50	05:31	06:25	07:18	07:15	08:08
	16:07	17:00	17:54	19:52	20:46	21:33		21:43	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48		04:50	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34		21:43	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47		04:51	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35		21:42	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46		04:52	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36		21:41	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46		04:53	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37		21:41	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45		04:54	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38		21:40	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45		04:55	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39		21:39	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44		04:57	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40		21:38	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44		04:58	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41		21:37	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44		04:59	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41		21:37	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43		05:00	05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42		21:36	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43		05:01	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43		21:34	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43		05:03	05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43		21:33	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43		05:04	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44		21:32	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43		05:05	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44		21:31	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43		05:07	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44		21:30	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43		05:08	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45		21:28	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:56 (1)	05:09	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	2 20:58 (1)	21:27	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:57 (1)	05:11	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	2 20:59 (1)	21:26	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43		05:12	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45		21:24	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44		05:14	06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	21:45		21:23	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44		05:15	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45		21:21	20:21	19:06	16:36	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45		05:17	06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45		21:20	20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45		05:18	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45		21:18	20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45		05:20	06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45		21:17	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46		05:22	06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45		21:15	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47		05:23	06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45		21:13	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52			05:25	06:18		07:08		08:29
	16:52		19:44		21:29			21:12	20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508		510	459	382	329	260	235
astr.max.mögl.Beschattung							4						
Red.Sonnenscheinwahrsch.							0.45						
Reduktion Betriebsdauer							0.91						
Reduktion Windrichtung							0.63						
Gesamte Reduktion							0.26						
Met.wahrsch.Beschattung							1						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** DZ - IO130

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31	21:44	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	21:44	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	04:50	05:31	06:25	07:18	07:15	08:08
	16:07	17:00	17:54	19:52	20:46	21:33	21:43	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	21:43	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	21:42	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	04:52	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	21:41	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	21:41	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54
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	16:15	17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	04:57	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	21:38	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	21:37	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	04:59	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	21:37	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	05:00	05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	21:36	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	21:34	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	05:03	05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	21:33	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	21:32	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	05:05	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	21:30	20:34	19:21	18:09	16:11	15:54
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21	08:15	07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	21:26	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	05:12	06:04	06:58	07:53	07:51	08:27
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24	08:11	07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	21:23	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	21:21	20:21	19:06	16:56	16:04	15:57
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27	08:07	07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	21:18	20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45	21:13	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		05:25	06:18		07:08		08:29
	16:52		19:44		21:29		21:12	20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508	510	459	382	329	260	235
astr.max.mögl.Beschattung												
Red.Sonnenscheinwahrsch.												
Reduktion Betriebsdauer												
Reduktion Windrichtung												
Gesamte Reduktion												
Met.wahrsch.Beschattung												

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EA - IO131

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	04:47	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31	21:44	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	21:44	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	04:50	05:31	06:25	07:18	07:15	08:08
	16:07	17:00	17:54	19:52	20:46	21:33	21:43	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	21:43	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	21:42	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	04:52	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	21:41	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	21:41	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	04:57	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	21:38	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	04:58	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	21:37	20:49	19:38	18:25	16:22	15:53
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	16:21	17:19	18:13	20:10	21:03	21:42	21:36	20:45	19:33	18:21	16:18	15:53
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	16:33	17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08	15:54
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24	08:11	07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:54	07:52	08:27
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	16:40	17:41	18:33	20:30	21:21	21:45	21:21	20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45	05:17	06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	21:20	20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	21:18	20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	21:17	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45	21:13	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		05:25	06:18		07:08		08:29
	16:52		19:44		21:29		21:12	20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508	510	459	382	329	260	235
astr.max.mögl.Beschattung												
Red.Sonnenscheinwahrsch.												
Reduktion Betriebsdauer												
Reduktion Windrichtung												
Gesamte Reduktion												
Met.wahrsch.Beschattung												

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EB - IO132

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April			Mai			Juni		
1	08:29	07:59	07:02	06:48			05:40		19:54 (1)	04:51		20:20 (3)
	16:03	16:54	17:49	19:46			20:41	13	20:07 (1)	21:30	21	20:41 (3)
2	08:28	07:57	07:00	06:46			05:38		19:52 (1)	04:50		20:21 (3)
	16:04	16:56	17:50	19:48			20:42	16	20:08 (1)	21:31	20	20:41 (3)
3	08:28	07:56	06:58	06:43			05:36		19:50 (1)	04:49		20:21 (3)
	16:05	16:58	17:52	19:50			20:44	19	20:09 (1)	21:32	20	20:41 (3)
4	08:28	07:54	06:55	06:41			05:34		19:50 (1)	04:49		20:21 (3)
	16:06	16:59	17:54	19:52			20:46	21	20:11 (1)	21:33	20	20:41 (3)
5	08:28	07:52	06:53	06:39			05:32		19:49 (1)	04:48		20:23 (3)
	16:08	17:01	17:56	19:53			20:48	22	20:11 (1)	21:34	18	20:41 (3)
6	08:27	07:50	06:51	06:36			05:30		19:48 (1)	04:47		20:23 (3)
	16:09	17:03	17:58	19:55			20:50	24	20:12 (1)	21:35	18	20:41 (3)
7	08:27	07:49	06:48	06:34			05:28		19:47 (1)	04:46		20:23 (3)
	16:10	17:05	18:00	19:57			20:51	25	20:12 (1)	21:36	17	20:40 (3)
8	08:26	07:47	06:46	06:31			05:26		19:47 (1)	04:46		20:24 (3)
	16:12	17:07	18:02	19:59			20:53	25	20:12 (1)	21:37	16	20:40 (3)
9	08:26	07:45	06:44	06:29			05:24		19:47 (1)	04:45		20:25 (3)
	16:13	17:09	18:04	20:01			20:55	26	20:13 (1)	21:38	16	20:41 (3)
10	08:25	07:43	06:41	06:27			05:22		19:47 (1)	04:45		20:24 (3)
	16:15	17:11	18:06	20:03			20:57	25	20:12 (1)	21:39	16	20:40 (3)
11	08:25	07:41	06:39	06:24			05:21		19:46 (1)	04:44		20:25 (3)
	16:16	17:13	18:08	20:04			20:58	26	20:12 (1)	21:40	15	20:40 (3)
12	08:24	07:39	06:37	06:22			05:19		19:47 (1)	04:44		20:26 (3)
	16:18	17:15	18:09	20:06			21:00	26	20:13 (1)	21:41	14	20:40 (3)
13	08:23	07:37	06:34	06:20			05:17		19:47 (1)	04:44		20:26 (3)
	16:19	17:17	18:11	20:08			21:02	25	20:12 (1)	21:41	13	20:39 (3)
14	08:22	07:35	06:32	06:17			05:15		19:47 (1)	04:43		20:26 (3)
	16:21	17:19	18:13	20:10			21:03	25	20:12 (1)	21:42	13	20:39 (3)
15	08:21	07:33	06:29	06:15			05:14		19:47 (1)	04:43		20:27 (3)
	16:22	17:21	18:15	20:12			21:05	32	20:33 (3)	21:43	12	20:39 (3)
16	08:20	07:31	06:27	06:13			05:12		19:48 (1)	04:43		20:28 (3)
	16:24	17:23	18:17	20:13			21:07	34	20:35 (3)	21:43	11	20:39 (3)
17	08:19	07:29	06:25	06:10			05:10		19:48 (1)	04:43		20:28 (3)
	16:26	17:25	18:19	20:15			21:08	36	20:36 (3)	21:44	11	20:39 (3)
18	08:18	07:27	06:22	06:08			05:09		19:49 (1)	04:43		20:28 (3)
	16:28	17:27	18:21	20:17			21:10	37	20:38 (3)	21:44	11	20:39 (3)
19	08:17	07:25	06:20	06:06			05:07		19:50 (1)	04:43		20:29 (3)
	16:29	17:29	18:22	20:19			21:11	37	20:38 (3)	21:44	10	20:39 (3)
20	08:16	07:22	06:17	06:04			05:06		19:51 (1)	04:43		20:29 (3)
	16:31	17:31	18:24	20:21			21:13	36	20:39 (3)	21:45	10	20:39 (3)
21	08:15	07:20	06:15	06:01			05:04		19:52 (1)	04:43		20:29 (3)
	16:33	17:33	18:26	20:23			21:15	36	20:40 (3)	21:45	10	20:39 (3)
22	08:14	07:18	06:12	05:59			05:03		19:53 (1)	04:43		20:30 (3)
	16:35	17:35	18:28	20:24			21:16	33	20:39 (3)	21:45	10	20:40 (3)
23	08:12	07:16	06:10	05:57			05:02		19:55 (1)	04:43		20:30 (3)
	16:36	17:37	18:30	20:26			21:18	30	20:40 (3)	21:45	10	20:40 (3)
24	08:11	07:14	06:08	05:55			05:00		19:58 (1)	04:44		20:30 (3)
	16:38	17:39	18:32	20:28			21:19	25	20:40 (3)	21:45	10	20:40 (3)
25	08:10	07:11	06:05	05:52			04:59		20:19 (3)	04:44		20:30 (3)
	16:40	17:41	18:33	20:30			21:21	22	20:41 (3)	21:45	11	20:41 (3)
26	08:08	07:09	06:03	05:50			04:58		20:19 (3)	04:44		20:30 (3)
	16:42	17:43	18:35	20:32			21:22	22	20:41 (3)	21:45	11	20:41 (3)
27	08:07	07:07	06:00	05:48			04:56		20:19 (3)	04:45		20:30 (3)
	16:44	17:45	18:37	20:33			21:23	22	20:41 (3)	21:45	12	20:42 (3)
28	08:05	07:05	05:58	05:46			04:55		20:19 (3)	04:45		20:30 (3)
	16:46	17:47	18:39	20:35			21:25	22	20:41 (3)	21:45	12	20:42 (3)
29	08:04		06:55	05:44			04:54		20:20 (3)	04:46		20:30 (3)
	16:48		19:41	20:37			21:26	21	20:41 (3)	21:45	13	20:43 (3)
30	08:02		06:53	05:42		19:57 (1)	04:53		20:20 (3)	04:47		20:29 (3)
	16:50		19:42	20:39	7	20:04 (1)	21:27	21	20:41 (3)	21:45	14	20:43 (3)
31	08:01		06:51				04:52		20:20 (3)			
	16:52		19:44				21:29	21	20:41 (3)			
Sonnenscheinstunden	252	274	367	419			492			508		
astr.max.mögl.Beschattung					7			805			415	
Red.Sonnenscheinwahrsch.					0.41			0.51			0.45	
Reduktion Betriebsdauer					0.91			0.91			0.91	
Reduktion Windrichtung					0.66			0.66			0.65	
Gesamte Reduktion					0.25			0.31			0.27	
Met.wahrsch.Beschattung					2			247			112	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EB - IO132

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September	Oktober	November	Dezember
1	04:47		20:30 (3) | 05:26		19:57 (1) | 06:20	07:12	07:10	08:04
	21:45	14	20:44 (3) | 21:10	26	20:23 (1) | 20:04	18:51	16:42	15:58
2	04:48		20:30 (3) | 05:28		19:57 (1) | 06:22	07:14	07:12	08:05
	21:44	15	20:45 (3) | 21:08	25	20:22 (1) | 20:02	18:49	16:40	15:57
3	04:49		20:29 (3) | 05:30		19:57 (1) | 06:23	07:16	07:14	08:07
	21:44	16	20:45 (3) | 21:06	26	20:23 (1) | 20:00	18:47	16:38	15:57
4	04:50		20:29 (3) | 05:31		19:57 (1) | 06:25	07:18	07:15	08:08
	21:43	16	20:45 (3) | 21:05	25	20:22 (1) | 19:57	18:44	16:36	15:56
5	04:50		20:29 (3) | 05:33		19:57 (1) | 06:27	07:19	07:17	08:10
	21:43	17	20:46 (3) | 21:03	25	20:22 (1) | 19:55	18:42	16:34	15:55
6	04:51		20:29 (3) | 05:35		19:57 (1) | 06:29	07:21	07:19	08:11
	21:42	18	20:47 (3) | 21:01	24	20:21 (1) | 19:52	18:39	16:32	15:55
7	04:52		20:29 (3) | 05:36		19:58 (1) | 06:30	07:23	07:21	08:12
	21:41	18	20:47 (3) | 20:59	23	20:21 (1) | 19:50	18:37	16:30	15:54
8	04:53		20:29 (3) | 05:38		19:58 (1) | 06:32	07:25	07:23	08:14
	21:41	19	20:48 (3) | 20:57	23	20:21 (1) | 19:48	18:35	16:28	15:54
9	04:54		20:29 (3) | 05:40		19:59 (1) | 06:34	07:27	07:25	08:15
	21:40	19	20:48 (3) | 20:55	20	20:19 (1) | 19:45	18:32	16:27	15:54
10	04:55		20:29 (3) | 05:42		20:00 (1) | 06:36	07:28	07:27	08:16
	21:39	20	20:49 (3) | 20:53	18	20:18 (1) | 19:43	18:30	16:25	15:53
11	04:56		20:29 (3) | 05:43		20:01 (1) | 06:37	07:30	07:29	08:17
	21:38	20	20:49 (3) | 20:51	15	20:16 (1) | 19:40	18:27	16:23	15:53
12	04:58		20:28 (3) | 05:45		20:03 (1) | 06:39	07:32	07:31	08:18
	21:37	21	20:49 (3) | 20:49	11	20:14 (1) | 19:38	18:25	16:22	15:53
13	04:59		20:28 (3) | 05:47		20:07 (1) | 06:41	07:34	07:33	08:19
	21:37	21	20:49 (3) | 20:47	4	20:11 (1) | 19:35	18:23	16:20	15:53
14	05:00		20:28 (3) | 05:49		| 06:42	07:36	07:34	08:20
	21:36	22	20:50 (3) | 20:45		| 19:33	18:21	16:18	15:53
15	05:01		20:28 (3) | 05:50		| 06:44	07:38	07:36	08:21
	21:34	22	20:50 (3) | 20:43		| 19:30	18:18	16:17	15:53
16	05:03		20:28 (3) | 05:52		| 06:46	07:39	07:38	08:22
	21:33	22	20:50 (3) | 20:41		| 19:28	18:16	16:15	15:53
17	05:04		20:29 (3) | 05:54		| 06:48	07:41	07:40	08:23
	21:32	21	20:50 (3) | 20:38		| 19:26	18:14	16:14	15:53
18	05:05		20:29 (3) | 05:55		| 06:49	07:43	07:42	08:24
	21:31	21	20:50 (3) | 20:36		| 19:23	18:11	16:12	15:53
19	05:07		20:29 (3) | 05:57		| 06:51	07:45	07:44	08:25
	21:30	21	20:50 (3) | 20:34		| 19:21	18:09	16:11	15:54
20	05:08		20:06 (1) | 05:59		| 06:53	07:47	07:45	08:25
	21:28	29	20:50 (3) | 20:32		| 19:18	18:07	16:10	15:54
21	05:09		20:04 (1) | 06:01		| 06:55	07:49	07:47	08:26
	21:27	33	20:50 (3) | 20:30		| 19:16	18:05	16:08	15:54
22	05:11		20:03 (1) | 06:02		| 06:56	07:51	07:49	08:26
	21:26	35	20:50 (3) | 20:27		| 19:13	18:03	16:07	15:55
23	05:12		20:02 (1) | 06:04		| 06:58	07:53	07:51	08:27
	21:24	37	20:50 (3) | 20:25		| 19:11	18:00	16:06	15:55
24	05:14		20:01 (1) | 06:06		| 07:00	07:54	07:52	08:27
	21:23	36	20:49 (3) | 20:23		| 19:08	17:58	16:05	15:56
25	05:15		20:00 (1) | 06:08		| 07:02	06:56	07:54	08:28
	21:21	37	20:48 (3) | 20:21		| 19:06	16:56	16:04	15:57
26	05:17		19:59 (1) | 06:09		| 07:03	06:58	07:56	08:28
	21:20	38	20:48 (3) | 20:18		| 19:04	16:54	16:03	15:57
27	05:18		19:58 (1) | 06:11		| 07:05	07:00	07:58	08:28
	21:18	36	20:46 (3) | 20:16		| 19:01	16:52	16:02	15:58
28	05:20		19:58 (1) | 06:13		| 07:07	07:02	07:59	08:28
	21:17	34	20:45 (3) | 20:14		| 18:59	16:50	16:01	15:59
29	05:22		19:58 (1) | 06:15		| 07:09	07:04	08:01	08:29
	21:15	29	20:42 (3) | 20:11		| 18:56	16:48	16:00	16:00
30	05:23		19:58 (1) | 06:16		| 07:11	07:06	08:02	08:29
	21:13	25	20:23 (1) | 20:09		| 18:54	16:46	15:59	16:01
31	05:25		19:57 (1) | 06:18			07:08		08:29
	21:12	25	20:22 (1) | 20:07			16:44		16:02
Sonnenscheinstunden	510		459		382	329	260	235
astr.max.mögl.Beschattung		757		265				
Red.Sonnenscheinwahrsch.		0.45		0.49				
Reduktion Betriebsdauer		0.91		0.91				
Reduktion Windrichtung		0.65		0.66				
Gesamte Reduktion		0.27		0.29				
Met.wahrsch.Beschattung		201		78				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EC - IO133

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April			Mai			Juni		
1	08:29	07:59	07:02	06:48			05:40		19:54 (1)	04:51		20:20 (3)
	16:03	16:54	17:49	19:46			20:41	13	20:07 (1)	21:30	20	20:40 (3)
2	08:28	07:57	07:00	06:46			05:38		19:52 (1)	04:50		20:21 (3)
	16:04	16:56	17:50	19:48			20:42	16	20:08 (1)	21:31	20	20:41 (3)
3	08:28	07:56	06:58	06:43			05:36		19:50 (1)	04:49		20:22 (3)
	16:05	16:58	17:52	19:50			20:44	20	20:10 (1)	21:32	19	20:41 (3)
4	08:28	07:54	06:55	06:41			05:34		19:50 (1)	04:49		20:22 (3)
	16:06	16:59	17:54	19:52			20:46	21	20:11 (1)	21:33	18	20:40 (3)
5	08:28	07:52	06:53	06:39			05:32		19:49 (1)	04:48		20:23 (3)
	16:08	17:01	17:56	19:53			20:48	23	20:12 (1)	21:34	18	20:41 (3)
6	08:27	07:50	06:51	06:36			05:30		19:48 (1)	04:47		20:23 (3)
	16:09	17:03	17:58	19:55			20:50	24	20:12 (1)	21:35	17	20:40 (3)
7	08:27	07:49	06:48	06:34			05:28		19:48 (1)	04:46		20:23 (3)
	16:10	17:05	18:00	19:57			20:51	24	20:12 (1)	21:36	16	20:39 (3)
8	08:26	07:47	06:46	06:31			05:26		19:47 (1)	04:46		20:24 (3)
	16:12	17:07	18:02	19:59			20:53	25	20:12 (1)	21:37	16	20:40 (3)
9	08:26	07:45	06:44	06:29			05:24		19:48 (1)	04:45		20:25 (3)
	16:13	17:09	18:04	20:01			20:55	25	20:13 (1)	21:38	15	20:40 (3)
10	08:25	07:43	06:41	06:27			05:22		19:47 (1)	04:45		20:25 (3)
	16:15	17:11	18:06	20:03			20:57	26	20:13 (1)	21:39	14	20:39 (3)
11	08:25	07:41	06:39	06:24			05:21		19:47 (1)	04:44		20:26 (3)
	16:16	17:13	18:08	20:04			20:58	25	20:12 (1)	21:40	13	20:39 (3)
12	08:24	07:39	06:37	06:22			05:19		19:47 (1)	04:44		20:27 (3)
	16:18	17:15	18:09	20:06			21:00	26	20:13 (1)	21:41	12	20:39 (3)
13	08:23	07:37	06:34	06:20			05:17		19:47 (1)	04:44		20:26 (3)
	16:19	17:17	18:11	20:08			21:02	25	20:12 (1)	21:41	12	20:38 (3)
14	08:22	07:35	06:32	06:17			05:15		19:48 (1)	04:43		20:27 (3)
	16:21	17:19	18:13	20:10			21:03	24	20:12 (1)	21:42	11	20:38 (3)
15	08:21	07:33	06:29	06:15			05:14		19:48 (1)	04:43		20:28 (3)
	16:22	17:21	18:15	20:12			21:05	31	20:33 (3)	21:43	10	20:38 (3)
16	08:20	07:31	06:27	06:13			05:12		19:49 (1)	04:43		20:28 (3)
	16:24	17:23	18:17	20:13			21:07	33	20:35 (3)	21:43	10	20:38 (3)
17	08:19	07:29	06:25	06:10			05:10		19:49 (1)	04:43		20:29 (3)
	16:26	17:25	18:19	20:15			21:08	35	20:36 (3)	21:44	9	20:38 (3)
18	08:18	07:27	06:22	06:08			05:09		19:50 (1)	04:43		20:29 (3)
	16:28	17:27	18:21	20:17			21:10	37	20:38 (3)	21:44	9	20:38 (3)
19	08:17	07:25	06:20	06:06			05:07		19:50 (1)	04:43		20:30 (3)
	16:29	17:29	18:22	20:19			21:11	37	20:38 (3)	21:44	8	20:38 (3)
20	08:16	07:22	06:17	06:04			05:06		19:52 (1)	04:43		20:30 (3)
	16:31	17:31	18:24	20:21			21:13	35	20:39 (3)	21:45	8	20:38 (3)
21	08:15	07:20	06:15	06:01			05:04		19:53 (1)	04:43		20:30 (3)
	16:33	17:33	18:26	20:23			21:15	34	20:40 (3)	21:45	8	20:38 (3)
22	08:14	07:18	06:12	05:59			05:03		19:54 (1)	04:43		20:31 (3)
	16:35	17:35	18:28	20:24			21:16	31	20:39 (3)	21:45	8	20:39 (3)
23	08:12	07:16	06:10	05:57			05:02		19:56 (1)	04:43		20:31 (3)
	16:36	17:37	18:30	20:26			21:18	28	20:40 (3)	21:45	8	20:39 (3)
24	08:11	07:14	06:08	05:55			05:00		20:19 (3)	04:44		20:31 (3)
	16:38	17:39	18:32	20:28			21:19	21	20:40 (3)	21:45	8	20:39 (3)
25	08:10	07:11	06:05	05:52			04:59		20:19 (3)	04:44		20:31 (3)
	16:40	17:41	18:33	20:30			21:21	21	20:40 (3)	21:45	9	20:40 (3)
26	08:08	07:09	06:03	05:50			04:58		20:19 (3)	04:44		20:31 (3)
	16:42	17:43	18:35	20:32			21:22	22	20:41 (3)	21:45	9	20:40 (3)
27	08:07	07:07	06:00	05:48			04:56		20:19 (3)	04:45		20:31 (3)
	16:44	17:45	18:37	20:33			21:23	22	20:41 (3)	21:45	10	20:41 (3)
28	08:05	07:05	05:58	05:46			04:55		20:20 (3)	04:45		20:31 (3)
	16:46	17:47	18:39	20:35			21:25	21	20:41 (3)	21:45	10	20:41 (3)
29	08:04		06:55	05:44			04:54		20:20 (3)	04:46		20:31 (3)
	16:48		19:41	20:37			21:26	21	20:41 (3)	21:45	11	20:42 (3)
30	08:02		06:53	05:42		19:57 (1)	04:53		20:20 (3)	04:47		20:30 (3)
	16:50		19:42	20:39	7	20:04 (1)	21:27	21	20:41 (3)	21:45	12	20:42 (3)
31	08:01		06:51				04:52		20:20 (3)			
	16:52		19:44				21:29	21	20:41 (3)			
Sonnenscheinstunden	252	274	367	419			492			508		
astr.max.mögl.Beschattung					7			788			368	
Red.Sonnenscheinwahrsch.					0.41			0.51			0.45	
Reduktion Betriebsdauer					0.91			0.91			0.91	
Reduktion Windrichtung					0.66			0.66			0.65	
Gesamte Reduktion					0.25			0.31			0.27	
Met.wahrsch.Beschattung					2			242			99	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EC - IO133

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September	Oktober	November	Dezember
1	04:47		20:30 (3) / 05:26		19:58 (1) / 06:20	07:12	07:10	08:04
	21:45	13	20:43 (3) / 21:10	25	20:23 (1) / 20:04	18:51	16:42	15:58
2	04:48		20:30 (3) / 05:28		19:57 (1) / 06:22	07:14	07:12	08:05
	21:44	14	20:44 (3) / 21:08	26	20:23 (1) / 20:02	18:49	16:40	15:57
3	04:49		20:29 (3) / 05:30		19:58 (1) / 06:23	07:16	07:14	08:07
	21:44	15	20:44 (3) / 21:06	25	20:23 (1) / 20:00	18:47	16:38	15:57
4	04:50		20:29 (3) / 05:31		19:57 (1) / 06:25	07:18	07:15	08:08
	21:43	16	20:45 (3) / 21:05	25	20:22 (1) / 19:57	18:44	16:36	15:56
5	04:50		20:29 (3) / 05:33		19:58 (1) / 06:27	07:19	07:17	08:10
	21:43	17	20:46 (3) / 21:03	24	20:22 (1) / 19:55	18:42	16:34	15:55
6	04:51		20:29 (3) / 05:35		19:57 (1) / 06:29	07:21	07:19	08:11
	21:42	17	20:46 (3) / 21:01	24	20:21 (1) / 19:52	18:39	16:32	15:55
7	04:52		20:29 (3) / 05:36		19:58 (1) / 06:30	07:23	07:21	08:12
	21:41	18	20:47 (3) / 20:59	23	20:21 (1) / 19:50	18:37	16:30	15:54
8	04:53		20:29 (3) / 05:38		19:59 (1) / 06:32	07:25	07:23	08:14
	21:41	18	20:47 (3) / 20:57	22	20:21 (1) / 19:48	18:35	16:28	15:54
9	04:54		20:29 (3) / 05:40		19:59 (1) / 06:34	07:27	07:25	08:15
	21:40	19	20:48 (3) / 20:55	20	20:19 (1) / 19:45	18:32	16:27	15:54
10	04:55		20:29 (3) / 05:42		20:00 (1) / 06:36	07:28	07:27	08:16
	21:39	19	20:48 (3) / 20:53	19	20:19 (1) / 19:43	18:30	16:25	15:53
11	04:56		20:29 (3) / 05:43		20:01 (1) / 06:37	07:30	07:29	08:17
	21:38	20	20:49 (3) / 20:51	16	20:17 (1) / 19:40	18:27	16:23	15:53
12	04:58		20:29 (3) / 05:45		20:03 (1) / 06:39	07:32	07:31	08:18
	21:37	20	20:49 (3) / 20:49	12	20:15 (1) / 19:38	18:25	16:22	15:53
13	04:59		20:28 (3) / 05:47		20:07 (1) / 06:41	07:34	07:33	08:19
	21:37	21	20:49 (3) / 20:47	4	20:11 (1) / 19:35	18:23	16:20	15:53
14	05:00		20:28 (3) / 05:49		06:42	07:36	07:34	08:20
	21:36	21	20:49 (3) / 20:45		19:33	18:21	16:18	15:53
15	05:01		20:28 (3) / 05:50		06:44	07:38	07:36	08:21
	21:34	21	20:49 (3) / 20:43		19:30	18:18	16:17	15:53
16	05:03		20:28 (3) / 05:52		06:46	07:39	07:38	08:22
	21:33	21	20:49 (3) / 20:41		19:28	18:16	16:15	15:53
17	05:04		20:29 (3) / 05:54		06:48	07:41	07:40	08:23
	21:32	21	20:50 (3) / 20:38		19:26	18:14	16:14	15:53
18	05:05		20:29 (3) / 05:55		06:49	07:43	07:42	08:24
	21:31	21	20:50 (3) / 20:36		19:23	18:11	16:12	15:53
19	05:07		20:29 (3) / 05:57		06:51	07:45	07:44	08:25
	21:30	21	20:50 (3) / 20:34		19:21	18:09	16:11	15:54
20	05:08		20:08 (1) / 05:59		06:53	07:47	07:45	08:25
	21:28	24	20:49 (3) / 20:32		19:18	18:07	16:10	15:54
21	05:09		20:06 (1) / 06:01		06:55	07:49	07:47	08:26
	21:27	30	20:50 (3) / 20:30		19:16	18:05	16:08	15:54
22	05:11		20:04 (1) / 06:02		06:56	07:51	07:49	08:26
	21:26	32	20:49 (3) / 20:27		19:13	18:03	16:07	15:55
23	05:12		20:03 (1) / 06:04		06:58	07:53	07:51	08:27
	21:24	35	20:50 (3) / 20:25		19:11	18:00	16:06	15:55
24	05:14		20:02 (1) / 06:06		07:00	07:54	07:52	08:27
	21:23	36	20:49 (3) / 20:23		19:08	17:58	16:05	15:56
25	05:15		20:00 (1) / 06:08		07:02	06:56	07:54	08:28
	21:21	36	20:48 (3) / 20:21		19:06	16:56	16:04	15:57
26	05:17		20:00 (1) / 06:09		07:03	06:58	07:56	08:28
	21:20	37	20:48 (3) / 20:18		19:04	16:54	16:03	15:57
27	05:18		19:59 (1) / 06:11		07:05	07:00	07:58	08:28
	21:18	35	20:46 (3) / 20:16		19:01	16:52	16:02	15:58
28	05:20		19:59 (1) / 06:13		07:07	07:02	07:59	08:28
	21:17	33	20:45 (3) / 20:14		18:59	16:50	16:01	15:59
29	05:22		19:58 (1) / 06:15		07:09	07:04	08:01	08:29
	21:15	31	20:43 (3) / 20:11		18:56	16:48	16:00	16:00
30	05:23		19:58 (1) / 06:16		07:11	07:06	08:02	08:29
	21:13	25	20:23 (1) / 20:09		18:54	16:46	15:59	16:01
31	05:25		19:58 (1) / 06:18			07:08		08:29
	21:12	24	20:22 (1) / 20:07			16:44		16:02
Sonnenscheinstunden	510		459		382	329	260	235
astr.max.mögl.Beschattung		731		265				
Red.Sonnenscheinwahrsch.		0.45		0.49				
Reduktion Betriebsdauer		0.91		0.91				
Reduktion Windrichtung		0.65		0.66				
Gesamte Reduktion		0.27		0.29				
Met.wahrsch.Beschattung		194		78				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** ED - IO134

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40		19:52 (1)	04:51		20:20 (3)
	16:03		16:54		17:49		19:46			20:41	15	20:07 (1)	21:30	19	20:39 (3)
2	08:28		07:57		07:00		06:46			05:38		19:50 (1)	04:50		20:21 (3)
	16:04		16:56		17:50		19:48			20:42	18	20:08 (1)	21:31	18	20:39 (3)
3	08:28		07:56		06:58		06:43			05:36		19:49 (1)	04:49		20:21 (3)
	16:05		16:58		17:52		19:50			20:44	20	20:09 (1)	21:32	18	20:39 (3)
4	08:28		07:54		06:55		06:41			05:34		19:49 (1)	04:49		20:21 (3)
	16:06		16:59		17:54		19:52			20:46	22	20:11 (1)	21:33	17	20:38 (3)
5	08:28		07:52		06:53		06:39			05:32		19:48 (1)	04:48		20:23 (3)
	16:08		17:01		17:56		19:53			20:48	23	20:11 (1)	21:34	16	20:39 (3)
6	08:27		07:50		06:51		06:36			05:30		19:47 (1)	04:47		20:23 (3)
	16:09		17:03		17:58		19:55			20:50	24	20:11 (1)	21:35	15	20:38 (3)
7	08:27		07:49		06:48		06:34			05:28		19:47 (1)	04:46		20:23 (3)
	16:10		17:05		18:00		19:57			20:51	24	20:11 (1)	21:36	14	20:37 (3)
8	08:26		07:47		06:46		06:31			05:26		19:46 (1)	04:46		20:24 (3)
	16:12		17:07		18:02		19:59			20:53	25	20:11 (1)	21:37	13	20:37 (3)
9	08:26		07:45		06:44		06:29			05:24		19:47 (1)	04:45		20:25 (3)
	16:13		17:09		18:04		20:01			20:55	25	20:12 (1)	21:38	12	20:37 (3)
10	08:25		07:43		06:41		06:27			05:22		19:46 (1)	04:45		20:25 (3)
	16:15		17:11		18:06		20:03			20:57	25	20:11 (1)	21:39	12	20:37 (3)
11	08:25		07:41		06:39		06:24			05:21		19:46 (1)	04:44		20:26 (3)
	16:16		17:13		18:08		20:04			20:58	25	20:11 (1)	21:40	11	20:37 (3)
12	08:24		07:39		06:37		06:22			05:19		19:47 (1)	04:44		20:27 (3)
	16:18		17:15		18:09		20:06			21:00	24	20:11 (1)	21:41	9	20:36 (3)
13	08:23		07:37		06:34		06:20			05:17		19:47 (1)	04:44		20:27 (3)
	16:19		17:17		18:11		20:08			21:02	24	20:11 (1)	21:41	8	20:35 (3)
14	08:22		07:35		06:32		06:17			05:15		19:48 (1)	04:43		20:28 (3)
	16:21		17:19		18:13		20:10			21:03	31	20:32 (3)	21:42	7	20:35 (3)
15	08:21		07:33		06:29		06:15			05:14		19:48 (1)	04:43		20:29 (3)
	16:22		17:21		18:15		20:12			21:05	33	20:33 (3)	21:43	6	20:35 (3)
16	08:20		07:31		06:27		06:13			05:12		19:49 (1)	04:43		20:31 (3)
	16:24		17:23		18:17		20:13			21:07	35	20:35 (3)	21:43	3	20:34 (3)
17	08:19		07:29		06:25		06:10			05:10		19:49 (1)	04:43		20:32 (3)
	16:26		17:25		18:19		20:15			21:08	35	20:36 (3)	21:44	1	20:33 (3)
18	08:18		07:27		06:22		06:08			05:09		19:50 (1)	04:43		
	16:28		17:27		18:21		20:17			21:10	35	20:37 (3)	21:44		
19	08:17		07:25		06:20		06:06			05:07		19:51 (1)	04:43		
	16:29		17:29		18:22		20:19			21:11	34	20:37 (3)	21:44		
20	08:16		07:22		06:17		06:04			05:06		19:52 (1)	04:43		
	16:31		17:31		18:24		20:21			21:13	33	20:38 (3)	21:45		
21	08:15		07:20		06:15		06:01			05:04		19:54 (1)	04:43		
	16:33		17:33		18:26		20:23			21:15	31	20:39 (3)	21:45		
22	08:14		07:18		06:12		05:59			05:03		19:57 (1)	04:43		
	16:35		17:35		18:28		20:24			21:16	24	20:38 (3)	21:45		
23	08:12		07:16		06:10		05:57			05:02		20:18 (3)	04:43		
	16:36		17:37		18:30		20:26			21:18	21	20:39 (3)	21:45		
24	08:11		07:14		06:08		05:55			05:00		20:18 (3)	04:44		
	16:38		17:39		18:32		20:28			21:19	21	20:39 (3)	21:45		
25	08:10		07:11		06:05		05:52			04:59		20:18 (3)	04:44		
	16:40		17:41		18:33		20:30			21:21	21	20:39 (3)	21:45		
26	08:08		07:09		06:03		05:50			04:58		20:18 (3)	04:44		20:33 (3)
	16:42		17:43		18:35		20:32			21:22	21	20:39 (3)	21:45	3	20:36 (3)
27	08:07		07:07		06:00		05:48			04:56		20:18 (3)	04:45		20:33 (3)
	16:44		17:45		18:37		20:33			21:23	21	20:39 (3)	21:45	4	20:37 (3)
28	08:05		07:05		05:58		05:46			04:55		20:19 (3)	04:45		20:32 (3)
	16:46		17:47		18:39		20:35			21:25	20	20:39 (3)	21:45	6	20:38 (3)
29	08:04				06:55		05:44		19:58 (1)	04:54		20:19 (3)	04:46		20:32 (3)
	16:48				19:41		20:37	4	20:02 (1)	21:26	20	20:39 (3)	21:45	7	20:39 (3)
30	08:02				06:53		05:42		19:54 (1)	04:53		20:19 (3)	04:47		20:31 (3)
	16:50				19:42		20:39	11	20:05 (1)	21:27	20	20:39 (3)	21:45	8	20:39 (3)
31	08:01				06:51					04:52		20:19 (3)			
	16:52				19:44					21:29	20	20:39 (3)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung								15			770			227	
Red.Sonnenscheinwahrsch.								0.41			0.51			0.45	
Reduktion Betriebsdauer								0.91			0.91			0.91	
Reduktion Windrichtung								0.66			0.66			0.65	
Gesamte Reduktion								0.25			0.31			0.27	
Met.wahrsch.Beschattung								4			236			61	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** ED - IO134

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September	Oktober	November	Dezember
1	04:47		20:31 (3)	05:26	19:57 (1)	06:20	07:12	07:10	08:04
	21:45	9	20:40 (3)	21:10	25	20:22 (1)	20:04	18:51	16:42	15:58
2	04:48		20:31 (3)	05:28	19:56 (1)	06:22	07:14	07:12	08:05
	21:44	11	20:42 (3)	21:08	25	20:21 (1)	20:02	18:49	16:40	15:57
3	04:49		20:30 (3)	05:30	19:57 (1)	06:23	07:16	07:14	08:07
	21:44	12	20:42 (3)	21:06	25	20:22 (1)	20:00	18:47	16:38	15:57
4	04:50		20:30 (3)	05:31	19:56 (1)	06:25	07:18	07:15	08:08
	21:43	12	20:42 (3)	21:05	25	20:21 (1)	19:57	18:44	16:36	15:56
5	04:50		20:29 (3)	05:33	19:56 (1)	06:27	07:19	07:17	08:10
	21:43	14	20:43 (3)	21:03	25	20:21 (1)	19:55	18:42	16:34	15:55
6	04:51		20:29 (3)	05:35	19:56 (1)	06:29	07:21	07:19	08:11
	21:42	15	20:44 (3)	21:01	25	20:21 (1)	19:52	18:39	16:32	15:55
7	04:52		20:29 (3)	05:36	19:57 (1)	06:30	07:23	07:21	08:12
	21:41	16	20:45 (3)	20:59	23	20:20 (1)	19:50	18:37	16:30	15:54
8	04:53		20:29 (3)	05:38	19:57 (1)	06:32	07:25	07:23	08:14
	21:41	16	20:45 (3)	20:57	23	20:20 (1)	19:48	18:35	16:28	15:54
9	04:54		20:29 (3)	05:40	19:57 (1)	06:34	07:27	07:25	08:15
	21:40	17	20:46 (3)	20:55	22	20:19 (1)	19:45	18:32	16:27	15:54
10	04:55		20:28 (3)	05:42	19:58 (1)	06:36	07:28	07:27	08:16
	21:39	18	20:46 (3)	20:53	20	20:18 (1)	19:43	18:30	16:25	15:53
11	04:56		20:28 (3)	05:43	19:59 (1)	06:37	07:30	07:29	08:17
	21:38	19	20:47 (3)	20:51	18	20:17 (1)	19:40	18:27	16:23	15:53
12	04:58		20:28 (3)	05:45	20:01 (1)	06:39	07:32	07:31	08:18
	21:37	19	20:47 (3)	20:49	14	20:15 (1)	19:38	18:25	16:22	15:53
13	04:59		20:28 (3)	05:47	20:03 (1)	06:41	07:34	07:33	08:19
	21:37	20	20:48 (3)	20:47	10	20:13 (1)	19:35	18:23	16:20	15:53
14	05:00		20:28 (3)	05:49			06:42	07:36	07:34	08:20
	21:36	20	20:48 (3)	20:45			19:33	18:21	16:18	15:53
15	05:01		20:27 (3)	05:50			06:44	07:38	07:36	08:21
	21:34	21	20:48 (3)	20:43			19:30	18:18	16:17	15:53
16	05:03		20:27 (3)	05:52			06:46	07:39	07:38	08:22
	21:33	21	20:48 (3)	20:41			19:28	18:16	16:15	15:53
17	05:04		20:28 (3)	05:54			06:48	07:41	07:40	08:23
	21:32	21	20:49 (3)	20:38			19:26	18:14	16:14	15:53
18	05:05		20:28 (3)	05:55			06:49	07:43	07:42	08:24
	21:31	21	20:49 (3)	20:36			19:23	18:11	16:12	15:53
19	05:07		20:27 (3)	05:57			06:51	07:45	07:44	08:25
	21:30	22	20:49 (3)	20:34			19:21	18:09	16:11	15:54
20	05:08		20:27 (3)	05:59			06:53	07:47	07:45	08:25
	21:28	21	20:48 (3)	20:32			19:18	18:07	16:10	15:54
21	05:09		20:28 (3)	06:01			06:55	07:49	07:47	08:26
	21:27	21	20:49 (3)	20:30			19:16	18:05	16:08	15:54
22	05:11		20:05 (1)	06:02			06:56	07:51	07:49	08:26
	21:26	29	20:49 (3)	20:27			19:13	18:03	16:07	15:55
23	05:12		20:04 (1)	06:04			06:58	07:53	07:51	08:27
	21:24	31	20:49 (3)	20:25			19:11	18:00	16:06	15:55
24	05:14		20:02 (1)	06:06			07:00	07:54	07:52	08:27
	21:23	33	20:48 (3)	20:23			19:08	17:58	16:05	15:56
25	05:15		20:01 (1)	06:08			07:02	06:56	07:54	08:28
	21:21	34	20:47 (3)	20:21			19:06	16:56	16:04	15:57
26	05:17		20:00 (1)	06:09			07:03	06:58	07:56	08:28
	21:20	36	20:47 (3)	20:18			19:04	16:54	16:03	15:57
27	05:18		19:59 (1)	06:11			07:05	07:00	07:58	08:28
	21:18	35	20:46 (3)	20:16			19:01	16:52	16:02	15:58
28	05:20		19:59 (1)	06:13			07:07	07:02	07:59	08:28
	21:17	34	20:45 (3)	20:14			18:59	16:50	16:01	15:59
29	05:22		19:58 (1)	06:15			07:09	07:04	08:01	08:29
	21:15	32	20:43 (3)	20:11			18:56	16:48	16:00	16:00
30	05:23		19:58 (1)	06:16			07:11	07:06	08:02	08:29
	21:13	29	20:42 (3)	20:09			18:54	16:46	15:59	16:01
31	05:25		19:57 (1)	06:18				07:08		08:29
	21:12	24	20:21 (1)	20:07				16:44		16:02
Sonnenscheinstunden	510			459		382	329	260	235
astr.max.mögl.Beschattung		683			280				
Red.Sonnenscheinwahrsch.		0.45			0.49				
Reduktion Betriebsdauer		0.91			0.91				
Reduktion Windrichtung		0.65			0.66				
Gesamte Reduktion		0.27			0.29				
Met.wahrsch.Beschattung		181			82				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EE - IO135

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40		19:47 (1)	04:51		20:18 (3)
	16:03		16:54		17:49		19:46			20:41	19	20:06 (1)	21:30	17	20:35 (3)
2	08:28		07:57		07:00		06:46			05:38		19:46 (1)	04:50		20:20 (3)
	16:04		16:56		17:50		19:48			20:42	21	20:07 (1)	21:31	15	20:35 (3)
3	08:28		07:56		06:58		06:43			05:36		19:45 (1)	04:49		20:20 (3)
	16:05		16:58		17:52		19:50			20:44	22	20:07 (1)	21:32	15	20:35 (3)
4	08:28		07:54		06:55		06:41			05:34		19:45 (1)	04:49		20:21 (3)
	16:06		16:59		17:54		19:52			20:46	24	20:09 (1)	21:33	13	20:34 (3)
5	08:28		07:52		06:53		06:39			05:32		19:44 (1)	04:48		20:22 (3)
	16:08		17:01		17:56		19:53			20:48	25	20:09 (1)	21:34	12	20:34 (3)
6	08:27		07:50		06:51		06:36			05:30		19:44 (1)	04:47		20:22 (3)
	16:09		17:03		17:58		19:55			20:50	25	20:09 (1)	21:35	11	20:33 (3)
7	08:27		07:49		06:48		06:34			05:28		19:43 (1)	04:46		20:23 (3)
	16:10		17:05		18:00		19:57			20:51	25	20:08 (1)	21:36	9	20:32 (3)
8	08:26		07:47		06:46		06:31			05:26		19:43 (1)	04:46		20:25 (3)
	16:12		17:07		18:02		19:59			20:53	25	20:08 (1)	21:37	6	20:31 (3)
9	08:26		07:45		06:44		06:29			05:24		19:44 (1)	04:45		20:27 (3)
	16:13		17:09		18:04		20:01			20:55	25	20:09 (1)	21:38	4	20:31 (3)
10	08:25		07:43		06:41		06:27			05:22		19:44 (1)	04:45		
	16:15		17:11		18:06		20:03			20:57	24	20:08 (1)	21:39		
11	08:25		07:41		06:39		06:24			05:21		19:44 (1)	04:44		
	16:16		17:13		18:07		20:04			20:58	23	20:07 (1)	21:40		
12	08:24		07:39		06:37		06:22			05:19		19:45 (1)	04:44		
	16:18		17:15		18:09		20:06			21:00	29	20:29 (3)	21:41		
13	08:23		07:37		06:34		06:20			05:17		19:45 (1)	04:44		
	16:19		17:17		18:11		20:08			21:02	32	20:30 (3)	21:41		
14	08:22		07:35		06:32		06:17			05:15		19:46 (1)	04:43		
	16:21		17:19		18:13		20:10			21:03	33	20:32 (3)	21:42		
15	08:21		07:33		06:29		06:15			05:14		19:46 (1)	04:43		
	16:22		17:21		18:15		20:12			21:05	34	20:33 (3)	21:43		
16	08:20		07:31		06:27		06:13			05:12		19:48 (1)	04:43		
	16:24		17:23		18:17		20:13			21:07	35	20:35 (3)	21:43		
17	08:19		07:29		06:25		06:10			05:10		19:48 (1)	04:43		
	16:26		17:25		18:19		20:15			21:08	34	20:35 (3)	21:44		
18	08:18		07:27		06:22		06:08			05:09		19:50 (1)	04:43		
	16:28		17:27		18:21		20:17			21:10	32	20:36 (3)	21:44		
19	08:17		07:25		06:20		06:06			05:07		19:52 (1)	04:43		
	16:29		17:29		18:22		20:19			21:11	27	20:35 (3)	21:44		
20	08:16		07:22		06:17		06:04			05:06		20:15 (3)	04:43		
	16:31		17:31		18:24		20:21			21:13	21	20:36 (3)	21:45		
21	08:15		07:20		06:15		06:01			05:04		20:15 (3)	04:43		
	16:33		17:33		18:26		20:23			21:15	21	20:36 (3)	21:45		
22	08:14		07:18		06:12		05:59			05:03		20:15 (3)	04:43		
	16:35		17:35		18:28		20:24			21:16	21	20:36 (3)	21:45		
23	08:12		07:16		06:10		05:57			05:02		20:15 (3)	04:43		
	16:36		17:37		18:30		20:26			21:18	21	20:36 (3)	21:45		
24	08:11		07:14		06:08		05:55			05:00		20:15 (3)	04:44		
	16:38		17:39		18:32		20:28			21:19	21	20:36 (3)	21:45		
25	08:10		07:11		06:05		05:52			04:59		20:16 (3)	04:44		
	16:40		17:41		18:33		20:30			21:21	20	20:36 (3)	21:45		
26	08:08		07:09		06:03		05:50			04:58		20:16 (3)	04:44		
	16:42		17:43		18:35		20:32			21:22	20	20:36 (3)	21:45		
27	08:07		07:07		06:00		05:48			04:56		20:16 (3)	04:45		
	16:44		17:45		18:37		20:33			21:23	20	20:36 (3)	21:45		
28	08:05		07:05		05:58		05:46		19:52 (1)	04:55		20:17 (3)	04:45		
	16:46		17:47		18:39		20:35	10	20:02 (1)	21:25	19	20:36 (3)	21:45		
29	08:04				06:55		05:44		19:50 (1)	04:54		20:17 (3)	04:46		
	16:48				19:41		20:37	14	20:04 (1)	21:26	19	20:36 (3)	21:45		
30	08:02				06:53		05:42		19:48 (1)	04:53		20:17 (3)	04:47		
	16:50				19:42		20:39	17	20:05 (1)	21:27	19	20:36 (3)	21:45		
31	08:01				06:51					04:52		20:18 (3)			
	16:52				19:44					21:29	17	20:35 (3)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung								41			753			102	
Red.Sonnenscheinwahrsch.								0.41			0.51			0.45	
Reduktion Betriebsdauer								0.91			0.91			0.91	
Reduktion Windrichtung								0.66			0.66			0.65	
Gesamte Reduktion								0.25			0.31			0.27	
Met.wahrsch.Beschattung								10			231			28	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EE - IO135

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli			August			September	Oktober	November	Dezember
1	04:47			05:26		19:55 (1)	06:20	07:12	07:10	08:04
	21:45			21:10	25	20:37 (3)	20:04	18:51	16:42	15:58
2	04:48			05:28		19:54 (1)	06:22	07:14	07:12	08:05
	21:44			21:08	24	20:18 (1)	20:02	18:49	16:40	15:57
3	04:49		20:32 (3)	05:30		19:54 (1)	06:23	07:16	07:14	08:07
	21:44	2	20:34 (3)	21:06	25	20:19 (1)	20:00	18:47	16:38	15:57
4	04:50		20:31 (3)	05:31		19:53 (1)	06:25	07:18	07:15	08:08
	21:43	5	20:36 (3)	21:05	25	20:18 (1)	19:57	18:44	16:36	15:56
5	04:50		20:30 (3)	05:33		19:53 (1)	06:27	07:19	07:17	08:10
	21:43	8	20:38 (3)	21:03	26	20:19 (1)	19:55	18:42	16:34	15:55
6	04:51		20:29 (3)	05:35		19:53 (1)	06:29	07:21	07:19	08:11
	21:42	10	20:39 (3)	21:01	25	20:18 (1)	19:52	18:39	16:32	15:55
7	04:52		20:29 (3)	05:36		19:53 (1)	06:30	07:23	07:21	08:12
	21:41	11	20:40 (3)	20:59	25	20:18 (1)	19:50	18:37	16:30	15:54
8	04:53		20:28 (3)	05:38		19:54 (1)	06:32	07:25	07:23	08:14
	21:41	13	20:41 (3)	20:57	24	20:18 (1)	19:48	18:35	16:28	15:54
9	04:54		20:28 (3)	05:40		19:53 (1)	06:34	07:27	07:25	08:15
	21:40	14	20:42 (3)	20:55	24	20:17 (1)	19:45	18:32	16:27	15:54
10	04:55		20:27 (3)	05:42		19:54 (1)	06:36	07:28	07:27	08:16
	21:39	15	20:42 (3)	20:53	23	20:17 (1)	19:43	18:30	16:25	15:53
11	04:56		20:27 (3)	05:43		19:54 (1)	06:37	07:30	07:29	08:17
	21:38	16	20:43 (3)	20:51	21	20:15 (1)	19:40	18:27	16:23	15:53
12	04:58		20:27 (3)	05:45		19:55 (1)	06:39	07:32	07:31	08:18
	21:37	17	20:44 (3)	20:49	20	20:15 (1)	19:38	18:25	16:22	15:53
13	04:59		20:26 (3)	05:47		19:57 (1)	06:41	07:34	07:33	08:19
	21:37	18	20:44 (3)	20:47	17	20:14 (1)	19:35	18:23	16:20	15:53
14	05:00		20:26 (3)	05:49		19:58 (1)	06:42	07:36	07:34	08:20
	21:36	18	20:44 (3)	20:45	13	20:11 (1)	19:33	18:21	16:18	15:53
15	05:01		20:25 (3)	05:50		20:01 (1)	06:44	07:38	07:36	08:21
	21:34	20	20:45 (3)	20:43	8	20:09 (1)	19:30	18:18	16:17	15:53
16	05:03		20:25 (3)	05:52			06:46	07:39	07:38	08:22
	21:33	20	20:45 (3)	20:41			19:28	18:16	16:15	15:53
17	05:04		20:26 (3)	05:54			06:48	07:41	07:40	08:23
	21:32	20	20:46 (3)	20:38			19:26	18:14	16:14	15:53
18	05:05		20:25 (3)	05:55			06:49	07:43	07:42	08:24
	21:31	21	20:46 (3)	20:36			19:23	18:11	16:12	15:53
19	05:07		20:25 (3)	05:57			06:51	07:45	07:44	08:25
	21:30	21	20:46 (3)	20:34			19:21	18:09	16:11	15:54
20	05:08		20:25 (3)	05:59			06:53	07:47	07:45	08:25
	21:28	21	20:46 (3)	20:32			19:18	18:07	16:10	15:54
21	05:09		20:25 (3)	06:01			06:55	07:49	07:47	08:26
	21:27	22	20:47 (3)	20:30			19:16	18:05	16:08	15:54
22	05:11		20:25 (3)	06:02			06:56	07:51	07:49	08:26
	21:26	21	20:46 (3)	20:27			19:13	18:03	16:07	15:55
23	05:12		20:26 (3)	06:04			06:58	07:53	07:51	08:27
	21:24	21	20:47 (3)	20:25			19:11	18:00	16:06	15:55
24	05:14		20:06 (1)	06:06			07:00	07:54	07:52	08:27
	21:23	21	20:46 (3)	20:23			19:08	17:58	16:05	15:56
25	05:15		20:01 (1)	06:08			07:02	06:56	07:54	08:28
	21:21	30	20:46 (3)	20:21			19:06	16:56	16:04	15:57
26	05:17		20:00 (1)	06:09			07:03	06:58	07:56	08:28
	21:20	32	20:46 (3)	20:18			19:04	16:54	16:03	15:57
27	05:18		19:58 (1)	06:11			07:05	07:00	07:58	08:28
	21:18	34	20:45 (3)	20:16			19:01	16:52	16:02	15:58
28	05:20		19:58 (1)	06:13			07:07	07:02	07:59	08:28
	21:17	35	20:45 (3)	20:14			18:59	16:50	16:01	15:59
29	05:22		19:56 (1)	06:15			07:09	07:04	08:01	08:29
	21:15	35	20:43 (3)	20:11			18:56	16:48	16:00	16:00
30	05:23		19:56 (1)	06:16			07:11	07:06	08:02	08:29
	21:13	33	20:42 (3)	20:09			18:54	16:46	15:59	16:01
31	05:25		19:55 (1)	06:18				07:08		08:29
	21:12	31	20:40 (3)	20:07				16:44		16:02
Sonnenscheinstunden	510			459			382	329	260	235
astr.max.mögl.Beschattung		585			325					
Red.Sonnenscheinwahrsch.		0.45			0.49					
Reduktion Betriebsdauer		0.91			0.91					
Reduktion Windrichtung		0.66			0.66					
Gesamte Reduktion		0.27			0.29					
Met.wahrsch.Beschattung		156			96					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EF - IO136

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40		19:42 (1)	04:51		20:18 (3)
	16:03		16:54		17:49		19:46			20:41	23	20:05 (1)	21:30	11	20:29 (3)
2	08:28		07:57		07:00		06:46			05:38		19:42 (1)	04:50		20:20 (3)
	16:04		16:56		17:50		19:48			20:42	23	20:05 (1)	21:31	8	20:28 (3)
3	08:28		07:56		06:58		06:43			05:36		19:41 (1)	04:49		20:22 (3)
	16:05		16:58		17:52		19:50			20:44	24	20:05 (1)	21:32	4	20:26 (3)
4	08:28		07:54		06:55		06:41			05:34		19:42 (1)	04:49		
	16:06		16:59		17:54		19:52			20:46	24	20:06 (1)	21:33		
5	08:28		07:52		06:53		06:39			05:32		19:41 (1)	04:48		
	16:08		17:01		17:56		19:53			20:48	25	20:06 (1)	21:34		
6	08:27		07:50		06:51		06:36			05:30		19:41 (1)	04:47		
	16:09		17:03		17:58		19:55			20:50	24	20:05 (1)	21:35		
7	08:27		07:49		06:48		06:34			05:28		19:41 (1)	04:46		
	16:10		17:05		18:00		19:57			20:51	24	20:05 (1)	21:36		
8	08:26		07:47		06:46		06:31			05:26		19:41 (1)	04:46		
	16:12		17:07		18:02		19:59			20:53	23	20:04 (1)	21:37		
9	08:26		07:45		06:44		06:29			05:24		19:42 (1)	04:45		
	16:13		17:09		18:04		20:01			20:55	23	20:05 (1)	21:38		
10	08:25		07:43		06:41		06:27			05:22		19:42 (1)	04:45		
	16:15		17:11		18:06		20:03			20:57	29	20:26 (3)	21:39		
11	08:25		07:41		06:39		06:24			05:21		19:42 (1)	04:44		
	16:16		17:13		18:07		20:04			20:58	31	20:27 (3)	21:40		
12	08:24		07:39		06:37		06:22			05:19		19:44 (1)	04:44		
	16:18		17:15		18:09		20:06			21:00	32	20:29 (3)	21:41		
13	08:23		07:37		06:34		06:20			05:17		19:44 (1)	04:44		20:49 (2)
	16:19		17:17		18:11		20:08			21:02	33	20:30 (3)	21:41	5	20:54 (2)
14	08:22		07:35		06:32		06:17			05:15		19:46 (1)	04:43		20:48 (2)
	16:21		17:19		18:13		20:10			21:03	32	20:32 (3)	21:42	8	20:56 (2)
15	08:21		07:33		06:29		06:15			05:14		19:47 (1)	04:43		20:48 (2)
	16:22		17:21		18:15		20:12			21:05	30	20:32 (3)	21:43	9	20:57 (2)
16	08:20		07:31		06:27		06:13			05:12		19:51 (1)	04:43		20:48 (2)
	16:24		17:23		18:17		20:13			21:07	25	20:33 (3)	21:43	10	20:58 (2)
17	08:19		07:29		06:25		06:10			05:10		20:12 (3)	04:43		20:48 (2)
	16:26		17:25		18:19		20:15			21:08	20	20:32 (3)	21:44	10	20:58 (2)
18	08:18		07:27		06:22		06:08			05:09		20:12 (3)	04:43		20:47 (2)
	16:28		17:27		18:21		20:17			21:10	21	20:33 (3)	21:44	12	20:59 (2)
19	08:17		07:25		06:20		06:06			05:07		20:12 (3)	04:43		20:47 (2)
	16:29		17:29		18:22		20:19			21:11	20	20:32 (3)	21:44	12	20:59 (2)
20	08:16		07:22		06:17		06:03			05:06		20:12 (3)	04:43		20:47 (2)
	16:31		17:31		18:24		20:21			21:13	21	20:33 (3)	21:45	12	20:59 (2)
21	08:15		07:20		06:15		06:01			05:04		20:12 (3)	04:43		20:47 (2)
	16:33		17:33		18:26		20:23			21:15	21	20:33 (3)	21:45	12	20:59 (2)
22	08:14		07:18		06:12		05:59			05:03		20:12 (3)	04:43		20:48 (2)
	16:35		17:35		18:28		20:24			21:16	20	20:32 (3)	21:45	12	21:00 (2)
23	08:12		07:16		06:10		05:57			05:02		20:12 (3)	04:43		20:48 (2)
	16:36		17:37		18:30		20:26			21:18	20	20:32 (3)	21:45	12	21:00 (2)
24	08:11		07:14		06:08		05:55			05:00		20:13 (3)	04:44		20:48 (2)
	16:38		17:39		18:32		20:28			21:19	19	20:32 (3)	21:45	12	21:00 (2)
25	08:10		07:11		06:05		05:52			04:59		20:13 (3)	04:44		20:50 (2)
	16:40		17:41		18:33		20:30			21:21	19	20:32 (3)	21:45	10	21:00 (2)
26	08:08		07:09		06:03		05:50		19:50 (1)	04:58		20:14 (3)	04:44		20:50 (2)
	16:42		17:43		18:35		20:32	9	19:59 (1)	21:22	18	20:32 (3)	21:45	10	21:00 (2)
27	08:07		07:07		06:00		05:48		19:47 (1)	04:56		20:15 (3)	04:45		20:51 (2)
	16:44		17:45		18:37		20:33	14	20:01 (1)	21:23	17	20:32 (3)	21:45	9	21:00 (2)
28	08:05		07:05		05:58		05:46		19:46 (1)	04:55		20:15 (3)	04:45		20:51 (2)
	16:46		17:47		18:39		20:35	16	20:02 (1)	21:25	16	20:31 (3)	21:45	8	20:59 (2)
29	08:04				06:55		05:44		19:44 (1)	04:54		20:16 (3)	04:46		20:53 (2)
	16:48				19:41		20:37	19	20:03 (1)	21:26	15	20:31 (3)	21:45	6	20:59 (2)
30	08:02				06:53		05:42		19:43 (1)	04:53		20:17 (3)	04:47		20:54 (2)
	16:50				19:42		20:39	21	20:04 (1)	21:27	13	20:30 (3)	21:45	3	20:57 (2)
31	08:01				06:51					04:52		20:17 (3)			
	16:52				19:44					21:29	13	20:30 (3)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung								79			698			195	
Red.Sonnenscheinwahrsch.								0.41			0.51			0.45	
Reduktion Betriebsdauer								0.91			0.91			0.91	
Reduktion Windrichtung								0.66			0.66			0.63	
Gesamte Reduktion								0.25			0.31			0.26	
Met.wahrsch.Beschattung								20			215			51	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EF - IO136

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli			August			September	Oktober	November	Dezember
1	04:47			05:26		19:54 (1)	06:20	07:12	07:10	08:04
	21:45			21:10	31	20:39 (3)	20:04	18:51	16:42	15:58
2	04:48			05:28		19:53 (1)	06:22	07:14	07:12	08:05
	21:44			21:08	29	20:37 (3)	20:02	18:49	16:40	15:57
3	04:49			05:30		19:52 (1)	06:23	07:16	07:14	08:07
	21:44			21:06	25	20:34 (3)	20:00	18:47	16:38	15:57
4	04:50			05:31		19:51 (1)	06:25	07:18	07:15	08:08
	21:43			21:05	23	20:14 (1)	19:57	18:44	16:36	15:56
5	04:50			05:33		19:51 (1)	06:27	07:19	07:17	08:10
	21:43			21:03	24	20:15 (1)	19:55	18:42	16:34	15:55
6	04:51			05:35		19:50 (1)	06:29	07:21	07:19	08:11
	21:42			21:01	24	20:14 (1)	19:52	18:39	16:32	15:55
7	04:52			05:36		19:50 (1)	06:30	07:23	07:21	08:12
	21:41			20:59	25	20:15 (1)	19:50	18:37	16:30	15:54
8	04:53			05:38		19:51 (1)	06:32	07:25	07:23	08:14
	21:41			20:57	24	20:15 (1)	19:48	18:35	16:28	15:54
9	04:54			05:40		19:50 (1)	06:34	07:27	07:25	08:15
	21:40			20:55	24	20:14 (1)	19:45	18:32	16:27	15:54
10	04:55		20:29 (3)	05:42		19:51 (1)	06:36	07:28	07:27	08:16
	21:39	6	20:35 (3)	20:53	23	20:14 (1)	19:43	18:30	16:25	15:53
11	04:56		20:27 (3)	05:43		19:50 (1)	06:37	07:30	07:29	08:17
	21:38	9	20:36 (3)	20:51	23	20:13 (1)	19:40	18:27	16:23	15:53
12	04:58		20:26 (3)	05:45		19:51 (1)	06:39	07:32	07:31	08:18
	21:37	12	20:38 (3)	20:49	22	20:13 (1)	19:38	18:25	16:22	15:53
13	04:59		20:25 (3)	05:47		19:52 (1)	06:41	07:34	07:33	08:19
	21:37	13	20:38 (3)	20:47	20	20:12 (1)	19:35	18:23	16:20	15:53
14	05:00		20:25 (3)	05:48		19:52 (1)	06:42	07:36	07:34	08:20
	21:36	14	20:39 (3)	20:45	19	20:11 (1)	19:33	18:21	16:18	15:53
15	05:01		20:24 (3)	05:50		19:53 (1)	06:44	07:38	07:36	08:21
	21:34	16	20:40 (3)	20:43	17	20:10 (1)	19:30	18:18	16:17	15:53
16	05:03		20:23 (3)	05:52		19:55 (1)	06:46	07:39	07:38	08:22
	21:33	17	20:40 (3)	20:41	13	20:08 (1)	19:28	18:16	16:15	15:53
17	05:04		20:24 (3)	05:54		19:58 (1)	06:48	07:41	07:40	08:23
	21:32	18	20:42 (3)	20:38	6	20:04 (1)	19:26	18:14	16:14	15:53
18	05:05		20:23 (3)	05:55			06:49	07:43	07:42	08:24
	21:31	19	20:42 (3)	20:36			19:23	18:11	16:12	15:53
19	05:07		20:23 (3)	05:57			06:51	07:45	07:44	08:25
	21:30	19	20:42 (3)	20:34			19:21	18:09	16:11	15:54
20	05:08		20:22 (3)	05:59			06:53	07:47	07:45	08:25
	21:28	20	20:42 (3)	20:32			19:18	18:07	16:10	15:54
21	05:09		20:23 (3)	06:01			06:55	07:49	07:47	08:26
	21:27	20	20:43 (3)	20:30			19:16	18:05	16:08	15:54
22	05:11		20:22 (3)	06:02			06:56	07:51	07:49	08:26
	21:26	21	20:43 (3)	20:27			19:13	18:02	16:07	15:55
23	05:12		20:23 (3)	06:04			06:58	07:53	07:51	08:27
	21:24	21	20:44 (3)	20:25			19:11	18:00	16:06	15:55
24	05:14		20:22 (3)	06:06			07:00	07:54	07:52	08:27
	21:23	21	20:43 (3)	20:23			19:08	17:58	16:05	15:56
25	05:15		20:22 (3)	06:08			07:02	06:56	07:54	08:28
	21:21	21	20:43 (3)	20:21			19:06	16:56	16:04	15:57
26	05:17		20:23 (3)	06:09			07:03	06:58	07:56	08:28
	21:20	20	20:43 (3)	20:18			19:04	16:54	16:03	15:57
27	05:18		20:23 (3)	06:11			07:05	07:00	07:58	08:28
	21:18	20	20:43 (3)	20:16			19:01	16:52	16:02	15:58
28	05:20		20:00 (1)	06:13			07:07	07:02	07:59	08:28
	21:17	27	20:43 (3)	20:14			18:59	16:50	16:01	15:59
29	05:22		19:57 (1)	06:15			07:09	07:04	08:01	08:29
	21:15	30	20:42 (3)	20:11			18:56	16:48	16:00	16:00
30	05:23		19:56 (1)	06:16			07:11	07:06	08:02	08:29
	21:13	32	20:42 (3)	20:09			18:54	16:46	15:59	16:01
31	05:25		19:54 (1)	06:18				07:08		08:29
	21:12	33	20:40 (3)	20:07				16:44		16:02
Sonnenscheinstunden	510			459			382	329	260	235
astr.max.mögl.Beschattung		429			372					
Red.Sonnenscheinwahrsch.		0.45			0.49					
Reduktion Betriebsdauer		0.91			0.91					
Reduktion Windrichtung		0.66			0.66					
Gesamte Reduktion		0.27			0.29					
Met.wahrsch.Beschattung		114			110					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EG - IO137

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni			Juli			August			September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51			20:23 (3)	04:47		20:31 (3)	05:28		20:01 (1)	06:20	07:12	07:10	08:04
	16:03	16:34	17:40	19:46	20:41			21:30	21		20:44 (3)	21:45	17	20:48 (3)	21:10	20	20:27 (1)	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		20:00 (1)	04:50			20:24 (3)	04:48		20:32 (3)	05:28		20:01 (1)	06:22	07:14	07:12	08:05
	16:04	16:36	17:50	19:48	20:42	8	20:08 (1)	21:31	21		20:45 (3)	21:44	17	20:48 (3)	21:08	25	20:26 (1)	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		19:57 (1)	04:49			20:24 (3)	04:48		20:31 (3)	05:30		20:02 (1)	06:23	07:16	07:14	08:07
	16:05	16:38	17:52	19:50	20:44	13	20:10 (1)	21:32	20		20:44 (3)	21:44	18	20:48 (3)	21:06	24	20:26 (1)	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		19:56 (1)	04:49			20:24 (3)	04:50		20:31 (3)	05:31		20:01 (1)	06:25	07:18	07:15	08:08
	16:06	16:40	17:54	19:52	20:46	17	20:13 (1)	21:33	20		20:44 (3)	21:43	18	20:48 (3)	21:05	24	20:25 (1)	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		19:55 (1)	04:49			20:25 (3)	04:50		20:31 (3)	05:33		20:02 (1)	06:27	07:19	07:17	08:10
	16:08	17:01	17:58	19:53	20:48	19	20:14 (1)	21:34	20		20:45 (3)	21:43	19	20:50 (3)	21:03	23	20:25 (1)	19:53	18:42	16:34	15:55
6	08:27	07:50	06:51	06:38	05:30		19:53 (1)	04:47			20:25 (3)	04:51		20:31 (3)	05:35		20:02 (1)	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21	20:14 (1)	21:35	19		20:44 (3)	21:42	19	20:50 (3)	21:01	22	20:24 (1)	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		19:52 (1)	04:46			20:25 (3)	04:52		20:31 (3)	05:38		20:03 (1)	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	23	20:15 (1)	21:36	19		20:44 (3)	21:41	20	20:51 (3)	20:58	21	20:24 (1)	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		19:52 (1)	04:46			20:26 (3)	04:53		20:31 (3)	05:38		20:04 (1)	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	23	20:15 (1)	21:37	18		20:44 (3)	21:41	19	20:51 (3)	20:57	19	20:23 (1)	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		19:52 (1)	04:45			20:27 (3)	04:54		20:31 (3)	05:43		20:05 (1)	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	24	20:16 (1)	21:38	17		20:44 (3)	21:40	21	20:52 (3)	20:55	16	20:21 (1)	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		19:51 (1)	04:45			20:26 (3)	04:55		20:31 (3)	05:47		20:07 (1)	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	25	20:16 (1)	21:39	18		20:44 (3)	21:39	21	20:52 (3)	20:53	12	20:19 (1)	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		19:51 (1)	04:44			20:27 (3)	04:58		20:31 (3)	05:43		20:10 (1)	06:37	07:30	07:28	08:17
	16:16	17:13	18:08	20:04	20:58	25	20:16 (1)	21:40	17		20:44 (3)	21:38	21	20:52 (3)	20:51	5	20:15 (1)	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		19:51 (1)	04:44			20:28 (3)	04:58		20:31 (3)	05:45			06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	25	20:16 (1)	21:41	16		20:44 (3)	21:37	21	20:52 (3)	20:49			19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		19:51 (1)	04:44			20:27 (3)	04:59		20:31 (3)	05:47			06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	25	20:16 (1)	21:41	17		20:44 (3)	21:37	22	20:53 (3)	20:47			19:35	18:23	16:20	15:53
14	08:22	07:36	06:32	06:17	05:15		19:51 (1)	04:43			20:28 (3)	05:00		20:31 (3)	05:49			06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	26	20:17 (1)	21:42	16		20:44 (3)	21:36	22	20:53 (3)	20:45			19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		19:51 (1)	04:43			20:29 (3)	05:01		20:31 (3)	05:50			06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	25	20:16 (1)	21:43	15		20:44 (3)	21:34	22	20:53 (3)	20:43			19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		19:52 (1)	04:43			20:29 (3)	05:03		20:31 (3)	05:52			06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	27	20:34 (3)	21:43	15		20:44 (3)	21:33	21	20:52 (3)	20:41			19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		19:51 (1)	04:43			20:29 (3)	05:04		20:12 (3)	05:54			06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	32	20:36 (3)	21:44	15		20:44 (3)	21:32	25	20:52 (3)	20:38			19:26	18:14	16:14	15:53
18	08:18	07:27	06:23	06:08	05:09		19:52 (1)	04:43			20:30 (3)	05:05		20:09 (1)	05:55			06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	35	20:38 (3)	21:44	14		20:44 (3)	21:31	30	20:53 (3)	20:36			19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		19:52 (1)	04:43			20:30 (3)	05:07		20:07 (1)	05:57			06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	36	20:39 (3)	21:44	14		20:44 (3)	21:30	34	20:53 (3)	20:34			19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		19:53 (1)	04:43			20:30 (3)	05:08		20:06 (1)	05:59			06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	38	20:41 (3)	21:45	14		20:44 (3)	21:28	35	20:52 (3)	20:32			19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		19:54 (1)	04:43			20:30 (3)	05:09		20:05 (1)	06:01			06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	38	20:42 (3)	21:45	14		20:44 (3)	21:27	36	20:52 (3)	20:30			19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		19:54 (1)	04:43			20:31 (3)	05:11		20:04 (1)	06:02			06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	36	20:41 (3)	21:45	14		20:45 (3)	21:26	38	20:52 (3)	20:27			19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		19:56 (1)	04:43			20:31 (3)	05:12		20:04 (1)	06:04			06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	35	20:42 (3)	21:45	14		20:45 (3)	21:24	37	20:52 (3)	20:25			19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		19:57 (1)	04:44			20:31 (3)	05:14		20:03 (1)	06:06			07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	35	20:43 (3)	21:45	14		20:45 (3)	21:23	37	20:50 (3)	20:23			19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		19:58 (1)	04:44			20:32 (3)	05:15		20:02 (1)	06:08			07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	33	20:43 (3)	21:45	14		20:46 (3)	21:21	36	20:49 (3)	20:21			19:06	16:56	16:04	15:57
26	08:09	07:09	06:03	05:50	04:58		20:01 (1)	04:44			20:31 (3)	05:17		20:02 (1)	06:09			07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	29	20:44 (3)	21:45	15		20:46 (3)	21:18	35	20:48 (3)	20:18			19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		20:23 (3)	04:45			20:32 (3)	05:18		20:02 (1)	06:11			07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21	20:44 (3)	21:45	15		20:47 (3)	21:18	31	20:46 (3)	20:16			19:01	16:52	16:02	15:58
28	08:06	07:05	05:58	05:46	04:55		20:23 (3)	04:45			20:31 (3)	05:20		20:02 (1)	06:13			07:07	07:02	07:58	08:28
	16:46	17:47	18:39	20:35	21:25	21	20:44 (3)	21:45	16		20:47 (3)	21:17	25	20:27 (1)	20:14			18:58	16:50	16:01	15:59
29	08:04		06:03	05:44	04:54		20:23 (3)	04:46			20:32 (3)	05:22		20:01 (1)	06:15			07:09	07:04	08:01	08:29
	16:48		18:41	20:37	21:26	21	20:44 (3)	21:45	16		20:48 (3)	21:16	25	20:26 (1)	20:11			18:56	16:48	16:00	08:29
30	08:02		06:53	05:42	04:53		20:23 (3)	04:47			20:31 (3)	05:23		20:02 (1)	06:16			07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	21	20:44 (3)	21:45	16		20:47 (3)	21:13	25	20:27 (1)	20:09			18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:23 (3)					05:25		20:01 (1)	06:18				07:08		08:29
	16:52		19:44		21:29	21	20:44 (3)					21:12	25	20:26 (1)	20:07				16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508			510			459				362	329	280	235
abtr.max.mögl.Beschattung						778			494			793			217						
Red.Sonnenscheinwahrsch.						0.51			0.45			0.45			0.49						
Reduktion Betriebsdauer						0.91			0.91			0.91			0.91						
Reduktion Windrichtung						0.66			0.65			0.65			0.66						
Gesamte Reduktion						0.31			0.27			0.27			0.29						
Met.wahrsch.Beschattung						238			133			210			64						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EH - IO138

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August		September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		20:09 (1)	04:51	20:22 (3)	04:47	20:31 (3)	05:28	20:31 (1)	06:20	07:12	07:10	08:04
	16:03	16:34	17:40	19:46	20:41	8	20:06 (1)	21:30	20 20:42 (3)	21:45	15 20:46 (3)	21:10	25 20:26 (1)	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		19:57 (1)	04:50	20:23 (3)	04:48	20:32 (3)	05:28	20:00 (1)	06:22	07:14	07:12	08:05
	16:04	16:36	17:50	19:48	20:42	12	20:09 (1)	21:31	20 20:43 (3)	21:44	15 20:47 (3)	21:08	25 20:25 (1)	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		19:55 (1)	04:49	20:23 (3)	04:46	20:31 (3)	05:30	20:01 (1)	06:23	07:16	07:14	08:07
	16:05	16:38	17:52	19:50	20:44	16	20:11 (1)	21:32	20 20:43 (3)	21:44	15 20:46 (3)	21:06	24 20:25 (1)	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		19:54 (1)	04:49	20:23 (3)	04:50	20:31 (3)	05:31	20:00 (1)	06:25	07:18	07:15	08:08
	16:06	16:39	17:54	19:52	20:46	19	20:13 (1)	21:33	19 20:42 (3)	21:43	16 20:47 (3)	21:05	24 20:24 (1)	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		19:53 (1)	04:48	20:24 (3)	04:50	20:31 (3)	05:33	20:01 (1)	06:27	07:19	07:17	08:10
	16:08	17:01	17:58	19:53	20:48	20	20:13 (1)	21:34	19 20:43 (3)	21:43	17 20:48 (3)	21:03	23 20:24 (1)	19:53	18:42	16:34	15:55
6	08:27	07:50	06:51	06:38	05:30		19:52 (1)	04:47	20:24 (3)	04:51	20:31 (3)	05:35	20:01 (1)	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	22	20:14 (1)	21:35	18 20:42 (3)	21:42	17 20:48 (3)	21:01	22 20:23 (1)	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		19:51 (1)	04:46	20:24 (3)	04:52	20:31 (3)	05:36	20:02 (1)	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	23	20:14 (1)	21:36	18 20:42 (3)	21:41	18 20:48 (3)	20:58	21 20:23 (1)	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		19:50 (1)	04:46	20:25 (3)	04:53	20:31 (3)	05:38	20:03 (1)	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	24	20:14 (1)	21:37	17 20:42 (3)	21:41	18 20:49 (3)	20:57	20 20:23 (1)	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		19:51 (1)	04:45	20:26 (3)	04:54	20:31 (3)	05:40	20:03 (1)	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	24	20:15 (1)	21:38	16 20:42 (3)	21:40	19 20:50 (3)	20:55	18 20:21 (1)	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		19:50 (1)	04:45	20:26 (3)	04:55	20:31 (3)	05:42	20:05 (1)	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	25	20:15 (1)	21:39	15 20:41 (3)	21:39	19 20:50 (3)	20:53	15 20:20 (1)	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		19:50 (1)	04:44	20:27 (3)	04:56	20:31 (3)	05:43	20:06 (1)	06:37	07:30	07:28	08:17
	16:16	17:13	18:08	20:04	20:58	25	20:15 (1)	21:40	15 20:42 (3)	21:38	20 20:51 (3)	20:51	11 20:17 (1)	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		19:50 (1)	04:44	20:28 (3)	04:58	20:30 (3)	05:45	20:11 (1)	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	25	20:15 (1)	21:41	14 20:42 (3)	21:37	21 20:51 (3)	20:49	2 20:13 (1)	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		19:50 (1)	04:44	20:28 (3)	04:59	20:30 (3)	05:47		06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	25	20:15 (1)	21:41	13 20:41 (3)	21:37	21 20:51 (3)	20:47		19:35	18:23	16:20	15:53
14	08:22	07:36	06:32	06:17	05:15		19:51 (1)	04:43	20:28 (3)	05:00	20:30 (3)	05:49		06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	24	20:15 (1)	21:42	13 20:41 (3)	21:36	21 20:51 (3)	20:45		19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		19:50 (1)	04:43	20:29 (3)	05:01	20:30 (3)	05:50		06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	24	20:12 (1)	21:43	12 20:41 (3)	21:34	21 20:51 (3)	20:43		19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		19:51 (1)	04:43	20:29 (3)	05:03	20:30 (3)	05:52		06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	31	20:35 (1)	21:43	12 20:41 (3)	21:33	21 20:51 (3)	20:41		19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		19:51 (1)	04:43	20:30 (3)	05:04	20:31 (3)	05:54		06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	33	20:36 (3)	21:44	11 20:41 (3)	21:32	21 20:52 (3)	20:38		19:26	18:14	16:14	15:53
18	08:18	07:27	06:23	06:08	05:09		19:52 (1)	04:43	20:30 (3)	05:05	20:31 (3)	05:55		06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	35	20:38 (3)	21:44	11 20:41 (3)	21:31	21 20:52 (3)	20:36		19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		19:52 (1)	04:43	20:30 (3)	05:07	20:10 (1)	05:57		06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	36	20:39 (3)	21:44	11 20:41 (3)	21:30	25 20:01 (3)	20:34		19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		19:53 (1)	04:43	20:31 (3)	05:08	20:07 (1)	05:59		06:53	07:47	07:46	08:25
	16:31	17:31	18:24	20:21	21:13	37	20:40 (3)	21:45	10 20:41 (3)	21:28	30 20:51 (3)	20:32		19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		19:55 (1)	04:43	20:31 (3)	05:09	20:06 (1)	06:01		06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	35	20:41 (3)	21:45	10 20:41 (3)	21:27	33 20:51 (3)	20:30		19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		19:55 (1)	04:43	20:32 (3)	05:11	20:05 (1)	06:02		06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	35	20:41 (3)	21:45	10 20:42 (3)	21:26	34 20:51 (3)	20:27		19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		19:57 (1)	04:43	20:32 (3)	05:12	20:05 (1)	06:04		06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	32	20:41 (3)	21:45	10 20:42 (3)	21:24	35 20:51 (3)	20:25		19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		19:59 (1)	04:44	20:31 (3)	05:14	20:03 (1)	06:06		07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	29	20:42 (3)	21:45	11 20:42 (3)	21:23	37 20:50 (3)	20:23		19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		20:21 (3)	21:44	11 20:32 (3)	05:15	20:02 (1)	06:08		07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21	20:42 (3)	21:45	11 20:43 (3)	21:21	37 20:49 (3)	20:21		19:06	18:56	16:04	15:57
26	08:09	07:09	06:03	05:50	04:58		20:21 (3)	21:44	11 20:32 (3)	05:17	20:02 (1)	06:09		07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21	20:42 (3)	21:45	11 20:43 (3)	21:18	35 20:48 (3)	20:18		19:04	18:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		20:21 (3)	21:45	12 20:32 (3)	05:18	20:01 (1)	06:11		07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	22	20:43 (3)	21:45	12 20:44 (3)	21:18	33 20:46 (3)	20:16		19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		20:21 (3)	21:45	12 20:32 (3)	05:20	20:01 (1)	06:13		07:07	07:02	07:58	08:28
	16:46	17:47	18:39	20:35	21:25	22	20:43 (3)	21:45	12 20:44 (3)	21:17	31 20:45 (3)	20:14		18:58	16:50	16:01	15:59
29	08:04		06:01	05:44	04:54		20:22 (3)	21:46	20:32 (3)	05:22	20:01 (1)	06:15		07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21	20:43 (3)	21:45	13 20:45 (3)	21:15	24 20:25 (1)	20:11		16:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		20:22 (3)	20:47	20:31 (3)	05:23	20:01 (1)	06:16		07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	21	20:43 (3)	21:45	14 20:45 (3)	21:13	25 20:28 (1)	20:09		16:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:22 (3)			05:25	20:00 (1)	06:18			07:08		08:29
	16:52		19:44		21:29	20	20:42 (3)			21:12	25 20:25 (1)	20:07			16:44		16:02
Sonnenscheinstunden	252	274	367	419	492		508		510		459		362	329	280		235
abtr.max.mögl.Beschattung						767		418		748		230					
Red.Sonnenscheinwahrsch.						0.51		0.45		0.45		0.49					
Reduktion Betriebsdauer						0.91		0.91		0.91		0.91					
Reduktion Windrichtung						0.66		0.65		0.65		0.66					
Gesamte Reduktion						0.31		0.27		0.27		0.29					
Mat.wahrsch.Beschattung						235		113		186		68					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EI - IO139

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April			Mai			Juni		
1	08:29	07:59	07:02	06:48			05:40		19:52 (1)	04:51		20:20 (3)
	16:03	16:54	17:49	19:46			20:41	16	20:08 (1)	21:30	17	20:37 (3)
2	08:28	07:57	07:00	06:46			05:38		19:50 (1)	04:50		20:22 (3)
	16:04	16:56	17:50	19:48			20:42	19	20:09 (1)	21:31	15	20:37 (3)
3	08:28	07:56	06:58	06:43			05:36		19:49 (1)	04:49		20:22 (3)
	16:05	16:58	17:52	19:50			20:44	21	20:10 (1)	21:32	15	20:37 (3)
4	08:28	07:54	06:55	06:41			05:34		19:49 (1)	04:49		20:22 (3)
	16:06	16:59	17:54	19:52			20:46	22	20:11 (1)	21:33	14	20:36 (3)
5	08:28	07:52	06:53	06:39			05:32		19:48 (1)	04:48		20:24 (3)
	16:08	17:01	17:56	19:53			20:48	23	20:11 (1)	21:34	12	20:36 (3)
6	08:27	07:50	06:51	06:36			05:30		19:48 (1)	04:47		20:24 (3)
	16:09	17:03	17:58	19:55			20:50	23	20:11 (1)	21:35	12	20:36 (3)
7	08:27	07:49	06:48	06:34			05:28		19:47 (1)	04:46		20:25 (3)
	16:10	17:05	18:00	19:57			20:51	24	20:11 (1)	21:36	10	20:35 (3)
8	08:26	07:47	06:46	06:31			05:26		19:47 (1)	04:46		20:26 (3)
	16:12	17:07	18:02	19:59			20:53	24	20:11 (1)	21:37	8	20:34 (3)
9	08:26	07:45	06:44	06:29			05:24		19:48 (1)	04:45		20:28 (3)
	16:13	17:09	18:04	20:01			20:55	24	20:12 (1)	21:38	6	20:34 (3)
10	08:25	07:43	06:41	06:27			05:22		19:47 (1)	04:45		20:29 (3)
	16:15	17:11	18:06	20:03			20:57	24	20:11 (1)	21:39	3	20:32 (3)
11	08:25	07:41	06:39	06:24			05:21		19:47 (1)	04:44		
	16:16	17:13	18:07	20:04			20:58	24	20:11 (1)	21:40		
12	08:24	07:39	06:37	06:22			05:19		19:48 (1)	04:44		
	16:18	17:15	18:09	20:06			21:00	23	20:11 (1)	21:41		
13	08:23	07:37	06:34	06:20			05:17		19:48 (1)	04:44		
	16:19	17:17	18:11	20:08			21:02	28	20:30 (3)	21:41		
14	08:22	07:35	06:32	06:17			05:15		19:49 (1)	04:43		
	16:21	17:19	18:13	20:10			21:03	31	20:32 (3)	21:42		
15	08:21	07:33	06:29	06:15			05:14		19:49 (1)	04:43		
	16:22	17:21	18:15	20:12			21:05	32	20:33 (3)	21:43		
16	08:20	07:31	06:27	06:13			05:12		19:50 (1)	04:43		
	16:24	17:23	18:17	20:13			21:07	34	20:35 (3)	21:43		
17	08:19	07:29	06:25	06:10			05:10		19:51 (1)	04:43		
	16:26	17:25	18:19	20:15			21:08	33	20:36 (3)	21:44		
18	08:18	07:27	06:22	06:08			05:09		19:52 (1)	04:43		
	16:28	17:27	18:21	20:17			21:10	33	20:37 (3)	21:44		
19	08:17	07:25	06:20	06:06			05:07		19:53 (1)	04:43		
	16:29	17:29	18:22	20:19			21:11	31	20:37 (3)	21:44		
20	08:16	07:22	06:17	06:03			05:06		19:56 (1)	04:43		
	16:31	17:31	18:24	20:21			21:13	27	20:38 (3)	21:45		
21	08:15	07:20	06:15	06:01			05:04		20:18 (3)	04:43		
	16:33	17:33	18:26	20:23			21:15	20	20:38 (3)	21:45		
22	08:14	07:18	06:12	05:59			05:03		20:17 (3)	04:43		
	16:35	17:35	18:28	20:24			21:16	21	20:38 (3)	21:45		
23	08:12	07:16	06:10	05:57			05:02		20:17 (3)	04:43		
	16:36	17:37	18:30	20:26			21:18	21	20:38 (3)	21:45		
24	08:11	07:14	06:08	05:55			05:00		20:18 (3)	04:44		
	16:38	17:39	18:32	20:28			21:19	20	20:38 (3)	21:45		
25	08:10	07:11	06:05	05:52			04:59		20:18 (3)	04:44		
	16:40	17:41	18:33	20:30			21:21	20	20:38 (3)	21:45		
26	08:08	07:09	06:03	05:50			04:58		20:18 (3)	04:44		
	16:42	17:43	18:35	20:32			21:22	20	20:38 (3)	21:45		
27	08:07	07:07	06:00	05:48			04:56		20:19 (3)	04:45		
	16:44	17:45	18:37	20:33			21:23	19	20:38 (3)	21:45		
28	08:05	07:05	05:58	05:46			04:55		20:19 (3)	04:45		
	16:46	17:47	18:39	20:35			21:25	19	20:38 (3)	21:45		
29	08:04		06:55	05:44		19:57 (1)	04:54		20:19 (3)	04:46		
	16:48		19:41	20:37	7	20:04 (1)	21:26	19	20:38 (3)	21:45		
30	08:02		06:53	05:42		19:54 (1)	04:53		20:20 (3)	04:47		
	16:50		19:42	20:39	12	20:06 (1)	21:27	18	20:38 (3)	21:45		
31	08:01		06:51				04:52		20:20 (3)			
	16:52		19:44				21:29	17	20:37 (3)			
Sonnenscheinstunden	252	274	367	419			492			508		
astr.max.mögl.Beschattung					19			730			112	
Red.Sonnenscheinwahrsch.					0.41			0.51			0.45	
Reduktion Betriebsdauer					0.91			0.91			0.91	
Reduktion Windrichtung					0.66			0.66			0.65	
Gesamte Reduktion					0.25			0.31			0.27	
Met.wahrsch.Beschattung					5			224			30	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EI - IO139

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli			August			September	Oktober	November	Dezember
1	04:47			05:26		19:58 (1)	06:20	07:12	07:10	08:04
	21:45			21:10	24	20:22 (1)	20:04	18:51	16:42	15:58
2	04:48		20:35 (3)	05:28		19:57 (1)	06:22	07:14	07:12	08:05
	21:44	1	20:36 (3)	21:08	24	20:21 (1)	20:02	18:49	16:40	15:57
3	04:49		20:32 (3)	05:30		19:58 (1)	06:23	07:16	07:14	08:07
	21:44	6	20:38 (3)	21:06	24	20:22 (1)	20:00	18:47	16:38	15:57
4	04:50		20:32 (3)	05:31		19:57 (1)	06:25	07:18	07:15	08:08
	21:43	7	20:39 (3)	21:05	24	20:21 (1)	19:57	18:44	16:36	15:56
5	04:50		20:31 (3)	05:33		19:57 (1)	06:27	07:19	07:17	08:10
	21:43	9	20:40 (3)	21:03	25	20:22 (1)	19:55	18:42	16:34	15:55
6	04:51		20:31 (3)	05:35		19:57 (1)	06:29	07:21	07:19	08:11
	21:42	11	20:42 (3)	21:01	24	20:21 (1)	19:52	18:39	16:32	15:55
7	04:52		20:30 (3)	05:36		19:57 (1)	06:30	07:23	07:21	08:12
	21:41	12	20:42 (3)	20:59	24	20:21 (1)	19:50	18:37	16:30	15:54
8	04:53		20:30 (3)	05:38		19:58 (1)	06:32	07:25	07:23	08:14
	21:41	13	20:43 (3)	20:57	23	20:21 (1)	19:48	18:35	16:28	15:54
9	04:54		20:30 (3)	05:40		19:58 (1)	06:34	07:27	07:25	08:15
	21:40	14	20:44 (3)	20:55	21	20:19 (1)	19:45	18:32	16:27	15:54
10	04:55		20:29 (3)	05:42		19:59 (1)	06:36	07:28	07:27	08:16
	21:39	16	20:45 (3)	20:53	20	20:19 (1)	19:43	18:30	16:25	15:53
11	04:56		20:29 (3)	05:43		19:59 (1)	06:37	07:30	07:29	08:17
	21:38	16	20:45 (3)	20:51	18	20:17 (1)	19:40	18:27	16:23	15:53
12	04:58		20:29 (3)	05:45		20:01 (1)	06:39	07:32	07:31	08:18
	21:37	17	20:46 (3)	20:49	15	20:16 (1)	19:38	18:25	16:22	15:53
13	04:59		20:28 (3)	05:47		20:03 (1)	06:41	07:34	07:33	08:19
	21:37	18	20:46 (3)	20:47	11	20:14 (1)	19:35	18:23	16:20	15:53
14	05:00		20:28 (3)	05:48		20:05 (1)	06:42	07:36	07:34	08:20
	21:36	18	20:46 (3)	20:45	5	20:10 (1)	19:33	18:21	16:18	15:53
15	05:01		20:27 (3)	05:50			06:44	07:38	07:36	08:21
	21:34	20	20:47 (3)	20:43			19:30	18:18	16:17	15:53
16	05:03		20:27 (3)	05:52			06:46	07:39	07:38	08:22
	21:33	20	20:47 (3)	20:41			19:28	18:16	16:15	15:53
17	05:04		20:28 (3)	05:54			06:48	07:41	07:40	08:23
	21:32	20	20:48 (3)	20:38			19:26	18:14	16:14	15:53
18	05:05		20:28 (3)	05:55			06:49	07:43	07:42	08:24
	21:31	20	20:48 (3)	20:36			19:23	18:11	16:12	15:53
19	05:07		20:27 (3)	05:57			06:51	07:45	07:44	08:25
	21:30	21	20:48 (3)	20:34			19:21	18:09	16:11	15:54
20	05:08		20:27 (3)	05:59			06:53	07:47	07:45	08:25
	21:28	21	20:48 (3)	20:32			19:18	18:07	16:10	15:54
21	05:09		20:28 (3)	06:01			06:55	07:49	07:47	08:26
	21:27	20	20:48 (3)	20:30			19:16	18:05	16:08	15:54
22	05:11		20:28 (3)	06:02			06:56	07:51	07:49	08:26
	21:26	20	20:48 (3)	20:27			19:13	18:02	16:07	15:55
23	05:12		20:09 (1)	06:04			06:58	07:53	07:51	08:27
	21:24	23	20:48 (3)	20:25			19:11	18:00	16:06	15:55
24	05:14		20:05 (1)	06:06			07:00	07:54	07:52	08:27
	21:23	29	20:48 (3)	20:23			19:08	17:58	16:05	15:56
25	05:15		20:03 (1)	06:08			07:02	06:56	07:54	08:28
	21:21	32	20:47 (3)	20:21			19:06	16:56	16:04	15:57
26	05:17		20:02 (1)	06:09			07:03	06:58	07:56	08:28
	21:20	34	20:47 (3)	20:18			19:04	16:54	16:03	15:57
27	05:18		20:01 (1)	06:11			07:05	07:00	07:58	08:28
	21:18	33	20:46 (3)	20:16			19:01	16:52	16:02	15:58
28	05:20		20:00 (1)	06:13			07:07	07:02	07:59	08:28
	21:17	34	20:45 (3)	20:14			18:59	16:50	16:01	15:59
29	05:22		19:59 (1)	06:15			07:09	07:04	08:01	08:29
	21:15	33	20:43 (3)	20:11			18:56	16:48	16:00	16:00
30	05:23		19:59 (1)	06:16			07:11	07:06	08:02	08:29
	21:13	30	20:42 (3)	20:09			18:54	16:46	15:59	16:01
31	05:25		19:58 (1)	06:18				07:08		08:29
	21:12	27	20:40 (3)	20:07				16:44		16:02
Sonnenscheinstunden	510			459			382	329	260	235
astr.max.mögl.Beschattung		595			282					
Red.Sonnenscheinwahrsch.		0.45			0.49					
Reduktion Betriebsdauer		0.91			0.91					
Reduktion Windrichtung		0.65			0.66					
Gesamte Reduktion		0.27			0.29					
Met.wahrsch.Beschattung		158			83					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EJ - IO140

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni			Juli			August			September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51			20:26 (3)	04:47		20:33 (3)	05:28		20:06 (1)	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41			21:30	21		20:47 (3)	21:45	20	20:53 (3)	21:10	24	20:30 (1)	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38			04:50			20:27 (3)	04:48		20:34 (3)	05:28		20:06 (1)	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42			21:31	21		20:46 (3)	21:44	20	20:54 (3)	21:08	23	20:29 (1)	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36			04:49			20:27 (3)	04:48		20:33 (3)	05:30		20:07 (1)	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44			21:32	21		20:46 (3)	21:44	20	20:53 (3)	21:06	22	20:29 (1)	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		20:05 (1)	04:49			20:27 (3)	04:50		20:33 (3)	05:31		20:07 (1)	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	6	20:11 (1)	21:33	21		20:48 (3)	21:43	21	20:54 (3)	21:09	21	20:28 (1)	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:38	05:32		20:02 (1)	04:49			20:28 (3)	04:50		20:34 (3)	05:33		20:08 (1)	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	12	20:14 (1)	21:34	21		20:49 (3)	21:43	20	20:54 (3)	21:03	20	20:28 (1)	19:53	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		20:00 (1)	04:47			20:27 (3)	04:51		20:34 (3)	05:35		20:08 (1)	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	16	20:16 (1)	21:35	21		20:48 (3)	21:42	21	20:55 (3)	21:01	18	20:26 (1)	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		19:58 (1)	04:46			20:27 (3)	04:52		20:34 (3)	05:36		20:10 (1)	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	19	20:17 (1)	21:36	21		20:48 (3)	21:41	21	20:55 (3)	20:58	15	20:25 (1)	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		19:57 (1)	04:46			20:28 (3)	04:53		20:34 (3)	05:38		20:12 (1)	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	20	20:17 (1)	21:37	20		20:48 (3)	21:41	21	20:55 (3)	20:57	11	20:23 (1)	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		19:57 (1)	04:45			20:29 (3)	04:54		20:34 (3)	05:40			06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	22	20:19 (1)	21:38	20		20:49 (3)	21:40	22	20:56 (3)	20:55			19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		19:56 (1)	04:45			20:29 (3)	04:55		20:34 (3)	05:42			06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	23	20:19 (1)	21:39	19		20:48 (3)	21:39	22	20:56 (3)	20:53			19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		19:55 (1)	04:44			20:29 (3)	04:56		20:34 (3)	05:43			06:37	07:30	07:28	08:17
	16:16	17:13	18:08	20:04	20:58	24	20:19 (1)	21:40	20		20:49 (3)	21:38	22	20:56 (3)	20:51			19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		19:55 (1)	04:44			20:30 (3)	04:58		20:35 (3)	05:45			06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	25	20:20 (1)	21:41	19		20:49 (3)	21:37	21	20:56 (3)	20:49			19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		19:55 (1)	04:44			20:29 (3)	04:59		20:14 (1)	05:47			06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	25	20:20 (1)	21:41	19		20:48 (3)	21:37	27	20:56 (3)	20:47			19:35	18:23	16:20	15:53
14	08:22	07:36	06:32	06:17	05:15		19:55 (1)	04:43			20:30 (3)	05:00		20:12 (1)	05:49			06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	26	20:21 (1)	21:42	19		20:49 (3)	21:36	31	20:56 (3)	20:45			19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		19:55 (1)	04:43			20:30 (3)	05:01		20:11 (1)	05:50			06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	25	20:20 (1)	21:43	19		20:49 (3)	21:34	33	20:56 (3)	20:43			19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		19:55 (1)	04:43			20:31 (3)	05:03		20:10 (1)	05:52			06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	28	20:21 (1)	21:43	18		20:49 (3)	21:33	34	20:55 (3)	20:41			19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		19:55 (1)	04:43			20:31 (3)	05:04		20:10 (1)	05:54			06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	25	20:20 (1)	21:44	18		20:49 (3)	21:32	36	20:56 (3)	20:38			19:26	18:14	16:14	15:53
18	08:18	07:27	06:23	06:08	05:09		19:55 (1)	04:43			20:31 (3)	05:05		20:09 (1)	05:55			06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	25	20:20 (1)	21:44	18		20:49 (3)	21:31	38	20:56 (3)	20:36			19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		19:55 (1)	04:43			20:31 (3)	05:07		20:08 (1)	05:57			06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	32	20:39 (3)	21:44	18		20:49 (3)	21:30	38	20:55 (3)	20:34			19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		19:56 (1)	04:43			20:32 (3)	05:08		20:07 (1)	05:59			06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	34	20:41 (3)	21:45	17		20:49 (3)	21:28	38	20:54 (3)	20:32			19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		19:56 (1)	04:43			20:32 (3)	05:09		20:07 (1)	06:01			06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	36	20:42 (3)	21:45	18		20:50 (3)	21:27	38	20:54 (3)	20:30			19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		19:56 (1)	04:43			20:33 (3)	05:11		20:06 (1)	06:02			06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	37	20:43 (3)	21:45	18		20:51 (3)	21:26	38	20:53 (3)	20:27			19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		19:57 (1)	04:43			20:32 (3)	05:12		20:06 (1)	06:04			06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	38	20:44 (3)	21:45	18		20:50 (3)	21:24	36	20:52 (3)	20:25			19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		19:58 (1)	04:44			20:32 (3)	05:14		20:06 (1)	06:06			07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	38	20:45 (3)	21:45	18		20:50 (3)	21:23	33	20:50 (3)	20:23			19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		19:59 (1)	04:44			20:33 (3)	05:15		20:05 (1)	06:08			07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	37	20:46 (3)	21:45	18		20:51 (3)	21:21	31	20:49 (3)	20:21			19:06	16:56	16:04	15:57
26	08:09	07:09	06:03	05:50	04:58		20:00 (1)	04:44			20:33 (3)	05:17		20:06 (1)	06:09			07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	36	20:46 (3)	21:45	18		20:51 (3)	21:18	25	20:31 (1)	20:18			19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		20:01 (1)	04:45			20:33 (3)	05:18		20:05 (1)	06:11			07:05	07:00	07:58	08:28
	16:44	17:45	16:37	20:33	21:23	36	20:47 (3)	21:45	19		20:52 (3)	21:18	25	20:30 (1)	20:16			19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		20:02 (1)	04:45			20:33 (3)	05:20		20:05 (1)	06:13			07:07	07:02	07:58	08:28
	16:46	17:47	16:39	20:38	21:25	34	20:47 (3)	21:45	18		20:52 (3)	21:17	28	20:31 (1)	20:14			18:58	16:50	16:01	15:59
29	08:04		06:03	05:44	04:54		20:03 (1)	04:46			20:34 (3)	05:22		20:05 (1)	06:15			07:09	07:04	08:01	08:29
	16:48		16:41	20:37	21:26	32	20:47 (3)	21:45	19		20:53 (3)	21:15	25	20:30 (1)	20:11			18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		20:05 (1)	04:47			20:33 (3)	05:23		20:05 (1)	06:16			07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	28	20:47 (3)	21:45	19		20:52 (3)	21:13	26	20:31 (1)	20:09			18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:26 (3)					05:25		20:05 (1)	06:18				07:08		08:29
	16:52		19:44		21:29	22	20:48 (3)					21:12	25	20:30 (1)	20:07				16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508			510			459				362	329	280	235
abstr.max.mögl.Beschattung						739			575			854			134						
Red.Sonnenscheinwahrsch.						0.51			0.45			0.45			0.49						
Reduktion Betriebsdauer						0.91			0.91			0.91			0.91						
Reduktion Windrichtung						0.66			0.65			0.65			0.66						
Gesamte Reduktion						0.31			0.27			0.28			0.29						
Mat.wahrsch.Beschattung						232			134			226			45						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EK - IO141

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August		September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		20:01 (1)	04:51	20:23 (3)	04:47	20:33 (3)	05:28	20:02 (1)	06:20	07:12	07:10	08:04
	16:03	16:34	17:40	19:46	20:41	8	20:07 (1)	21:30	20:41 (3)	21:44	20:43 (3)	21:10	20:26 (1)	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		19:58 (1)	04:50	20:24 (3)	04:48	20:33 (3)	05:28	20:02 (1)	06:22	07:14	07:12	08:05
	16:04	16:36	17:50	19:48	20:42	12	20:10 (1)	21:31	20:42 (3)	21:44	20:44 (3)	21:08	20:26 (1)	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		19:56 (1)	04:49	20:24 (3)	04:46	20:32 (3)	05:30	20:02 (1)	06:23	07:16	07:14	08:07
	16:05	16:38	17:52	19:50	20:44	15	20:11 (1)	21:32	20:41 (3)	21:44	20:44 (3)	21:06	20:26 (1)	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		19:55 (1)	04:49	20:24 (3)	04:50	20:32 (3)	05:31	20:02 (1)	06:25	07:18	07:15	08:08
	16:06	16:39	17:54	19:52	20:46	18	20:13 (1)	21:33	20:41 (3)	21:43	20:45 (3)	21:05	20:25 (1)	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:38	05:32		19:54 (1)	04:49	20:25 (3)	04:50	20:32 (3)	05:33	20:02 (1)	06:27	07:19	07:17	08:10
	16:08	17:01	17:58	19:53	20:48	20	20:14 (1)	21:34	20:41 (3)	21:43	20:46 (3)	21:03	20:25 (1)	19:53	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		19:53 (1)	04:47	20:25 (3)	04:51	20:32 (3)	05:35	20:02 (1)	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	22	20:15 (1)	21:35	20:41 (3)	21:42	20:47 (3)	21:01	20:24 (1)	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		19:52 (1)	04:46	20:26 (3)	04:52	20:32 (3)	05:36	20:03 (1)	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	23	20:15 (1)	21:36	20:40 (3)	21:41	20:47 (3)	20:58	20:24 (1)	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		19:52 (1)	04:46	20:27 (3)	04:53	20:32 (3)	05:38	20:04 (1)	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	23	20:15 (1)	21:37	20:40 (3)	21:41	20:48 (3)	20:57	20:23 (1)	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		19:52 (1)	04:45	20:28 (3)	04:54	20:32 (3)	05:40	20:04 (1)	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	24	20:16 (1)	21:38	20:40 (3)	21:40	20:49 (3)	20:55	20:22 (1)	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		19:52 (1)	04:45	20:28 (3)	04:55	20:31 (3)	05:42	20:06 (1)	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	23	20:15 (1)	21:39	20:39 (3)	21:39	20:49 (3)	20:53	20:20 (1)	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		19:51 (1)	04:44	20:29 (3)	04:56	20:31 (3)	05:43	20:07 (1)	06:37	07:30	07:28	08:17
	16:16	17:13	18:07	20:04	20:58	24	20:15 (1)	21:40	20:39 (3)	21:38	20:49 (3)	20:51	20:18 (1)	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		19:52 (1)	04:44	20:30 (3)	04:58	20:31 (3)	05:45	20:12 (1)	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	24	20:16 (1)	21:41	20:39 (3)	21:37	20:50 (3)	20:49	20:14 (1)	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		19:52 (1)	04:44	20:30 (3)	04:59	20:31 (3)	05:47		06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	23	20:15 (1)	21:41	20:38 (3)	21:37	20:50 (3)	20:47		19:35	18:23	16:20	15:53
14	08:22	07:36	06:32	06:17	05:15		19:52 (1)	04:43	20:31 (3)	05:00	20:31 (3)	05:48		06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	23	20:15 (1)	21:42	20:38 (3)	21:36	20:50 (3)	20:45		19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		19:52 (1)	04:43	20:32 (3)	05:01	20:30 (3)	05:50		06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	29	20:13 (3)	21:43	20:38 (3)	21:34	20:50 (3)	20:43		19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		19:53 (1)	04:43	20:32 (3)	05:03	20:30 (3)	05:52		06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	31	20:35 (3)	21:43	20:38 (3)	21:33	20:50 (3)	20:41		19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		19:53 (1)	04:43	20:33 (3)	05:04	20:31 (3)	05:54		06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	33	20:36 (3)	21:44	20:37 (3)	21:32	20:51 (3)	20:38		19:26	18:14	16:14	15:53
18	08:18	07:27	06:23	06:08	05:09		19:54 (1)	04:43	20:34 (3)	05:05	20:31 (3)	05:55		06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	34	20:38 (3)	21:44	20:37 (3)	21:31	20:51 (3)	20:36		19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		19:54 (1)	04:43	20:35 (3)	05:07	20:31 (3)	05:57		06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	35	20:39 (3)	21:44	20:36 (3)	21:30	20:51 (3)	20:34		19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:03	05:06		19:56 (1)	04:43		05:08	20:31 (3)	05:59		06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	33	20:43 (3)	21:45		21:28	20:50 (3)	20:32		19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		19:57 (1)	04:43		05:09	20:10 (1)	06:01		06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	33	20:41 (3)	21:45		21:27	20:51 (3)	20:30		19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		19:58 (1)	04:43		05:11	20:08 (1)	06:02		06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	30	20:40 (3)	21:45		21:26	20:51 (3)	20:27		19:13	18:02	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		20:01 (1)	04:43		05:12	20:07 (1)	06:04		06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	26	20:41 (3)	21:45		21:24	20:51 (3)	20:25		19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		20:21 (3)	04:44	20:35 (3)	05:14	20:06 (1)	06:06		07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	20	20:41 (3)	21:45	20:38 (3)	21:23	20:50 (3)	20:23		19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		20:21 (3)	04:44	20:36 (3)	05:15	20:04 (1)	06:08		07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21	20:42 (3)	21:45	20:39 (3)	21:21	20:49 (3)	20:21		19:06	18:56	16:04	15:57
26	08:09	07:09	06:03	05:50	04:58		20:21 (3)	04:44	20:35 (3)	05:17	20:04 (1)	06:09		07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21	20:42 (3)	21:45	20:40 (3)	21:18	20:48 (3)	20:18		19:04	18:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		20:22 (3)	04:45	20:35 (3)	05:18	20:03 (1)	06:11		07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	20	20:42 (3)	21:45	20:40 (3)	21:18	20:46 (3)	20:16		19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		20:22 (3)	04:45	20:34 (3)	05:20	20:03 (1)	06:13		07:07	07:02	07:58	08:28
	16:46	17:47	18:39	20:35	21:25	20	20:42 (3)	21:45	20:41 (3)	21:17	20:45 (3)	20:14		18:58	18:50	16:01	13:59
29	08:04		06:03	05:44	04:54		20:22 (3)	04:46	20:34 (3)	05:22	20:02 (1)	06:15		07:09	07:04	08:01	08:28
	16:48		19:41	20:37	21:26	20	20:42 (3)	21:45	20:42 (3)	21:16	20:43 (3)	20:11		18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		20:22 (3)	04:47	20:33 (3)	05:23	20:03 (1)	06:16		07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	20	20:42 (3)	21:45	20:42 (3)	21:13	20:28 (1)	20:09		18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:22 (3)			05:25	20:02 (1)	06:18			07:08		08:29
	16:52		19:44		21:29	19	20:41 (3)			21:12	20:28 (1)	20:07			16:44		16:02
Sonnenscheinstunden	252	274	367	419	492		508		510		459		362	329	280	235	
abtr.max.mögl.Beschattung						725		247		668		225					
Red.Sonnenscheinwahrsch.						0.51		0.45		0.45		0.49					
Reduktion Betriebsdauer						0.91		0.91		0.91		0.91					
Reduktion Windrichtung						0.66		0.65		0.65		0.66					
Gesamte Reduktion						0.31		0.27		0.27		0.29					
Mat.wahrsch.Beschattung						222		67		177		66					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EL - IO142

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40			19:51 (1)	04:51	
	16:03		16:54		17:49		19:46			20:41	18		20:09 (1)	21:30	
2	08:28		07:57		07:00		06:46			05:38			19:50 (1)	04:50	
	16:04		16:56		17:50		19:48			20:42	19		20:09 (1)	21:31	
3	08:28		07:56		06:58		06:43			05:36			19:49 (1)	04:49	
	16:05		16:58		17:52		19:50			20:44	21		20:10 (1)	21:32	
4	08:28		07:54		06:55		06:41			05:34			19:48 (1)	04:49	
	16:06		16:59		17:54		19:52			20:46	22		20:10 (1)	21:33	
5	08:28		07:52		06:53		06:38			05:32			19:49 (1)	04:48	
	16:08		17:01		17:56		19:53			20:48	22		20:11 (1)	21:34	
6	08:27		07:50		06:51		06:36			05:30			19:48 (1)	04:47	
	16:09		17:03		17:58		19:55			20:50	23		20:11 (1)	21:35	
7	08:27		07:49		06:48		06:34			05:28			19:48 (1)	04:46	
	16:10		17:05		18:00		19:57			20:51	23		20:11 (1)	21:36	
8	08:26		07:47		06:46		06:31			05:26			19:48 (1)	04:46	
	16:12		17:07		18:02		19:59			20:53	22		20:10 (1)	21:37	
9	08:26		07:45		06:44		06:29			05:24			19:48 (1)	04:45	
	16:13		17:09		18:04		20:01			20:55	23		20:11 (1)	21:38	
10	08:25		07:43		06:41		06:27			05:22			19:48 (1)	04:45	
	16:15		17:11		18:06		20:03			20:57	22		20:10 (1)	21:39	
11	08:25		07:41		06:39		06:24			05:21			19:48 (1)	04:44	
	16:16		17:13		18:07		20:04			20:58	21		20:09 (1)	21:40	
12	08:24		07:39		06:37		06:22			05:19			19:49 (1)	04:44	
	16:18		17:15		18:09		20:06			21:00	20		20:09 (1)	21:41	
13	08:23		07:37		06:34		06:20			05:17			19:50 (1)	04:44	20:52 (2)
	16:19		17:17		18:11		20:08			21:02	18		20:08 (1)	21:41	6 20:58 (2)
14	08:22		07:35		06:32		06:17			05:15			19:51 (1)	04:43	20:52 (2)
	16:21		17:19		18:13		20:10			21:03	17		20:08 (1)	21:42	7 20:59 (2)
15	08:21		07:33		06:29		06:15			05:14			19:52 (1)	04:43	20:51 (2)
	16:22		17:21		18:15		20:12			21:05	15		20:07 (1)	21:43	9 21:00 (2)
16	08:20		07:31		06:27		06:13			05:12			19:53 (1)	04:43	20:51 (2)
	16:24		17:23		18:17		20:13			21:07	13		20:06 (1)	21:43	10 21:01 (2)
17	08:19		07:29		06:25		06:10			05:10			19:55 (1)	04:43	20:51 (2)
	16:26		17:25		18:19		20:15			21:08	9		20:04 (1)	21:44	10 21:01 (2)
18	08:18		07:27		06:22		06:08			05:09				04:43	20:51 (2)
	16:28		17:27		18:21		20:17			21:10				21:44	11 21:02 (2)
19	08:17		07:25		06:20		06:06			05:07				04:43	20:51 (2)
	16:29		17:29		18:22		20:19			21:11				21:44	11 21:02 (2)
20	08:16		07:22		06:17		06:03			05:06				04:43	20:51 (2)
	16:31		17:31		18:24		20:21			21:13				21:45	11 21:02 (2)
21	08:15		07:20		06:15		06:01			05:04				04:43	20:51 (2)
	16:33		17:33		18:26		20:23			21:15				21:45	11 21:02 (2)
22	08:14		07:18		06:12		05:59			05:03				04:43	20:52 (2)
	16:35		17:35		18:28		20:24			21:16				21:45	11 21:03 (2)
23	08:12		07:16		06:10		05:57			05:02				04:43	20:52 (2)
	16:36		17:37		18:30		20:26			21:18				21:45	11 21:03 (2)
24	08:11		07:14		06:08		05:55			05:00				04:44	20:52 (2)
	16:38		17:39		18:32		20:28			21:19				21:45	11 21:03 (2)
25	08:10		07:11		06:05		05:52			04:59				04:44	20:53 (2)
	16:40		17:41		18:33		20:30			21:21				21:45	11 21:04 (2)
26	08:08		07:09		06:03		05:50			04:58				04:44	20:53 (2)
	16:42		17:43		18:35		20:32			21:22				21:45	10 21:03 (2)
27	08:07		07:07		06:00		05:48			04:56				04:45	20:54 (2)
	16:44		17:45		18:37		20:33			21:23				21:45	9 21:03 (2)
28	08:05		07:05		05:58		05:46		19:58 (1)	04:55				04:45	20:55 (2)
	16:46		17:47		18:39		20:35	5	20:03 (1)	21:25				21:45	7 21:02 (2)
29	08:04				06:55		05:44		19:54 (1)	04:54				04:46	20:56 (2)
	16:48				19:41		20:37	12	20:06 (1)	21:26				21:45	6 21:02 (2)
30	08:02				06:53		05:42		19:52 (1)	04:53				04:47	20:57 (2)
	16:50				19:42		20:39	16	20:08 (1)	21:27				21:45	3 21:00 (2)
31	08:01				06:51					04:52					
	16:52				19:44					21:29					
Sonnenscheinstunden	252		274		367		419			492				508	
astr.max.mögl.Beschattung								33			328				165
Red.Sonnenscheinwahrsch.								0.41			0.51				0.45
Reduktion Betriebsdauer								0.91			0.91				0.91
Reduktion Windrichtung								0.66			0.66				0.63
Gesamte Reduktion								0.25			0.31				0.26
Met.wahrsch.Beschattung								8			101				43

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EL - IO142

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli			August			September	Oktober	November	Dezember
1	04:47			05:26		20:00 (1)	06:20	07:12	07:10	08:04
	21:44			21:10	20	20:20 (1)	20:04	18:51	16:42	15:58
2	04:48			05:28		19:59 (1)	06:22	07:14	07:12	08:05
	21:44			21:08	21	20:20 (1)	20:02	18:49	16:40	15:57
3	04:49			05:30		19:59 (1)	06:23	07:16	07:14	08:07
	21:44			21:06	22	20:21 (1)	20:00	18:47	16:38	15:57
4	04:50			05:31		19:58 (1)	06:25	07:18	07:15	08:08
	21:43			21:05	22	20:20 (1)	19:57	18:44	16:36	15:56
5	04:50			05:33		19:58 (1)	06:27	07:19	07:17	08:10
	21:43			21:03	23	20:21 (1)	19:55	18:42	16:34	15:55
6	04:51			05:35		19:57 (1)	06:29	07:21	07:19	08:11
	21:42			21:01	23	20:20 (1)	19:52	18:39	16:32	15:55
7	04:52			05:36		19:58 (1)	06:30	07:23	07:21	08:12
	21:41			20:59	22	20:20 (1)	19:50	18:37	16:30	15:54
8	04:53			05:38		19:58 (1)	06:32	07:25	07:23	08:14
	21:41			20:57	22	20:20 (1)	19:48	18:35	16:28	15:54
9	04:54			05:40		19:58 (1)	06:34	07:27	07:25	08:15
	21:40			20:55	21	20:19 (1)	19:45	18:32	16:27	15:54
10	04:55			05:42		19:59 (1)	06:36	07:28	07:27	08:16
	21:39			20:53	20	20:19 (1)	19:43	18:30	16:25	15:53
11	04:56			05:43		19:59 (1)	06:37	07:30	07:29	08:17
	21:38			20:51	19	20:18 (1)	19:40	18:27	16:23	15:53
12	04:58			05:45		20:00 (1)	06:39	07:32	07:31	08:18
	21:37			20:49	17	20:17 (1)	19:38	18:25	16:22	15:53
13	04:59			05:47		20:01 (1)	06:41	07:34	07:33	08:19
	21:37			20:47	15	20:16 (1)	19:35	18:23	16:20	15:53
14	05:00			05:48		20:03 (1)	06:42	07:36	07:34	08:20
	21:36			20:45	10	20:13 (1)	19:33	18:21	16:18	15:53
15	05:01			05:50			06:44	07:38	07:36	08:21
	21:34			20:43			19:30	18:18	16:17	15:53
16	05:03			05:52			06:46	07:39	07:38	08:22
	21:33			20:40			19:28	18:16	16:15	15:53
17	05:04			05:54			06:48	07:41	07:40	08:23
	21:32			20:38			19:26	18:14	16:14	15:53
18	05:05			05:55			06:49	07:43	07:42	08:24
	21:31			20:36			19:23	18:11	16:12	15:53
19	05:07			05:57			06:51	07:45	07:44	08:25
	21:30			20:34			19:21	18:09	16:11	15:54
20	05:08			05:59			06:53	07:47	07:45	08:25
	21:28			20:32			19:18	18:07	16:10	15:54
21	05:09			06:01			06:55	07:49	07:47	08:26
	21:27			20:30			19:16	18:05	16:08	15:54
22	05:11			06:02			06:56	07:51	07:49	08:26
	21:26			20:27			19:13	18:02	16:07	15:55
23	05:12			06:04			06:58	07:53	07:51	08:27
	21:24			20:25			19:11	18:00	16:06	15:55
24	05:14			06:06			07:00	07:54	07:52	08:27
	21:23			20:23			19:08	17:58	16:05	15:56
25	05:15			06:08			07:02	06:56	07:54	08:28
	21:21			20:21			19:06	16:56	16:04	15:57
26	05:17		20:07 (1)	06:09			07:03	06:58	07:56	08:28
	21:20	6	20:13 (1)	20:18			19:04	16:54	16:03	15:57
27	05:18		20:04 (1)	06:11			07:05	07:00	07:58	08:28
	21:18	11	20:15 (1)	20:16			19:01	16:52	16:02	15:58
28	05:20		20:03 (1)	06:13			07:07	07:02	07:59	08:28
	21:17	14	20:17 (1)	20:14			18:59	16:50	16:01	15:59
29	05:22		20:02 (1)	06:15			07:09	07:04	08:01	08:29
	21:15	15	20:17 (1)	20:11			18:56	16:48	16:00	16:00
30	05:23		20:01 (1)	06:16			07:11	07:06	08:02	08:29
	21:13	18	20:19 (1)	20:09			18:54	16:46	15:59	16:01
31	05:25		20:00 (1)	06:18				07:08		08:29
	21:12	19	20:19 (1)	20:07				16:44		16:02
Sonnenscheinstunden	510			459			382	329	260	235
astr.max.mögl.Beschattung		83			277					
Red.Sonnenscheinwahrsch.		0.45			0.49					
Reduktion Betriebsdauer		0.91			0.91					
Reduktion Windrichtung		0.66			0.66					
Gesamte Reduktion		0.27			0.29					
Met.wahrsch.Beschattung		22			82					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EM - IO143

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni			Juli			August			September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51			20:06 (1)	04:47		20:35 (3)	05:28		20:38 (1)	06:20	07:12	07:10	08:04
	16:03	16:34	17:40	18:46	20:41			21:30	30		20:49 (3)	21:45	20	20:55 (3)	21:10	24	20:32 (1)	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38			04:50			20:10 (1)	04:48		20:35 (3)	05:28		20:38 (1)	06:22	07:14	07:12	08:05
	16:04	16:36	17:50	18:48	20:42			21:31	24		20:50 (3)	21:44	21	20:56 (3)	21:08	23	20:31 (1)	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36			04:49			20:28 (3)	04:48		20:34 (3)	05:30		20:09 (1)	06:23	07:16	07:14	08:07
	16:05	16:38	17:52	18:50	20:44			21:32	22		20:50 (3)	21:44	21	20:55 (3)	21:06	21	20:30 (1)	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34			04:49			20:28 (3)	04:50		20:35 (3)	05:31		20:10 (1)	06:25	07:18	07:15	08:08
	16:06	16:39	17:54	18:52	20:46			21:33	22		20:50 (3)	21:43	21	20:56 (3)	21:05	19	20:29 (1)	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:38	05:32		20:08 (1)	04:49			20:29 (3)	04:50		20:35 (3)	05:33		20:11 (1)	06:27	07:19	07:17	08:10
	16:08	17:01	17:58	18:53	20:48	5	20:13 (1)	21:34	21		20:50 (3)	21:43	21	20:58 (3)	21:03	17	20:28 (1)	19:53	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		20:04 (1)	04:47			20:29 (3)	04:51		20:35 (3)	05:35		20:12 (1)	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	18:55	20:50	12	20:16 (1)	21:35	21		20:50 (3)	21:42	21	20:56 (3)	21:01	14	20:26 (1)	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		20:02 (1)	04:46			20:29 (3)	04:52		20:36 (3)	05:38		20:14 (1)	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	15	20:17 (1)	21:36	21		20:50 (3)	21:41	21	20:57 (3)	20:58	10	20:24 (1)	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		20:00 (1)	04:46			20:29 (3)	04:53		20:36 (3)	05:38			06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	18	20:18 (1)	21:37	21		20:50 (3)	21:41	21	20:57 (3)	20:57			19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		20:00 (1)	04:45			20:30 (3)	04:54		20:36 (3)	05:40			06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	20	20:20 (1)	21:38	21		20:51 (3)	21:40	21	20:57 (3)	20:55			19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		19:59 (1)	04:45			20:30 (3)	04:55		20:36 (3)	05:42			06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21	20:20 (1)	21:39	20		20:50 (3)	21:39	21	20:57 (3)	20:53			19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		19:58 (1)	04:44			20:30 (3)	04:56		20:36 (1)	05:43			06:37	07:30	07:28	08:17
	16:16	17:13	18:08	20:04	20:58	23	20:21 (1)	21:40	21		20:51 (3)	21:38	18	20:58 (3)	20:51			19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		19:58 (1)	04:44			20:31 (3)	04:58		20:14 (1)	05:45			06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	24	20:22 (1)	21:41	20		20:51 (3)	21:37	32	20:58 (3)	20:49			19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		19:57 (1)	04:44			20:31 (3)	04:59		20:13 (1)	05:47			06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	25	20:23 (1)	21:41	20		20:51 (3)	21:37	33	20:57 (3)	20:47			19:35	18:23	16:20	15:53
14	08:22	07:36	06:32	06:17	05:15		19:57 (1)	04:43			20:31 (3)	05:00		20:12 (1)	05:49			06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	25	19:58 (1)	04:44	20		20:51 (3)	21:42	20	20:51 (3)	21:36	34		19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		19:57 (1)	04:43			20:31 (3)	05:01		20:11 (1)	05:50			06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	25	20:22 (1)	21:43	20		20:51 (3)	21:34	36	20:57 (3)	20:43			19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		19:57 (1)	04:43			20:32 (3)	05:03		20:10 (1)	05:52			06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	26	20:23 (1)	21:43	19		20:51 (3)	21:33	38	20:57 (3)	20:41			19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		19:58 (1)	04:43			20:32 (3)	05:04		20:10 (1)	05:54			06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	26	20:22 (1)	21:44	19		20:51 (3)	21:32	38	20:57 (3)	20:38			19:26	18:14	16:14	15:53
18	08:18	07:27	06:23	06:08	05:09		19:57 (1)	04:43			20:32 (3)	05:05		20:09 (1)	05:55			06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	25	20:22 (1)	21:44	20		20:52 (3)	21:31	40	20:57 (3)	20:36			19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		19:57 (1)	04:43			20:33 (3)	05:07		20:09 (1)	05:57			06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	25	20:22 (1)	21:44	19		20:52 (3)	21:30	38	20:56 (3)	20:34			19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		19:57 (1)	04:43			20:33 (3)	05:08		20:08 (1)	05:59			06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	32	20:41 (3)	21:45	19		20:52 (3)	21:28	38	20:55 (3)	20:32			19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		19:58 (1)	04:43			20:33 (3)	05:09		20:08 (1)	06:01			06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	34	20:42 (3)	21:45	19		20:52 (3)	21:27	36	20:54 (3)	20:30			19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		19:57 (1)	04:43			20:34 (3)	05:11		20:08 (1)	06:02			06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	37	20:43 (3)	21:45	19		20:53 (3)	21:26	36	20:53 (3)	20:27			19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		19:58 (1)	04:43			20:34 (3)	05:12		20:08 (1)	06:04			06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	38	20:45 (3)	21:45	19		20:53 (3)	21:24	33	20:52 (3)	20:25			19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		19:59 (1)	04:44			20:33 (3)	05:14		20:07 (1)	06:06			07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	39	20:46 (3)	21:45	20		20:53 (3)	21:23	30	20:50 (3)	20:23			19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		20:00 (1)	04:44			20:34 (3)	05:15		20:07 (1)	06:08			07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	38	20:47 (3)	21:45	19		20:53 (3)	21:21	25	20:32 (1)	20:21			19:06	16:56	16:04	15:57
26	08:09	07:09	06:03	05:50	04:58		20:00 (1)	04:44			20:34 (3)	05:17		20:07 (1)	06:09			07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	39	20:48 (3)	21:45	19		20:53 (3)	21:20	28	20:33 (3)	20:18			19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		20:01 (1)	04:45			20:35 (3)	05:18		20:07 (1)	06:11			07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	39	20:48 (3)	21:45	19		20:54 (3)	21:18	25	20:32 (1)	20:16			19:01	16:52	16:02	15:58
28	08:06	07:05	05:58	05:46	04:55		20:02 (1)	04:45			20:34 (3)	05:20		20:07 (1)	06:13			07:07	07:02	07:58	08:28
	16:46	17:47	18:39	20:35	21:25	37	20:48 (3)	21:45	20		20:54 (3)	21:17	28	20:33 (1)	20:14			18:58	16:50	16:01	15:59
29	08:04		06:01	05:44	04:54		20:03 (1)	04:46			20:35 (3)	05:22		20:07 (1)	06:15			07:09	07:04	08:01	08:29
	16:48		18:41	20:37	21:26	36	20:49 (3)	21:45	20		20:55 (3)	21:15	25	20:32 (1)	20:11			16:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		20:04 (1)	04:47			20:34 (3)	05:23		20:06 (1)	06:16			07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	34	20:49 (3)	21:45	20		20:54 (3)	21:13	25	20:33 (1)	20:09			16:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:05 (1)					05:25		20:07 (1)	06:18				07:08		08:29
	16:52		19:44		21:29	32	20:49 (3)					21:12	25	20:32 (1)	20:07				16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508			510			459				362	329	280	235
abstr.max.mögl.Beschattung						750			814			876			128						
Red.Sonnenscheinwahrsch.						0.51			0.45			0.45			0.49						
Reduktion Betriebsdauer						0.91			0.91			0.91			0.91						
Reduktion Windrichtung						0.66			0.64			0.65			0.66						
Gesamte Reduktion						0.31			0.27			0.28			0.29						
Mat.wahrsch.Beschattung						229			164			202			37						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)	
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)	

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EN - IO144

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni			Juli			August			September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51			04:47			05:28			06:20	07:12	07:10	08:04
	16:03	16:34	17:40	18:46	20:41			21:30	16		21:44	13		21:10	24		18:51	16:42	15:58	
2	08:28	07:57	07:00	06:46	05:38		20:02 (1)	04:50			04:48			05:28			06:22	07:14	07:12	08:05
	16:04	16:36	17:50	19:48	20:42	7	20:09 (1)	21:31	18		21:44	13		21:08	24		18:49	16:40	15:57	
3	08:28	07:56	06:58	06:43	05:36		19:59 (1)	04:49			04:49			05:30			06:23	07:16	07:14	08:07
	16:05	16:38	17:52	19:50	20:44	13	20:12 (1)	21:32	18		21:44	13		21:06	23		18:47	16:38	15:57	
4	08:28	07:54	06:55	06:41	05:34		19:58 (1)	04:49			04:50			05:31			06:25	07:18	07:15	08:08
	16:06	16:39	17:54	19:52	20:46	18	20:14 (1)	21:33	18		21:43	14		21:05	22		18:44	16:36	15:56	
5	08:28	07:52	06:53	06:38	05:32		19:57 (1)	04:49			04:50			05:33			06:27	07:19	07:17	08:10
	16:08	17:01	17:58	19:53	20:48	18	20:15 (1)	21:34	17		21:43	15		21:03	22		18:42	16:34	15:55	
6	08:27	07:50	06:51	06:38	05:30		19:55 (1)	04:47			04:51			05:35			06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	20	20:15 (1)	21:35	16		21:42	16		21:01	21		18:39	16:32	15:55	
7	08:27	07:49	06:48	06:34	05:28		19:53 (1)	04:46			04:52			05:36			06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21	20:18 (1)	21:36	16		21:41	16		20:58	20		18:37	16:30	15:54	
8	08:26	07:47	06:46	06:31	05:26		19:51 (1)	04:46			04:53			05:38			06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	22	20:16 (1)	21:37	15		21:40	17		20:57	18		18:35	16:28	15:54	
9	08:26	07:45	06:44	06:29	05:24		19:54 (1)	04:45			04:54			05:40			06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	23	20:17 (1)	21:38	14		21:40	18		20:55	19		18:32	16:27	15:54	
10	08:25	07:43	06:41	06:27	05:22		19:53 (1)	04:45			04:55			05:42			06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	24	20:17 (1)	21:39	14		21:39	19		20:53	11		18:30	16:25	15:53	
11	08:25	07:41	06:39	06:24	05:21		19:53 (1)	04:44			04:56			05:43			06:37	07:30	07:28	08:17
	16:16	17:13	18:07	20:04	20:58	24	20:17 (1)	21:40	13		21:38	19		20:51	4		18:27	16:23	15:53	
12	08:24	07:39	06:37	06:22	05:19		19:53 (1)	04:44			04:58			05:45			06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	24	20:17 (1)	21:41	12		21:37	19		20:49			18:25	16:22	15:53	
13	08:23	07:37	06:34	06:20	05:17		19:53 (1)	04:44			04:59			05:47			06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	24	20:17 (1)	21:41	11		21:37	19		20:47			18:23	16:20	15:53	
14	08:22	07:36	06:32	06:17	05:15		19:54 (1)	04:43			05:00			05:49			06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	23	20:17 (1)	21:42	10		21:36	20		20:45			18:21	16:18	15:53	
15	08:21	07:33	06:29	06:15	05:14		19:54 (1)	04:43			05:01			05:50			06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	22	20:16 (1)	21:43	10		21:34	20		20:43			18:18	16:17	15:53	
16	08:20	07:31	06:27	06:13	05:12		19:54 (1)	04:43			05:03			05:52			06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	20	20:16 (1)	21:43	9		21:33	21		20:41			18:16	16:15	15:53	
17	08:19	07:29	06:25	06:10	05:10		19:54 (1)	04:43			05:04			05:54			06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	32	20:16 (3)	21:44	9		21:32	21		20:38			18:14	16:14	15:53	
18	08:18	07:27	06:23	06:08	05:09		19:53 (1)	04:43			05:05			05:55			06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	34	20:16 (3)	21:44	8		21:31	20		20:36			18:11	16:12	15:53	
19	08:17	07:25	06:20	06:06	05:07		19:55 (1)	04:43			05:07			05:57			06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	34	20:39 (3)	21:44	8		21:30	24		20:34			18:09	16:11	15:54	
20	08:16	07:22	06:17	06:03	05:06		19:56 (1)	04:43			05:08			05:59			06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	35	20:41 (3)	21:45	8		21:28	29		20:32			18:07	16:10	15:54	
21	08:15	07:20	06:15	06:01	05:04		19:58 (1)	04:43			05:09			06:01			06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	34	20:42 (3)	21:45	8		21:27	32		20:30			18:05	16:08	15:54	
22	08:14	07:18	06:12	05:59	05:03		19:58 (1)	04:43			05:11			06:02			06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	33	20:41 (3)	21:45	8		21:26	34		20:27			18:02	16:07	15:55	
23	08:12	07:16	06:10	05:57	05:02		20:00 (1)	04:43			05:12			06:04			06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	31	20:42 (3)	21:45	8		21:24	34		20:25			18:01	16:06	15:55	
24	08:11	07:14	06:08	05:55	05:00		20:02 (1)	04:44			05:14			06:06			07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	26	20:43 (3)	21:45	8		21:23	35		20:23			19:08	17:08	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		20:23 (3)	04:44			05:15			06:08			07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	20	20:43 (3)	21:45	8		21:21	34		20:21			19:06	16:56	16:04	15:57
26	08:09	07:09	06:03	05:50	04:58		20:23 (3)	04:44			05:17			06:09			07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	20	20:43 (3)	21:45	9		21:18	33		20:18			19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		20:23 (3)	04:45			05:18			06:11			07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	20	20:43 (3)	21:45	10		21:18	31		20:16			19:01	16:52	16:02	15:58
28	08:06	07:05	05:58	05:46	04:55		20:23 (3)	04:45			05:20			06:13			07:07	07:02	07:58	08:28
	16:46	17:47	18:39	20:35	21:25	20	20:43 (3)	21:45	10		21:17	27		20:14			18:58	16:50	16:01	15:59
29	08:04		06:03	05:44	04:54		20:23 (3)	04:46			05:22			06:15			07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	20	20:43 (3)	21:45	11		21:15	23		20:11			18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		20:23 (3)	04:47			05:23			06:16			07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	20	20:43 (3)	21:45	12		21:13	24		20:09			18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:23 (3)				05:25			06:18				07:08		08:29
	16:52		19:44		21:29	20	20:43 (3)				21:12	24		20:07				16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508			510			459			362	329	280	235
abstr.max.mögl.Beschattung						710			355			697			334					
Red.Sonnenscheinwahrsch.						0.51			0.45			0.45			0.49					
Reduktion Betriebsdauer						0.91			0.91			0.91			0.91					
Reduktion Windrichtung						0.66			0.65			0.65			0.66					
Gesamte Reduktion						0.31			0.27			0.27			0.29					
Mat.wahrsch.Beschattung						217			96			185			60					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EO - IO145

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni			Juli			August			September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51			20:06 (1)	04:47		20:37 (3)	05:28		20:12 (1)	06:20	07:12	07:10	08:04
	16:03	16:34	17:40	19:46	20:41			21:30	36		20:51 (3)	21:45	21	20:58 (3)	21:10	22	20:34 (1)	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38			04:50			20:08 (1)	04:48		20:37 (3)	05:28		20:12 (1)	06:22	07:14	07:12	08:05
	16:04	16:36	17:50	19:48	20:42			21:31	34		20:52 (3)	21:44	21	20:58 (3)	21:08	20	20:32 (1)	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36			04:49			20:08 (1)	04:48		20:36 (3)	05:30		20:14 (1)	06:23	07:16	07:14	08:07
	16:05	16:38	17:52	19:50	20:44			21:32	33		20:52 (3)	21:44	22	20:58 (3)	21:06	18	20:32 (1)	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34			04:49			20:09 (1)	04:50		20:37 (3)	05:31		20:14 (1)	06:25	07:18	07:15	08:08
	16:06	16:39	17:54	19:52	20:46			21:33	30		20:52 (3)	21:43	21	20:58 (3)	21:05	16	20:30 (1)	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:38	05:32			04:48			20:12 (1)	04:50		20:37 (3)	05:33		20:16 (1)	06:27	07:19	07:17	08:10
	16:08	17:01	17:58	19:53	20:48			21:34	28		20:53 (3)	21:43	22	20:59 (3)	21:03	13	20:29 (1)	19:53	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30			04:47			20:31 (3)	04:51		20:37 (3)	05:35		20:19 (1)	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50			21:35	22		20:53 (3)	21:42	22	20:59 (3)	21:01	6	20:25 (1)	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		20:08 (1)	04:46			20:31 (3)	04:52		20:19 (1)	05:36			06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	9	20:17 (1)	21:36	21		20:52 (3)	21:41	25	20:59 (3)	20:58			19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		20:05 (1)	04:46			20:32 (3)	04:53		20:17 (1)	05:38			06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	14	20:19 (1)	21:37	21		20:53 (3)	21:41	19	20:59 (3)	20:57			19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		20:04 (1)	04:45			20:32 (3)	04:54		20:16 (1)	05:40			06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	17	20:21 (1)	21:38	21		20:53 (3)	21:40	33	21:00 (3)	20:55			19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		20:03 (1)	04:45			20:32 (3)	04:55		20:15 (1)	05:42			06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	19	20:22 (1)	21:39	21		20:53 (3)	21:39	35	21:00 (3)	20:53			19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		20:02 (1)	04:44			20:32 (3)	04:57		20:15 (1)	05:43			06:37	07:30	07:28	08:17
	16:16	17:13	18:08	20:04	20:58	20	20:22 (1)	21:40	21		20:53 (3)	21:38	35	21:00 (3)	20:51			19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		20:01 (1)	04:44			20:33 (3)	04:58		20:14 (1)	05:45			06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	23	20:24 (1)	21:41	21		20:54 (3)	21:37	37	21:00 (3)	20:49			19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		20:00 (1)	04:44			20:32 (3)	04:59		20:13 (1)	05:47			06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	24	20:24 (1)	21:41	21		20:53 (3)	21:37	37	20:59 (3)	20:47			19:35	18:23	16:20	15:53
14	08:22	07:36	06:32	06:17	05:15		20:01 (1)	04:43			20:33 (3)	05:00		20:12 (1)	05:49			06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	24	20:25 (1)	21:42	21		20:54 (3)	21:36	39	20:59 (3)	20:45			19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		20:00 (1)	04:43			20:33 (3)	05:01		20:12 (1)	05:50			06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	24	20:24 (1)	21:43	21		20:54 (3)	21:34	39	20:59 (3)	20:43			19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		20:00 (1)	04:43			20:34 (3)	05:03		20:11 (1)	05:52			06:46	07:39	07:38	08:22
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	16:44	17:45	18:37	20:33	21:23	40	20:50 (3)	21:45	21		20:57 (3)	21:18	25	20:35 (1)	20:16			19:01	16:52	16:02	15:58
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30	08:02		06:53	05:42	04:53		20:04 (1)	04:47			20:36 (3)	05:23		20:11 (1)	06:16			07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	38	20:51 (3)	21:45	21		20:57 (3)	21:13	24	20:35 (1)	20:09			16:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:05 (1)					05:25		20:11 (1)	06:18				07:08		08:29
	16:52		19:44		21:29	38	20:51 (3)					21:12	23	20:34 (1)	20:07				16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508			510			459				362	329	280	235
abtr.max.mögl.Beschattung						703			680			920			95						
Red.Sonnenscheinwahrsch.						0.51			0.45			0.45			0.49						
Reduktion Betriebsdauer						0.91			0.91			0.91			0.91						
Reduktion Windrichtung						0.65			0.64			0.65			0.66						
Gesamte Reduktion						0.31			0.27			0.28			0.29						
Met.wahrsch.Beschattung						215			182			243			28						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EP - IO146

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April		Mai			Juni			Juli			August			September		Oktober		November		Dezember	
1	08:29		07:59		07:02		06:48		05:40			04:51			20:25 (3)	04:47		20:34 (3)	05:28		20:06 (1)	06:20		07:12		07:10		08:04	
	16:03		16:34		17:40		19:46		20:41			21:30		16	20:44 (3)	21:44	14	20:48 (3)	21:10	23	20:29 (1)	20:04		18:51		16:42		15:58	
2	08:28		07:57		07:00		06:46		05:38			04:50			20:26 (3)	04:48		20:34 (3)	05:28		20:05 (1)	06:22		07:14		07:12		08:05	
	16:04		16:36		17:50		19:48		20:42			21:31		19	20:45 (3)	21:44	15	20:48 (3)	21:08	24	20:29 (1)	20:02		18:49		16:40		15:57	
3	08:29		07:56		06:58		06:43		05:36		20:03 (1)	04:49			20:26 (3)	04:48		20:33 (3)	05:30		20:06 (1)	06:23		07:16		07:14		08:07	
	16:05		16:38		17:52		19:50		20:44	8	20:11 (1)	21:32		19	20:45 (3)	21:44	16	20:48 (3)	21:06	23	20:29 (1)	20:00		18:47		16:38		15:57	
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	16:08		17:01		17:58		19:53		20:48	17	20:19 (1)	21:34		18	20:45 (3)	21:43	17	20:50 (3)	21:03	20	20:27 (1)	19:53		18:42		16:34		15:55	
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	16:44		17:45		18:37		20:33		21:23	20	20:44 (3)	21:45		12	20:47 (3)	21:18	28	20:46 (3)	20:16			19:01		16:52		16:02		15:58	
28	08:05		07:05		05:58		05:46		04:55		20:24 (3)	04:45			20:34 (3)	05:20		20:06 (1)	06:13			07:07		07:02		07:58		08:28	
	16:46		17:47		18:39		20:35		21:25	21	20:45 (3)	21:45		13	20:47 (3)	21:17	33	20:29 (1)	20:14			18:58		16:50		16:01		15:59	
29	08:04				06:01		05:44		04:54		20:24 (3)	04:46			20:34 (3)	05:22		20:05 (1)	06:15			07:09		07:04		08:01		08:29	
	16:48				19:41		20:37		21:26	21	20:45 (3)	21:45		13	20:47 (3)	21:12	24	20:29 (1)	20:11			18:56		16:48		16:00		16:00	
30	08:02				06:53		05:42		04:53		20:25 (3)	04:47			20:34 (3)	05:23		20:06 (1)	06:16			07:11		07:06		08:02		08:29	
	16:50				19:42		20:39		21:27	20	20:45 (3)	21:45		13	20:47 (3)	21:13	23	20:29 (1)	20:09			18:54		16:46		15:59		16:01	
31	08:01				06:51				04:52		20:25 (3)					05:25		20:05 (1)	06:18					07:08				08:29	
	16:52				19:44				21:29	20	20:45 (3)					21:12	24	20:28 (1)	20:07					16:44				16:02	
Sonnenscheinstunden	252		274		367		419		492			508			510			459			362		329		280		235	
abstr.max.mögl.Beschattung										705			416			718			181									
Red.Sonnenscheinwahrsch.										0.51			0.45			0.45			0.49									
Reduktion Betriebsdauer										0.91			0.91			0.91			0.91									
Reduktion Windrichtung										0.66			0.65			0.65			0.66									
Gesamte Reduktion										0.31			0.27			0.28			0.29									
Mat.wahrsch.Beschattung										216			112			180			83									

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang		(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende		(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EQ - IO147

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni	Juli		August		September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51	04:47		05:28		20:07 (1)	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	21:44		21:10	24	20:31 (1)	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50	04:48		05:28		20:07 (1)	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	21:44		21:08	23	20:30 (1)	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49	04:49		05:30		20:08 (1)	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	21:44		21:06	22	20:30 (1)	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	20:05 (1)	04:49	04:55		05:31		20:08 (1)	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	9 20:14 (1)	21:33	21:43		21:05	21	20:29 (1)	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	20:02 (1)	04:48	04:50		05:33		20:09 (1)	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	14 20:16 (1)	21:34	21:43		21:03	19	20:28 (1)	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	20:01 (1)	04:47	04:51		05:35		20:09 (1)	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	16 20:17 (1)	21:35	21:42		21:01	18	20:27 (1)	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	19:59 (1)	04:46	04:52		05:36		20:11 (1)	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	18 20:18 (1)	21:36	21:41		20:59	15	20:26 (1)	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	19:58 (1)	04:46	04:53		05:38		20:12 (1)	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	20 20:18 (1)	21:37	21:41		20:57	13	20:25 (1)	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	19:58 (1)	04:45	04:54		05:40		20:14 (1)	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	22 20:19 (1)	21:38	21:40		20:55	7	20:21 (1)	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	19:57 (1)	04:45	04:55		05:42			06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	23 20:20 (1)	21:39	21:39		20:53			19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	19:57 (1)	04:44	04:56		05:43			06:37	07:30	07:28	08:17
	16:18	17:13	18:07	20:04	20:58	23 20:20 (1)	21:40	21:38		20:51			19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	19:57 (1)	04:44	04:58		05:45			06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	23 20:20 (1)	21:41	21:37		20:49			19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	19:56 (1)	04:44	04:59		05:47			06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	24 20:20 (1)	21:41	21:37		20:47			19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	19:57 (1)	04:43	05:00		05:48			06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	24 20:21 (1)	21:42	21:36		20:45			19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	19:57 (1)	04:43	05:01		05:50			06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	23 20:20 (1)	21:43	21:34		20:43			19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	19:57 (1)	04:43	05:03		05:52			06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	23 20:20 (1)	21:43	21:33		20:40			19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	19:57 (1)	04:43	05:04	20:15 (1)	05:54			06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	23 20:20 (1)	21:44	21:32	8 20:23 (1)	20:38			19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	19:58 (1)	04:43	05:05	20:13 (1)	05:55			06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	22 20:20 (1)	21:44	21:31	11 20:24 (1)	20:36			19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	19:57 (1)	04:43	05:07	20:12 (1)	05:57			06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	22 20:19 (1)	21:44	21:30	13 20:25 (1)	20:34			19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	19:58 (1)	04:43	05:08	20:10 (1)	05:59			06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21 20:19 (1)	21:45	21:28	16 20:26 (1)	20:32			19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	19:59 (1)	04:43	05:09	20:10 (1)	06:01			06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	20 20:19 (1)	21:45	21:27	18 20:28 (1)	20:30			19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	19:59 (1)	04:43	05:11	20:09 (1)	06:02			06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	18 20:17 (1)	21:45	21:26	19 20:28 (1)	20:27			19:13	18:02	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	20:06 (1)	04:43	05:12	20:09 (1)	06:04			06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	17 20:17 (1)	21:45	21:24	20 20:29 (1)	20:25			19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	20:02 (1)	04:44	05:14	20:08 (1)	06:06			07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	14 20:16 (1)	21:45	21:23	21 20:29 (1)	20:23			19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:03 (1)	04:44	05:15	20:08 (1)	06:08			07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	12 20:15 (1)	21:45	21:21	21 20:29 (1)	20:21			19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:05 (1)	04:44	05:17	20:08 (1)	06:09			07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	9 20:14 (1)	21:45	21:20	22 20:30 (1)	20:18			19:04	16:58	18:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:07 (1)	04:45	05:18	20:07 (1)	06:11			07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	5 20:12 (1)	21:45	21:18	23 20:30 (1)	20:16			19:01	16:52	18:02	15:58
28	08:05	07:05	05:58	05:46	04:55		04:45	05:20	20:08 (1)	06:13			07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25		21:45	21:17	23 20:31 (1)	20:14			18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54		04:46	05:22	20:07 (1)	06:15			07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26		21:45	21:15	24 20:31 (1)	20:11			18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		04:47	05:23	20:07 (1)	06:16			07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27		21:45	21:13	24 20:31 (1)	20:09			18:54	16:46	15:59	16:01
31	08:01		06:51		04:52			05:25	20:07 (1)	06:18				07:08		08:29
	16:52		19:44		21:29			21:12	23 20:30 (1)	20:07				16:44		16:02
Sonnenscheinstunden	152	274	367	419	492		508	530		459			382	329	260	235
astr.max.mögl.Beschattung						446			286		162					
Red.Sonnenscheinwahrsch.						0.51			0.45		0.49					
Reduktion Betriebsdauer						0.91			0.91		0.91					
Reduktion Windrichtung						0.68			0.66		0.66					
Gesamte Reduktion						0.33			0.27		0.29					
Met.wahrsch.Beschattung						137			77		48					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** ER - IO148

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni	Juli			August			September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51	04:47			05:28		20:10 (1)	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41			21:30	21:44			21:10	22	20:32 (1)	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38			04:50	04:48			05:28		20:10 (1)	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42			21:31	21:44			21:08	21	20:31 (1)	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36			04:49	04:49			05:30		20:10 (1)	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44			21:32	21:44			21:06	21	20:31 (1)	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34			04:49	04:55			05:31		20:10 (1)	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46			21:33	21:43			21:05	20	20:30 (1)	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		20:07 (1)	04:48	04:59			05:33		20:12 (1)	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	9	20:16 (1)	21:34	21:43			21:03	17	20:29 (1)	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		20:04 (1)	04:47	04:51			05:35		20:12 (1)	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	13	20:17 (1)	21:35	21:42			21:01	16	20:28 (1)	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		20:02 (1)	04:46	04:52			05:36		20:14 (1)	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	17	20:19 (1)	21:36	21:41			20:59	12	20:26 (1)	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		20:01 (1)	04:46	04:53			05:38		20:17 (1)	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	18	20:19 (1)	21:37	21:41			20:57	7	20:24 (1)	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		20:01 (1)	04:45	04:54			05:42			06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	20	20:21 (1)	21:38	21:40			20:55			19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		20:00 (1)	04:45	04:55			05:42			06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21	20:21 (1)	21:39	21:39			20:53			19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		19:59 (1)	04:44	04:56			05:43			06:37	07:30	07:28	08:17
	16:18	17:13	18:07	20:04	20:58	22	20:21 (1)	21:40	21:38			20:51			19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		19:59 (1)	04:44	04:58			05:45			06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	23	20:22 (1)	21:41	21:37			20:49			19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		19:59 (1)	04:44	04:59			05:47			06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	23	20:22 (1)	21:41	21:37			20:47			19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		19:59 (1)	04:43	05:00			05:48			06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	24	20:23 (1)	21:42	21:36			20:45			19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		19:58 (1)	04:43	05:01		20:17 (1)	05:50			06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	24	20:22 (1)	21:43	21:34	6	20:23 (1)	20:43			19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		19:59 (1)	04:43	05:03		20:15 (1)	05:52			06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	24	20:23 (1)	21:43	21:33	10	20:25 (1)	20:40			19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		19:59 (1)	04:43	05:04		20:14 (1)	05:54			06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	23	20:22 (1)	21:44	21:32	13	20:27 (1)	20:38			19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		19:59 (1)	04:43	05:05		20:15 (1)	05:55			06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	23	20:22 (1)	21:44	21:31	15	20:28 (1)	20:36			19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		19:58 (1)	04:43	05:07		20:12 (1)	05:57			06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	22	20:21 (1)	21:44	21:30	17	20:29 (1)	20:34			19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		20:00 (1)	04:43	05:08		20:11 (1)	05:59			06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21	20:21 (1)	21:45	21:28	18	20:29 (1)	20:32			19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		20:00 (1)	04:43	05:09		20:11 (1)	06:01			06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21	20:21 (1)	21:45	21:27	19	20:30 (1)	20:30			19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		20:00 (1)	04:43	05:11		20:10 (1)	06:02			06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	20	20:20 (1)	21:45	21:26	21	20:31 (1)	20:27			19:13	18:02	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		20:01 (1)	04:43	05:12		20:11 (1)	06:04			06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	19	20:20 (1)	21:45	21:24	21	20:32 (1)	20:25			19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		20:02 (1)	04:44	05:14		20:10 (1)	06:06			07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	17	20:19 (1)	21:45	21:23	22	20:32 (1)	20:23			19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		20:03 (1)	04:44	05:15		20:09 (1)	06:08			07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	16	20:19 (1)	21:45	21:21	23	20:32 (1)	20:21			19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58		20:04 (1)	04:44	05:17		20:09 (1)	06:09			07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	14	20:18 (1)	21:45	21:20	24	20:33 (1)	20:18			19:04	16:58	18:03	15:57
27	08:07	07:07	06:00	05:48	04:56		20:06 (1)	04:45	05:18		20:09 (1)	06:11			07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	11	20:17 (1)	21:45	21:18	23	20:32 (1)	20:16			19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		20:07 (1)	04:45	05:20		20:09 (1)	06:13			07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	9	20:16 (1)	21:45	21:17	24	20:33 (1)	20:14			18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54		20:10 (1)	04:46	05:22		20:09 (1)	06:15			07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	3	20:13 (1)	21:45	21:15	23	20:32 (1)	20:11			18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53			04:47	05:23		20:09 (1)	06:16			07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27			21:45	21:13	24	20:33 (1)	20:09			18:54	16:46	15:59	16:01
31	08:01		06:51		04:52				05:25		20:09 (1)	06:18				07:08		08:29
	16:52		19:44		21:29				21:12	23	20:32 (1)	20:07				16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508	530			459			382	329	260	235
astr.max.mögl.Beschattung						457				126			136					
Red.Sonnenscheinwahrsch.						0.51				0.45			0.49					
Reduktion Betriebsdauer						0.91				0.91			0.91					
Reduktion Windrichtung						0.68				0.66			0.66					
Gesamte Reduktion						0.31				0.27			0.29					
Mat.wahrsch.Beschattung						141				87			40					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** ES - IO149

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April		Mai			Juni		Juli		August			September		Oktober		November		Dezember	
1	08:29	16:03	07:59	16:54	07:02	17:49	06:48	19:46	05:40	20:41		04:51	21:30	04:47	21:44	05:28	21:10	23	20:09 (1)	20:32 (1)	06:20	20:04	07:12	18:51	07:10	16:42	08:04	15:58
2	08:28	16:04	07:57	16:56	07:00	17:50	06:46	19:48	05:38	20:42		04:50	21:31	04:48	21:44	05:28	21:08	23	20:08 (1)	20:31 (1)	06:22	20:02	07:14	18:49	07:12	16:40	08:05	15:57
3	08:28	16:05	07:56	16:58	06:58	17:52	06:43	19:50	05:36	20:44		04:49	21:32	04:49	21:44	05:31	21:06	22	20:06 (1)	20:31 (1)	06:23	20:00	07:16	18:47	07:14	16:38	08:07	15:57
4	08:28	16:06	07:54	16:59	06:55	17:54	06:41	19:52	05:34	20:46	20:07 (1) 7 20:14 (1)	04:49	21:33	04:55	21:43	05:31	21:05	21	20:04 (1)	20:30 (1)	06:25	19:57	07:18	18:44	07:15	16:36	08:08	15:56
5	08:28	16:08	07:52	17:01	06:53	17:56	06:39	19:53	05:32	20:48	20:04 (1) 13 20:17 (1)	04:48	21:34	04:50	21:43	05:33	21:03	19	20:02 (1)	20:29 (1)	06:27	19:55	07:19	18:42	07:17	16:34	08:10	15:55
6	08:27	16:09	07:50	17:03	06:51	17:58	06:36	19:55	05:30	20:50	20:02 (1) 18 20:18 (1)	04:47	21:35	04:51	21:42	05:35	21:01	18	20:00 (1)	20:28 (1)	06:29	19:52	07:21	18:39	07:19	16:32	08:11	15:55
7	08:27	16:10	07:49	17:05	06:48	18:00	06:34	19:57	05:28	20:51	20:01 (1) 18 20:19 (1)	04:46	21:36	04:52	21:41	05:36	20:59	15	20:12 (1)	20:27 (1)	06:30	19:50	07:23	18:37	07:21	16:30	08:12	15:54
8	08:26	16:12	07:47	17:07	06:46	18:02	06:31	19:59	05:26	20:53	20:00 (1) 19 20:19 (1)	04:46	21:37	04:53	21:41	05:38	20:57	11	20:14 (1)	20:25 (1)	06:32	19:48	07:25	18:35	07:23	16:28	08:14	15:54
9	08:26	16:13	07:45	17:09	06:44	18:04	06:29	20:01	05:24	20:55	20:00 (1) 20 20:20 (1)	04:45	21:38	04:54	21:40	05:42	20:53	6	20:16 (1)	20:22 (1)	06:34	19:45	07:27	18:32	07:25	16:27	08:15	15:54
10	08:25	16:15	07:43	17:11	06:41	18:06	06:27	20:03	05:22	20:57	19:59 (1) 21 20:20 (1)	04:45	21:39	04:55	21:39	05:42	20:53				06:36	19:43	07:28	18:30	07:27	16:25	08:16	15:53
11	08:25	16:18	07:41	17:13	06:39	18:07	06:24	20:04	05:21	20:58	19:58 (1) 22 20:20 (1)	04:44	21:40	04:56	21:38	05:45	20:51				06:37	19:41	07:30	18:27	07:28	16:23	08:17	15:53
12	08:24	16:18	07:39	17:15	06:37	18:09	06:22	20:06	05:19	21:00	19:58 (1) 23 20:21 (1)	04:44	21:41	04:58	21:37	05:49	20:49				06:39	19:38	07:32	18:25	07:31	16:22	08:18	15:53
13	08:23	16:19	07:37	17:17	06:34	18:11	06:20	20:08	05:17	21:02	19:58 (1) 23 20:21 (1)	04:44	21:41	04:59	21:37	05:47	20:47				06:41	19:35	07:34	18:23	07:33	16:20	08:19	15:53
14	08:22	16:21	07:35	17:19	06:32	18:13	06:17	20:10	05:15	21:03	19:58 (1) 23 20:21 (1)	04:43	21:42	05:00	21:35	05:48	20:45				06:42	19:33	07:36	18:21	07:34	16:18	08:20	15:53
15	08:21	16:22	07:33	17:21	06:29	18:15	06:15	20:12	05:14	21:05	19:58 (1) 23 20:21 (1)	04:43	21:43	05:01	21:34	05:52	20:43				06:44	19:30	07:38	18:18	07:36	16:17	08:21	15:53
16	08:20	16:24	07:31	17:23	06:27	18:17	06:13	20:13	05:12	21:07	19:59 (1) 22 20:21 (1)	04:43	21:43	05:03	21:33	05:52	20:42				06:46	19:28	07:39	18:16	07:38	16:15	08:22	15:53
17	08:19	16:26	07:29	17:25	06:25	18:19	06:10	20:15	05:10	21:08	19:58 (1) 22 20:20 (1)	04:43	21:44	05:04	21:32	20:18 (1) 4 20:22 (1)	05:54	20:38			06:48	19:26	07:41	18:14	07:40	16:14	08:23	15:53
18	08:18	16:28	07:27	17:27	06:22	18:21	06:08	20:17	05:09	21:10	19:59 (1) 22 20:21 (1)	04:43	21:44	05:05	21:31	20:15 (1) 9 20:24 (1)	05:55	20:36			06:49	19:23	07:43	18:11	07:42	16:12	08:24	15:53
19	08:17	16:29	07:25	17:29	06:20	18:22	06:06	20:19	05:07	21:11	19:58 (1) 21 20:20 (1)	04:43	21:44	05:07	21:30	20:13 (1) 13 20:26 (1)	05:57	20:34			06:51	19:21	07:45	18:09	07:44	16:11	08:25	15:54
20	08:16	16:31	07:22	17:31	06:17	18:24	06:03	20:21	05:06	21:13	20:00 (1) 19 20:19 (1)	04:43	21:45	05:08	21:28	20:12 (1) 14 20:26 (1)	05:59	20:32			06:53	19:18	07:47	18:07	07:45	16:10	08:25	15:54
21	08:15	16:33	07:20	17:33	06:15	18:26	06:01	20:23	05:04	21:15	20:01 (1) 18 20:19 (1)	04:43	21:45	05:09	21:27	20:12 (1) 16 20:28 (1)	06:01	20:30			06:55	19:16	07:49	18:05	07:47	16:08	08:26	15:54
22	08:14	16:35	07:18	17:35	06:12	18:28	05:59	20:24	05:03	21:16	20:01 (1) 17 20:18 (1)	04:43	21:45	05:11	21:26	20:11 (1) 18 20:29 (1)	06:02	20:27			06:56	19:13	07:51	18:02	07:49	16:07	08:26	15:55
23	08:12	16:36	07:16	17:37	06:10	18:30	05:57	20:26	05:02	21:18	20:02 (1) 15 20:17 (1)	04:43	21:45	05:12	21:24	20:11 (1) 19 20:30 (1)	06:04	20:25			06:58	19:11	07:53	18:00	07:51	16:06	08:27	15:55
24	08:11	16:38	07:14	17:39	06:08	18:32	05:55	20:28	05:00	21:19	20:03 (1) 14 20:17 (1)	04:44	21:45	05:14	21:23	20:10 (1) 20 20:30 (1)	06:06	20:23			07:00	19:08	07:54	17:58	07:52	16:05	08:27	15:56
25	08:10	16:40	07:11	17:41	06:05	18:33	05:52	20:30	04:59	23:21	20:05 (1) 10 20:15 (1)	04:44	21:45	05:15	21:21	20:09 (1) 21 20:30 (1)	06:08	20:21			07:02	19:06	07:56	16:56	07:54	16:04	08:28	15:57
26	08:08	16:42	07:09	17:43	06:03	18:35	05:50	20:32	04:58	23:22	20:07 (1) 7 20:14 (1)	04:44	21:45	05:17	21:20	20:09 (1) 22 20:31 (1)	06:09	20:18			07:03	19:04	07:58	16:58	07:56	16:03	08:28	15:57
27	08:07	16:44	07:07	17:45	06:00	18:37	05:48	20:33	04:56	23:23		04:45	21:45	05:18	21:18	20:09 (1) 22 20:31 (1)	06:11	20:16			07:05	19:01	07:00	16:52	07:58	16:02	08:28	15:58
28	08:05	16:46	07:05	17:47	05:58	18:39	05:46	20:35	04:55	23:25		04:45	21:45	05:20	21:17	20:09 (1) 23 20:32 (1)	06:13	20:14			07:07	18:59	07:02	16:50	07:59	16:01	08:28	15:59
29	08:04	16:48			06:55	19:41	05:44	20:37	04:54	23:26		04:46	21:45	05:22	21:15	20:08 (1) 23 20:31 (1)	06:15	20:13			07:09	18:56	07:04	16:48	08:01	16:00	08:29	16:00
30	08:02	16:50			06:53	19:42	05:42	20:39	04:53	23:27		04:47	21:45	05:23	21:13	20:09 (1) 23 20:32 (1)	06:16	20:09			07:11	18:54	07:06	16:46	08:02	15:59	08:29	16:01
31	08:01	16:52			06:51	19:44			04:52	23:29				05:23	21:12	20:08 (1) 23 20:31 (1)	06:18	20:07					07:08	16:44			08:29	16:02
Sonnenscheinstunden	252		274		367		419		492			508		530		459			382		329		260		235	
astr.max.mögl.Beschattung											415				270		258									
Red.Sonnenscheinwahrsch.											0.51				0.45		0.49									
Reduktion Betriebsdauer											0.91				0.91		0.91									
Reduktion Windrichtung											0.68				0.66		0.66									
Gesamte Reduktion											0.31				0.27		0.29									
Met.wahrsch.Beschattung											128				72		46									

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** ET - IO150

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April		Mai			Juni		Juli			August			September		Oktober		November		Dezember	
1	08:29	16:03	07:59	16:54	07:02	17:49	06:48	19:46	05:40	20:41		04:51	21:30	04:47	21:44		05:28	21:10	20:12 (1)	20:34 (1)	06:20	20:04	07:12	18:51	07:10	16:42	08:04	15:58
2	08:28	16:04	07:57	16:56	07:00	17:50	06:46	19:48	05:38	20:42		04:50	21:31	04:48	21:44		05:28	21:08	20:12 (1)	20:33 (1)	06:22	20:02	07:14	18:49	07:12	16:40	08:05	15:57
3	08:28	16:05	07:56	16:58	06:58	17:52	06:43	19:50	05:36	20:44		04:49	21:32	04:49	21:44		05:26	21:06	20:32 (1)	20:32 (1)	06:23	20:00	07:16	18:47	07:14	16:38	08:07	15:57
4	08:28	16:06	07:54	16:59	06:55	17:54	06:41	19:52	05:34	20:46		04:49	21:33	04:48	21:43		05:24	21:05	20:31 (1)	20:13 (1)	06:25	19:57	07:18	18:44	07:15	16:36	08:08	15:56
5	08:28	16:08	07:52	17:01	06:53	17:56	06:39	19:53	05:32	20:48		04:48	21:34	04:48	21:43		05:22	21:03	20:30 (1)	20:31 (1)	06:27	19:55	07:19	18:42	07:17	16:34	08:10	15:55
6	08:27	16:09	07:50	17:03	06:51	17:58	06:36	19:55	05:30	20:50	9	20:08 (1)	04:47	04:47	21:43		05:20	21:01	20:29 (1)	20:16 (1)	06:29	19:52	07:21	18:39	07:19	16:32	08:11	15:55
7	08:27	16:10	07:49	17:05	06:48	18:00	06:34	19:57	05:28	20:51	13	20:17 (1)	21:38	04:46	21:42		05:18	20:59	20:28 (1)	20:18 (1)	06:30	19:50	07:23	18:37	07:21	16:30	08:12	15:54
8	08:26	16:12	07:47	17:07	06:46	18:02	06:31	19:59	05:26	20:53	18	20:19 (1)	21:36	04:46	21:41		05:16	20:57	20:16 (1)	10:26 (1)	06:32	19:48	07:25	18:35	07:23	16:28	08:14	15:54
9	08:26	16:13	07:45	17:09	06:44	18:04	06:29	20:01	05:24	20:55	19	20:20 (1)	21:37	04:45	21:41		05:14	20:55			06:34	19:45	07:27	18:32	07:25	16:27	08:15	15:54
10	08:25	16:15	07:43	17:11	06:41	18:06	06:27	20:03	05:22	20:57	20	20:21 (1)	21:39	04:45	21:40		05:12	20:53			06:36	19:43	07:28	18:30	07:27	16:25	08:16	15:53
11	08:25	16:18	07:41	17:13	06:39	18:07	06:24	20:04	05:21	20:58	21	20:22 (1)	21:40	04:44	21:38		05:10	20:51			06:37	19:40	07:30	18:27	07:28	16:23	08:17	15:53
12	08:24	16:18	07:39	17:15	06:37	18:09	06:22	20:06	05:19	21:00	22	20:23 (1)	21:41	04:44	21:37		05:08	20:49			06:39	19:38	07:32	18:25	07:31	16:22	08:18	15:53
13	08:23	16:19	07:37	17:17	06:34	18:11	06:20	20:08	05:17	21:02	22	20:23 (1)	21:41	04:44	21:37	4	20:20 (1) 20:24 (1)	20:47			06:41	19:35	07:34	18:23	07:33	16:20	08:19	15:53
14	08:22	16:21	07:35	17:19	06:32	18:13	06:17	20:10	05:15	21:03	23	20:24 (1)	21:42	04:43	21:36	8	20:18 (1) 20:26 (1)	20:48			06:42	19:33	07:36	18:21	07:34	16:18	08:20	15:53
15	08:21	16:22	07:33	17:21	06:29	18:15	06:15	20:12	05:14	21:05	24	20:24 (1)	21:43	04:43	21:34	11	20:27 (1)	20:45			06:44	19:30	07:38	18:18	07:36	16:17	08:21	15:53
16	08:20	16:24	07:31	17:23	06:27	18:17	06:13	20:13	05:12	21:07	23	20:24 (1)	21:43	04:43	21:33	13	20:15 (1) 20:28 (1)	20:43			06:46	19:28	07:39	18:16	07:38	16:15	08:22	15:53
17	08:19	16:26	07:29	17:25	06:25	18:19	06:10	20:15	05:10	21:08	24	20:24 (1)	21:44	04:43	21:32	15	20:15 (1) 20:30 (1)	20:42			06:48	19:26	07:41	18:14	07:40	16:14	08:23	15:53
18	08:18	16:28	07:27	17:27	06:22	18:21	06:08	20:17	05:09	21:10	23	20:24 (1)	21:44	04:43	21:31	17	20:14 (1) 20:31 (1)	20:38			06:49	19:23	07:43	18:11	07:42	16:12	08:24	15:53
19	08:17	16:29	07:25	17:29	06:20	18:22	06:06	20:19	05:07	21:11	23	20:23 (1)	21:44	04:43	21:30	18	20:13 (1) 20:32 (1)	20:34			06:51	19:21	07:45	18:09	07:44	16:11	08:25	15:54
20	08:16	16:31	07:22	17:31	06:17	18:24	06:04	20:21	05:06	21:13	22	20:23 (1)	21:45	04:43	21:28	20	20:12 (1) 20:32 (1)	20:32			06:53	19:18	07:47	18:07	07:45	16:10	08:25	15:54
21	08:15	16:33	07:20	17:33	06:15	18:26	06:01	20:23	05:04	21:15	21	20:23 (1)	21:45	04:43	21:27	21	20:12 (1) 20:33 (1)	20:30			06:55	19:16	07:49	18:05	07:47	16:08	08:26	15:54
22	08:14	16:35	07:18	17:35	06:12	18:28	05:59	20:24	05:03	21:16	21	20:22 (1)	21:45	04:43	21:26	21	20:12 (1) 20:33 (1)	20:27			06:56	19:13	07:51	18:02	07:49	16:07	08:26	15:55
23	08:12	16:36	07:16	17:37	06:10	18:30	05:57	20:26	05:02	21:18	20	20:22 (1)	21:45	04:43	21:24	22	20:12 (1) 20:34 (1)	20:25			06:58	19:11	07:53	18:00	07:51	16:06	08:27	15:55
24	08:11	16:38	07:14	17:39	06:08	18:32	05:55	20:28	05:00	21:19	19	20:22 (1)	21:45	04:44	21:23	23	20:11 (1) 20:34 (1)	20:23			07:00	19:08	07:54	17:58	07:52	16:05	08:27	15:56
25	08:10	16:40	07:11	17:41	06:05	18:33	05:52	20:30	04:59	21:21	18	20:22 (1)	21:45	04:44	21:21	23	20:11 (1) 20:34 (1)	20:21			07:02	19:06	07:56	16:56	07:54	16:04	08:28	15:57
26	08:08	16:42	07:09	17:43	06:03	18:35	05:50	20:32	04:58	21:22	18	20:21 (1)	21:45	04:44	21:20	24	20:11 (1) 20:35 (1)	20:18			07:03	19:04	07:58	16:58	07:56	16:03	08:28	15:57
27	08:07	16:44	07:07	17:45	06:00	18:37	05:48	20:33	04:56	21:23	14	20:06 (1)	21:45	04:45	21:18	23	20:11 (1) 20:34 (1)	20:16			07:05	19:01	07:00	16:52	07:58	16:02	08:28	15:58
28	08:05	16:46	07:05	17:47	05:58	18:39	05:46	20:35	04:55	21:25	12	20:19 (1)	21:45	04:45	21:17	24	20:11 (1) 20:35 (1)	20:14			07:07	18:59	07:02	16:50	07:59	16:01	08:28	15:59
29	08:04	16:48			05:55	19:41	05:44	20:37	04:54	21:26	10	20:08 (1)	21:46	04:46	21:15	23	20:11 (1) 20:34 (1)	20:13			07:09	18:56	07:04	16:48	08:01	16:00	08:29	16:00
30	08:02	16:50			05:53	19:42	05:42	20:39	04:53	21:27	6	20:18 (1)	21:46	04:47	21:13	23	20:11 (1) 20:34 (1)	20:09			07:11	18:54	07:06	16:46	08:02	15:59	08:29	16:01
31	08:01	16:52			05:51	19:44			04:52	21:29		20:16 (1)	21:45		21:12	23	20:11 (1) 20:34 (1)	20:07					07:08	16:44			08:29	16:02
Sonnenscheinstunden		232		274		367		419		492			508		510			459				382		329		260		235
astr.max.mögl.Beschattung											461					356			115								
Red.Sonnenscheinwahrsch.											0.51					0.45			0.49								
Reduktion Betriebsdauer											0.91					0.91			0.91								
Reduktion Windrichtung											0.68					0.66			0.66								
Gesamte Reduktion											0.31					0.27			0.29								
Met.wahrsch.Beschattung											142					95			34								

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM) Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang Zeitpunkt (SS:MM) Schattenende	(WEA mit erstem Schatten) (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EU - IO151

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni			Juli			August			September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51		20:14 (1)	04:47			05:28		20:14 (1)	06:20	07:12	07:10	08:04
	16:03	16:34	17:40	18:46	20:41			21:30	1	20:15 (1)	21:44			21:10	21	20:25 (1)	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38			04:50			04:48			05:28		20:14 (1)	06:22	07:14	07:12	08:05
	16:04	16:36	17:50	19:48	20:42			21:31			21:44			21:08	19	20:33 (1)	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36			04:49			04:48			05:30		20:15 (1)	06:23	07:16	07:14	08:07
	16:05	16:38	17:52	19:50	20:44			21:32			21:44			21:06	18	20:33 (1)	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34			04:49			04:50			05:31		20:15 (1)	06:25	07:18	07:15	08:08
	16:06	16:39	17:54	19:52	20:46			21:33			21:43			21:05	16	20:31 (1)	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:38	05:32			04:48			04:50			05:33		20:17 (1)	06:27	07:19	07:17	08:10
	16:08	17:01	17:58	19:53	20:48			21:34			21:43			21:03	13	20:30 (1)	19:53	18:42	16:34	15:55
6	08:27	07:50	06:51	06:38	05:30		20:12 (1)	04:47			04:51			05:35		20:18 (1)	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	3	20:15 (1)	21:35			21:42			21:01	9	20:27 (1)	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		20:06 (1)	04:46			04:52			05:36			06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	11	20:18 (1)	21:36			21:41			20:58			19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		20:06 (1)	04:46			04:53			05:38			06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	14	20:20 (1)	21:37			21:41			20:57			19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		20:08 (1)	04:45			04:54			05:40			06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	17	20:22 (1)	21:38			21:40			20:55			19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		20:04 (1)	04:45			04:55			05:42			06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	19	20:23 (1)	21:39			21:39			20:53			19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		20:03 (1)	04:44			04:56			05:43			06:37	07:30	07:28	08:17
	16:16	17:13	18:07	20:04	20:58	20	20:23 (1)	21:40			21:38			20:51			19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		20:01 (1)	04:44			04:58		20:20 (1)	05:45			06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21	20:24 (1)	21:41			21:37	6	20:26 (1)	20:49			19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		20:02 (1)	04:44			04:59		20:18 (1)	05:47			06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	22	20:24 (1)	21:41			21:37	10	20:26 (1)	20:47			19:35	18:23	16:20	15:53
14	08:22	07:36	06:32	06:17	05:15		20:02 (1)	04:43			05:00		20:17 (1)	05:49			06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	23	20:25 (1)	21:42			21:36	12	20:26 (1)	20:45			19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		20:02 (1)	04:43			05:01		20:16 (1)	05:50			06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	23	20:25 (1)	21:43			21:34	14	20:30 (1)	20:43			19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		20:02 (1)	04:43			05:03		20:15 (1)	05:52			06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	24	20:26 (1)	21:43			21:33	16	20:31 (1)	20:40			19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		20:01 (1)	04:43			05:04		20:15 (1)	05:54			06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	24	20:25 (1)	21:44			21:32	17	20:32 (1)	20:38			19:26	18:14	16:14	15:53
18	08:18	07:27	06:23	06:08	05:09		20:02 (1)	04:43			05:05		20:14 (1)	05:55			06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	23	20:26 (1)	21:44			21:31	18	20:33 (1)	20:36			19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		20:01 (1)	04:43			05:07		20:14 (1)	05:57			06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	24	20:25 (1)	21:44			21:30	19	20:33 (1)	20:34			19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		20:02 (1)	04:43			05:08		20:13 (1)	05:59			06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	23	20:25 (1)	21:45			21:28	20	20:33 (1)	20:32			19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		20:03 (1)	04:43			05:09		20:13 (1)	06:01			06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	22	20:25 (1)	21:45			21:27	21	20:34 (1)	20:30			19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		20:02 (1)	04:43			05:11		20:13 (1)	06:02			06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	22	20:24 (1)	21:45			21:26	22	20:35 (1)	20:27			19:13	18:02	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		20:03 (1)	04:43			05:12		20:13 (1)	06:04			06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21	20:24 (1)	21:45			21:24	23	20:36 (1)	20:25			19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		20:04 (1)	04:44			05:14		20:12 (1)	06:06			07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	20	20:24 (1)	21:45			21:23	23	20:35 (1)	20:23			19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		20:04 (1)	04:44			05:15		20:12 (1)	06:08			07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	19	20:23 (1)	21:45			21:21	23	20:35 (1)	20:21			19:06	17:56	16:04	15:57
26	08:09	07:09	06:03	05:50	04:58		20:05 (1)	04:44			05:17		20:12 (1)	06:09			07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	18	20:23 (1)	21:45			21:20	24	20:36 (1)	20:18			19:04	17:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		20:06 (1)	04:45			05:18		20:12 (1)	06:11			07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	16	20:22 (1)	21:45			21:18	23	20:35 (1)	20:16			19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		20:07 (1)	04:45			05:20		20:12 (1)	06:13			07:07	07:02	07:58	08:28
	16:46	17:47	18:39	20:35	21:25	15	20:23 (1)	21:45			21:17	24	20:36 (1)	20:14			18:58	16:50	16:01	15:59
29	08:04		06:03	05:44	04:54		20:08 (1)	04:46			05:22		20:12 (1)	06:15			07:09	07:04	08:01	08:28
	16:48		19:41	20:37	21:26	13	20:21 (1)	21:45			21:15	23	20:35 (1)	20:11			18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		20:09 (1)	04:47			05:23		20:13 (1)	06:16			07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	11	20:20 (1)	21:45			21:13	22	20:35 (1)	20:09			18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:11 (1)				05:25		20:13 (1)	06:18				07:08		08:29
	16:52		19:44		21:29	7	20:18 (1)				21:12	22	20:35 (1)	20:07				16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508			510			459			362	329	280	235
astr.max.mögl.Beschattung						475			1			383			96					
Red.Sonnenscheinwahrsch.						0.51			0.45			0.45			0.49					
Reduktion Betriebsdauer						0.91			0.91			0.91			0.91					
Reduktion Windrichtung						0.66			0.66			0.66			0.66					
Gesamte Reduktion						0.31			0.27			0.27			0.29					
Mat.wahrsch.Beschattung						146			0			102			28					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EV - IO152

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni	Juli			August			September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51	04:47			05:28		20:15 (1)	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41			21:30	21:44			21:10	20	20:35 (1)	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38			04:50	04:48			05:28		20:15 (1)	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42			21:31	21:44			21:08	19	20:34 (1)	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36			04:49	04:49			05:30		20:16 (1)	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44			21:32	21:44			21:06	17	20:33 (1)	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34			04:49	04:55			05:31		20:16 (1)	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46			21:33	21:43			21:05	16	20:32 (1)	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32			04:48	04:50			05:33		20:16 (1)	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48			21:34	21:43			21:03	13	20:31 (1)	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30			04:47	04:51			05:35		20:17 (1)	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50			21:35	21:42			21:01	8	20:28 (1)	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		20:09 (1)	04:46	04:52			05:36			06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	10	20:19 (1)	21:36	21:41			20:59			19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		20:07 (1)	04:46	04:53			05:38			06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	14	20:21 (1)	21:37	21:41			20:57			19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		20:06 (1)	04:45	04:54			05:40			06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	17	20:23 (1)	21:38	21:40			20:55			19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		20:05 (1)	04:45	04:55			05:42			06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	18	20:23 (1)	21:39	21:39			20:53			19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		20:04 (1)	04:44	04:56			05:43			06:37	07:30	07:29	08:17
	16:18	17:13	18:07	20:04	20:58	20	20:24 (1)	21:40	21:38			20:51			19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		20:04 (1)	04:44	04:58		20:23 (1)	05:45			06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21	20:25 (1)	21:41	21:37	1	20:24 (1)	20:49			19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		20:03 (1)	04:44	04:59		20:20 (1)	05:47			06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	22	20:25 (1)	21:41	21:37	8	20:28 (1)	20:47			19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		20:03 (1)	04:43	05:00		20:19 (1)	05:48			06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	23	20:26 (1)	21:42	21:35	10	20:29 (1)	20:45			19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		20:03 (1)	04:43	05:01		20:17 (1)	05:50			06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	22	20:25 (1)	21:43	21:34	13	20:30 (1)	20:43			19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		20:03 (1)	04:43	05:03		20:16 (1)	05:52			06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	23	20:26 (1)	21:43	21:33	15	20:31 (1)	20:40			19:28	18:16	16:15	15:52
17	08:19	07:29	06:25	06:10	05:10		20:02 (1)	04:43	05:04		20:16 (1)	05:54			06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	24	20:26 (1)	21:44	21:32	17	20:33 (1)	20:38			19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		20:03 (1)	04:43	05:05		20:16 (1)	05:55			06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	23	20:26 (1)	21:44	21:31	17	20:33 (1)	20:36			19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		20:03 (1)	04:43	05:07		20:15 (1)	05:57			06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	22	20:25 (1)	21:44	21:30	19	20:34 (1)	20:34			19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:03	05:06		20:03 (1)	04:43	05:08		20:14 (1)	05:59			06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	22	20:25 (1)	21:45	21:28	20	20:34 (1)	20:32			19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		20:04 (1)	04:43	05:09		20:14 (1)	06:01			06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	22	20:26 (1)	21:45	21:27	21	20:35 (1)	20:30			19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		20:03 (1)	04:43	05:11		20:14 (1)	06:02			06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21	20:24 (1)	21:45	21:26	21	20:35 (1)	20:27			19:13	18:02	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		20:04 (1)	04:43	05:12		20:14 (1)	06:04			06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	20	20:24 (1)	21:45	21:24	22	20:36 (1)	20:25			19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		20:05 (1)	04:44	05:14		20:13 (1)	06:06			07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	19	20:24 (1)	21:45	21:23	23	20:36 (1)	20:23			19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		20:06 (1)	04:44	05:15		20:13 (1)	06:08			07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	18	20:24 (1)	21:45	21:21	23	20:36 (1)	20:21			19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58		20:06 (1)	04:44	05:17		20:13 (1)	06:09			07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	17	20:23 (1)	21:45	21:20	23	20:36 (1)	20:18			19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		20:07 (1)	04:45	05:18		20:13 (1)	06:11			07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	16	20:23 (1)	21:45	21:18	23	20:36 (1)	20:16			19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		20:08 (1)	04:45	05:20		20:13 (1)	06:13			07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	14	20:22 (1)	21:45	21:17	23	20:36 (1)	20:14			18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54		20:08 (1)	04:46	05:22		20:13 (1)	06:15			07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	12	20:21 (1)	21:45	21:15	23	20:36 (1)	20:11			18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		20:11 (1)	04:47	05:23		20:14 (1)	06:16			07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	9	20:20 (1)	21:45	21:13	22	20:36 (1)	20:09			18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:13 (1)		05:25		20:14 (1)	06:18				07:08		08:29
	16:52		19:44		21:29	5	20:18 (1)		21:12	21	20:35 (1)	20:07				16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508	530			459			382	329	268	235
astr.max.mögl.Beschattung						454				365			93					
Red.Sonnenscheinwahrsch.						0.51				0.45			0.49					
Reduktion Betriebsdauer						0.91				0.91			0.91					
Reduktion Windrichtung						0.68				0.66			0.66					
Gesamte Reduktion						0.31				0.27			0.29					
Mat.wahrsch.Beschattung						139				98			27					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EW - IO153

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni			Juli			August			September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51		20:11 (1)	04:47			05:28		20:17 (1)	06:20	07:12	07:10	08:04
	16:03	16:34	17:40	19:46	20:41			21:30	11	20:22 (1)	21:44			21:10	19	20:36 (1)	18:51	16:42	15:58	
2	08:28	07:57	07:00	06:46	05:38			04:50		20:13 (1)	04:48			05:28		20:17 (1)	06:22	07:14	07:12	08:05
	16:04	16:36	17:50	19:48	20:42			21:31	9	20:22 (1)	21:44			21:08	17	20:34 (1)	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36			04:49		20:15 (1)	04:49			05:30		20:19 (1)	06:23	07:16	07:14	08:07
	16:05	16:38	17:52	19:50	20:44			21:32	5	20:20 (1)	21:44			21:06	16	20:34 (1)	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34			04:49			04:50			05:31		20:19 (1)	06:25	07:18	07:15	08:08
	16:06	16:39	17:54	19:52	20:46			21:33			21:43			21:05	13	20:32 (1)	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:38	05:32			04:48			04:50			05:33		20:22 (1)	06:27	07:19	07:17	08:10
	16:08	17:01	17:58	19:53	20:48			21:34			21:43			21:03	8	20:30 (1)	19:53	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30			04:47			04:51			05:35			06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50			21:35			21:42			21:01			19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28			04:46			04:52			05:36			06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51			21:36			21:41			20:58			19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		20:11 (1)	04:46			04:53			05:38			06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	9	20:20 (1)	21:37			21:41			20:57			19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		20:09 (1)	04:45			04:54		20:24 (1)	05:40			06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	14	20:23 (1)	21:38			21:40	2	20:26 (1)	20:55			19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		20:07 (1)	04:45			04:55		20:23 (1)	05:42			06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	17	20:24 (1)	21:39			21:39	8	20:29 (1)	20:53			19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		20:06 (1)	04:44			04:58		20:20 (1)	05:43			06:37	07:30	07:28	08:17
	16:16	17:13	18:07	20:04	20:58	18	20:24 (1)	21:40			21:38	18	20:30 (1)	20:51			19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		20:04 (1)	04:44			04:58		20:18 (1)	05:45			06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	20	20:26 (1)	21:41			21:37	12	20:21 (1)	20:49			19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		20:05 (1)	04:44			04:59		20:18 (1)	05:47			06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21	20:26 (1)	21:41			21:37	14	20:32 (1)	20:47			19:35	18:23	16:20	15:53
14	08:22	07:36	06:32	06:17	05:15		20:05 (1)	04:43			05:00		20:17 (1)	05:49			06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	22	20:27 (1)	21:42			21:35	16	20:33 (1)	20:45			19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		20:04 (1)	04:43			05:01		20:17 (1)	05:50			06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	23	20:27 (1)	21:43			21:34	17	20:34 (1)	20:43			19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		20:04 (1)	04:43			05:03		20:16 (1)	05:52			06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	23	20:27 (1)	21:43			21:33	18	20:34 (1)	20:40			19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		20:04 (1)	04:43			05:04		20:16 (1)	05:54			06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	23	20:27 (1)	21:44			21:32	19	20:35 (1)	20:38			19:26	18:14	16:14	15:53
18	08:18	07:27	06:23	06:08	05:09		20:04 (1)	04:43			05:05		20:18 (1)	05:55			06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	24	20:28 (1)	21:44			21:31	20	20:36 (1)	20:36			19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		20:03 (1)	04:43			05:07		20:15 (1)	05:57			06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	24	20:27 (1)	21:44			21:30	21	20:36 (1)	20:34			19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		20:04 (1)	04:43			05:08		20:14 (1)	05:59			06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	23	20:27 (1)	21:45			21:28	22	20:36 (1)	20:32			19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		20:04 (1)	04:43			05:09		20:15 (1)	06:01			06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	23	20:27 (1)	21:45			21:27	22	20:37 (1)	20:30			19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		20:04 (1)	04:43			05:11		20:14 (1)	06:02			06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	23	20:27 (1)	21:45			21:26	23	20:37 (1)	20:27			19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		20:04 (1)	04:43			05:12		20:15 (1)	06:04			06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	23	20:27 (1)	21:45			21:24	23	20:38 (1)	20:25			19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		20:05 (1)	04:44			05:14		20:14 (1)	06:06			07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	22	20:27 (1)	21:45			21:23	24	20:38 (1)	20:23			19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		20:06 (1)	04:44			05:15		20:14 (1)	06:08			07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	20	20:26 (1)	21:45			21:21	23	20:37 (1)	20:21			19:06	18:56	16:04	15:57
26	08:09	07:09	06:03	05:50	04:58		20:06 (1)	04:44			05:17		20:14 (1)	06:09			07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	20	20:26 (1)	21:45			21:20	24	20:38 (1)	20:18			19:04	18:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		20:07 (1)	04:45			05:18		20:14 (1)	06:11			07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	19	20:26 (1)	21:45			21:18	23	20:37 (1)	20:16			19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		20:08 (1)	04:45			05:20		20:15 (1)	06:13			07:07	07:02	07:58	08:28
	16:46	17:47	18:39	20:35	21:25	17	20:25 (1)	21:45			21:17	23	20:38 (1)	20:14			18:58	16:50	16:01	15:59
29	08:04		06:03	05:44	04:54		20:08 (1)	04:46			05:22		20:15 (1)	06:15			07:09	07:04	08:01	08:28
	16:48		19:41	20:37	21:26	17	20:25 (1)	21:45			21:12	22	20:37 (1)	20:11			16:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		20:09 (1)	04:47			05:23		20:15 (1)	06:16			07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	15	20:24 (1)	21:45			21:13	22	20:37 (1)	20:09			16:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:10 (1)				05:25		20:15 (1)	06:18				07:08		08:29
	16:52		19:44		21:29	13	20:23 (1)				21:12	21	20:36 (1)	20:07				16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508			510			459			362	329	280	235
abz.max.mögl.Beschattung						473			25			428			73						
Red.Sonnenscheinwahrsch.						0.51			0.45			0.45			0.49						
Reduktion Betriebsdauer						0.91			0.91			0.91			0.91						
Reduktion Windrichtung						0.66			0.66			0.66			0.66						
Gesamte Reduktion						0.31			0.27			0.27			0.29						
Mat.wahrsch.Beschattung						145			7			115			21						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)	
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)	

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EX - IO154

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni			Juli			August			September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51		20:11 (1)	04:47			05:28		20:18 (1)	06:20	07:12	07:10	08:04
	16:03	16:34	17:40	18:46	20:41			21:30	13	20:24 (1)	21:44			21:10	18	20:36 (1)	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38			04:50		20:13 (1)	04:48			05:28		20:19 (1)	06:22	07:14	07:12	08:05
	16:04	16:36	17:50	19:48	20:42			21:31	12	20:25 (1)	21:44			21:08	16	20:35 (1)	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36			04:49		20:14 (1)	04:48			05:30		20:20 (1)	06:23	07:16	07:14	08:07
	16:05	16:38	17:52	19:50	20:44			21:32	9	20:23 (1)	21:44			21:06	14	20:34 (1)	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34			04:49		20:15 (1)	04:50			05:31		20:22 (1)	06:25	07:18	07:15	08:08
	16:06	16:39	17:54	19:52	20:46			21:33	7	20:22 (1)	21:43			21:05	9	20:31 (1)	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:38	05:32			04:49		20:19 (1)	04:50			05:33			06:27	07:19	07:17	08:10
	16:08	17:01	17:58	19:53	20:48			21:34	1	20:20 (1)	21:43			21:03			19:53	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30			04:47			04:51			05:35			06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50			21:35			21:42			21:01			19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28			04:46			04:52			05:36			06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51			21:36			21:41			20:58			19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		20:14 (1)	04:46			04:53		20:23 (1)	05:38			06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	5	20:19 (1)	21:37			21:41	5	20:28 (1)	20:57			19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		20:11 (1)	04:45			04:54		20:22 (1)	05:40			06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	12	20:23 (1)	21:38			21:40	8	20:30 (1)	20:55			19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		20:08 (1)	04:45			04:55		20:21 (1)	05:42			06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	15	20:24 (1)	21:39			21:39	10	20:31 (1)	20:53			19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		20:08 (1)	04:44			04:58		20:26 (1)	05:43			06:37	07:30	07:28	08:17
	16:16	17:13	18:07	20:04	20:58	17	20:25 (1)	21:40			21:38	13	20:33 (1)	20:51			19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		20:07 (1)	04:44			04:58		20:19 (1)	05:45			06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	19	20:26 (1)	21:41			21:37	14	20:33 (1)	20:49			19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		20:06 (1)	04:44			04:59		20:18 (1)	05:47			06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21	20:27 (1)	21:41			21:37	16	20:34 (1)	20:47			19:35	18:23	16:20	15:53
14	08:22	07:36	06:32	06:17	05:15		20:04 (1)	04:43			05:00		20:18 (1)	05:49			06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	22	20:28 (1)	21:42			21:35	17	20:35 (1)	20:45			19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		20:05 (1)	04:43			05:01		20:17 (1)	05:50			06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	23	20:28 (1)	21:43			21:34	18	20:35 (1)	20:43			19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		20:06 (1)	04:43			05:03		20:16 (1)	05:52			06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	22	20:28 (1)	21:43			21:33	20	20:36 (1)	20:40			19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		20:05 (1)	04:43			05:04		20:17 (1)	05:54			06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	23	20:28 (1)	21:44			21:32	20	20:37 (1)	20:38			19:26	18:14	16:14	15:53
18	08:18	07:27	06:23	06:08	05:09		20:05 (1)	04:43			05:05		20:18 (1)	05:55			06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	24	20:29 (1)	21:44			21:31	21	20:37 (1)	20:36			19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		20:05 (1)	04:43			05:07		20:16 (1)	05:57			06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	23	20:28 (1)	21:44			21:30	21	20:37 (1)	20:34			19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		20:05 (1)	04:43			05:08		20:15 (1)	05:59			06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	23	20:28 (1)	21:45			21:28	23	20:36 (1)	20:32			19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		20:05 (1)	04:43			05:09		20:16 (1)	06:01			06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	24	20:28 (1)	21:45			21:27	22	20:36 (1)	20:30			19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		20:05 (1)	04:43			05:11		20:15 (1)	06:02			06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	23	20:28 (1)	21:45			21:26	23	20:36 (1)	20:27			19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		20:05 (1)	04:43			05:12		20:16 (1)	06:04			06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	23	20:28 (1)	21:45			21:24	23	20:36 (1)	20:25			19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		20:06 (1)	04:44			05:14		20:15 (1)	06:06			07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	22	20:28 (1)	21:45			21:23	24	20:39 (1)	20:23			19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		20:06 (1)	04:44			05:15		20:15 (1)	06:08			07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	22	20:28 (1)	21:45			21:21	23	20:38 (1)	20:21			19:06	17:56	16:04	15:57
26	08:09	07:09	06:03	05:50	04:58		20:07 (1)	04:44			05:17		20:16 (1)	06:09			07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21	20:28 (1)	21:45			21:20	23	20:38 (1)	20:18			19:04	17:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		20:08 (1)	04:45			05:18		20:15 (1)	06:11			07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	19	20:27 (1)	21:45			21:18	23	20:38 (1)	20:16			19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		20:08 (1)	04:45			05:20		20:16 (1)	06:13			07:07	07:02	07:58	08:28
	16:46	17:47	18:39	20:35	21:25	19	20:27 (1)	21:45			21:17	23	20:38 (1)	20:14			18:58	16:50	16:01	15:59
29	08:04		06:03	05:44	04:54		20:09 (1)	04:46			05:22		20:16 (1)	06:15			07:09	07:04	08:01	08:28
	16:48		19:41	20:37	21:26	18	20:27 (1)	21:45			21:15	22	20:38 (1)	20:11			16:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		20:09 (1)	04:47			05:23		20:17 (1)	06:16			07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	17	20:26 (1)	21:45			21:13	21	20:38 (1)	20:09			16:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:10 (1)				05:25		20:17 (1)	06:18				07:08		08:29
	16:52		19:44		21:29	15	20:25 (1)				21:12	20	20:37 (1)	20:07				16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508			510			459			362	329	280	235
abstr.max.mögl.Beschattung						472			42			453			57					
Red.Sonnenscheinwahrsch.						0.51			0.45			0.45			0.49					
Reduktion Betriebsdauer						0.91			0.91			0.91			0.91					
Reduktion Windrichtung						0.66			0.66			0.66			0.66					
Gesamte Reduktion						0.31			0.27			0.27			0.29					
Mat.wahrsch.Beschattung						145			11			121			17					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)	
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)	

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EY - IO155

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	20:11 (1) 04:47	05:28	20:20 (1) 06:20	07:12	07:10	08:04
	16:03	16:34	17:40	18:46	20:41	21:30 15	20:26 (1) 21:44	21:10 17	20:37 (1) 20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:13 (1) 04:48	05:28	20:20 (1) 06:22	07:14	07:12	08:05
	16:04	16:36	17:50	19:48	20:42	21:31 14	20:27 (1) 21:44	21:08 15	20:35 (1) 20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:13 (1) 04:48	05:30	20:22 (1) 06:23	07:16	07:14	08:07
	16:05	16:38	17:52	19:50	20:44	21:32 13	20:26 (1) 21:44	21:06 12	20:34 (1) 20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:14 (1) 04:50	05:31	20:25 (1) 06:25	07:18	07:15	08:08
	16:06	16:39	17:54	19:52	20:46	21:33 10	20:24 (1) 21:43	21:05 9	20:30 (1) 19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:16 (1) 04:50	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:58	19:53	20:48	21:34 8	20:24 (1) 21:43	21:03	19:53	18:42	16:34	15:55
6	08:27	07:50	06:51	06:38	05:30	04:47	20:18 (1) 04:51	20:25 (1) 05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35 4	20:22 (1) 21:42 2	20:27 (1) 21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	04:52	20:23 (1) 05:36	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	21:41 7	20:30 (1) 20:58	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	04:53	20:22 (1) 05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	21:41 9	20:31 (1) 20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	20:14 (1) 04:45	04:54	20:23 (1) 05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55 8	20:22 (1) 21:38	21:40 12	20:33 (1) 20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	20:11 (1) 04:45	04:55	20:20 (1) 05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57 13	20:24 (1) 21:39	21:39 14	20:34 (1) 20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	20:18 (1) 04:44	04:58	20:20 (1) 05:43	06:37	07:30	07:28	08:17
	16:16	17:13	18:07	20:04	20:58 15	20:25 (1) 21:40	21:38 14	20:34 (1) 20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	20:09 (1) 04:44	04:58	20:19 (1) 05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00 18	20:27 (1) 21:41	21:37 16	20:35 (1) 20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	20:08 (1) 04:44	04:59	20:19 (1) 05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02 19	20:27 (1) 21:41	21:37 17	20:36 (1) 20:47	19:35	18:23	16:20	15:53
14	08:22	07:36	06:32	06:17	05:15	20:08 (1) 04:43	05:00	20:18 (1) 05:49	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03 20	20:28 (1) 21:42	21:35 18	20:36 (1) 20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	20:07 (1) 04:43	05:01	20:17 (1) 05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05 21	20:28 (1) 21:43	21:34 20	20:37 (1) 20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	20:07 (1) 04:43	05:03	20:17 (1) 05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07 22	20:28 (1) 21:43	21:33 20	20:37 (1) 20:40	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	20:06 (1) 04:43	05:04	20:17 (1) 05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08 23	20:29 (1) 21:44	21:32 21	20:38 (1) 20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:23	06:08	05:09	20:06 (1) 04:43	05:05	20:17 (1) 05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10 24	20:30 (1) 21:44	21:31 22	20:39 (1) 20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	20:06 (1) 04:43	05:07	20:16 (1) 05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11 23	20:29 (1) 21:44	21:30 23	20:39 (1) 20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	20:06 (1) 04:43	05:08	20:16 (1) 05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13 24	20:30 (1) 21:45	21:28 23	20:39 (1) 20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	20:06 (1) 04:43	05:09	20:16 (1) 06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15 24	20:30 (1) 21:45	21:27 24	20:40 (1) 20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	20:06 (1) 04:43	05:11	20:16 (1) 06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16 23	20:29 (1) 21:45	21:26 23	20:39 (1) 20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	20:06 (1) 04:43	05:12	20:17 (1) 06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18 23	20:29 (1) 21:45	21:24 23	20:40 (1) 20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	20:07 (1) 04:44	05:14	20:16 (1) 06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19 22	20:29 (1) 21:45	21:23 24	20:40 (1) 20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:07 (1) 04:44	05:15	20:16 (1) 06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21 22	20:29 (1) 21:45	21:21 23	20:39 (1) 20:21	19:06	18:56	16:04	15:57
26	08:09	07:09	06:03	05:50	04:58	20:08 (1) 04:44	05:17	20:17 (1) 06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22 21	20:29 (1) 21:45	21:20 23	20:40 (1) 20:18	19:04	18:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:08 (1) 04:45	05:18	20:18 (1) 06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23 21	20:29 (1) 21:45	21:18 23	20:39 (1) 20:16	19:01	16:52	16:02	15:58
28	08:06	07:05	05:58	05:46	04:55	20:09 (1) 04:45	05:20	20:17 (1) 06:13	07:07	07:02	07:58	08:28
	16:46	17:47	18:39	20:35	21:25 20	20:29 (1) 21:45	21:17 22	20:38 (1) 20:14	18:58	18:50	16:01	15:59
29	08:04		06:01	05:44	04:54	20:09 (1) 04:46	05:22	20:17 (1) 06:15	07:09	07:04	08:01	08:28
	16:48		18:41	20:37	21:26 19	20:28 (1) 21:45	21:15 22	20:39 (1) 20:11	18:56	18:48	16:00	16:00
30	08:02		05:53	05:42	04:53	20:10 (1) 04:47	05:23	20:18 (1) 06:16	07:11	07:06	08:02	08:29
	16:50		18:42	20:39	21:27 18	20:28 (1) 21:45	21:13 20	20:36 (1) 20:09	18:54	18:46	15:59	16:01
31	08:01		05:51		04:52	20:10 (1)	05:25	20:18 (1) 06:18		07:00		08:29
	16:52		18:44		21:29 17	20:27 (1)	21:12 19	20:37 (1) 20:07		18:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508	510	459	362	329	280	235
abstr.max.mögl.Beschattung					460	64	484	49				
Red.Sonnenscheinwahrsch.					0.51	0.45	0.45	0.49				
Reduktion Betriebsdauer					0.91	0.91	0.91	0.91				
Reduktion Windrichtung					0.66	0.66	0.66	0.66				
Gesamte Reduktion					0.31	0.27	0.27	0.29				
Mat.wahrsch.Beschattung					141	17	128	14				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** EZ - IO156

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni			Juli			August			September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51		20:12 (1)	04:47			05:28		20:24 (1)	06:20	07:12	07:10	08:04
	16:03	16:34	17:40	19:46	20:41			21:30	18	20:30 (1)	21:44			21:10	13	20:37 (1)	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38			04:50		20:13 (1)	04:48			05:28		20:25 (1)	06:22	07:14	07:12	08:05
	16:04	16:36	17:50	19:48	20:42			21:31	17	20:30 (1)	21:44			21:08	10	20:35 (1)	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36			04:49		20:14 (1)	04:48		20:25 (1)	05:30		20:29 (1)	06:23	07:16	07:14	08:07
	16:05	16:38	17:52	19:50	20:44			21:32	16	20:30 (1)	21:44	5	20:30 (1)	21:06	3	20:32 (1)	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34			04:49		20:14 (1)	04:50		20:24 (1)	05:31			06:25	07:18	07:15	08:08
	16:06	16:39	17:54	19:52	20:46			21:33	15	20:29 (1)	21:43	7	20:31 (1)	21:05			19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:38	05:32			04:49		20:16 (1)	04:50		20:23 (1)	05:33			06:27	07:19	07:17	08:10
	16:08	17:01	17:58	19:53	20:48			21:34	13	20:29 (1)	21:43	10	20:33 (1)	21:03			19:53	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30			04:47		20:16 (1)	04:51		20:22 (1)	05:35			06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50			21:35	12	20:28 (1)	21:42	11	20:34 (1)	21:01			19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28			04:46		20:17 (1)	04:52		20:22 (1)	05:36			06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51			21:36	10	20:27 (1)	21:41	13	20:35 (1)	20:59			19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26			04:46		20:18 (1)	04:53		20:22 (1)	05:38			06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53			21:37	9	20:27 (1)	21:41	14	20:36 (1)	20:57			19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24			04:45		20:20 (1)	04:54		20:21 (1)	05:40			06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55			21:38	6	20:26 (1)	21:40	16	20:37 (1)	20:55			19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		20:19 (1)	04:45		20:21 (1)	04:55		20:21 (1)	05:42			06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	7	20:23 (1)	21:39	3	20:24 (1)	21:39	18	20:37 (1)	20:53			19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		20:14 (1)	04:44			04:56		20:20 (1)	05:43			06:37	07:30	07:28	08:17
	16:16	17:13	18:07	20:04	20:58	11	20:25 (1)	21:40			21:38	18	20:36 (1)	20:51			19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		20:13 (1)	04:44			04:58		20:20 (1)	05:45			06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	15	20:28 (1)	21:41			21:37	19	20:39 (1)	20:49			19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		20:11 (1)	04:44			04:59		20:20 (1)	05:47			06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	17	20:28 (1)	21:41			21:37	19	20:39 (1)	20:47			19:35	18:23	16:20	15:53
14	08:22	07:36	06:32	06:17	05:15		20:11 (1)	04:43			05:00		20:19 (1)	05:49			06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	19	20:30 (1)	21:42			21:35	20	20:39 (1)	20:45			19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		20:10 (1)	04:43			05:01		20:19 (1)	05:50			06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	20	20:30 (1)	21:43			21:34	21	20:40 (1)	20:43			19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		20:09 (1)	04:43			05:03		20:18 (1)	05:52			06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	22	20:31 (1)	21:43			21:33	22	20:40 (1)	20:40			19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		20:09 (1)	04:43			05:04		20:19 (1)	05:54			06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	22	20:31 (1)	21:44			21:32	22	20:41 (1)	20:38			19:26	18:14	16:14	15:53
18	08:18	07:27	06:23	06:08	05:09		20:08 (1)	04:43			05:05		20:19 (1)	05:55			06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	22	20:31 (1)	21:44			21:31	22	20:41 (1)	20:36			19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		20:08 (1)	04:43			05:07		20:18 (1)	05:57			06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	23	20:31 (1)	21:44			21:30	23	20:41 (1)	20:34			19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		20:08 (1)	04:43			05:08		20:18 (1)	05:59			06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	24	20:32 (1)	21:45			21:28	23	20:41 (1)	20:32			19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		20:08 (1)	04:43			05:09		20:18 (1)	06:01			06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	24	20:32 (1)	21:45			21:27	24	20:42 (1)	20:30			19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		20:08 (1)	04:43			05:11		20:18 (1)	06:02			06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	23	20:31 (1)	21:45			21:26	24	20:42 (1)	20:27			19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		20:08 (1)	04:43			05:12		20:19 (1)	06:04			06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	24	20:32 (1)	21:45			21:24	23	20:42 (1)	20:25			19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		20:08 (1)	04:44			05:14		20:19 (1)	06:06			07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	24	20:33 (1)	21:45			21:23	23	20:42 (1)	20:23			19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		20:09 (1)	04:44			05:15		20:18 (1)	06:08			07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	23	20:32 (1)	21:45			21:21	23	20:41 (1)	20:21			19:06	17:56	16:04	15:57
26	08:09	07:09	06:03	05:50	04:58		20:09 (1)	04:44			05:17		20:19 (1)	06:09			07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	23	20:32 (1)	21:45			21:20	23	20:42 (1)	20:18			19:04	17:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		20:10 (1)	04:45			05:18		20:19 (1)	06:11			07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	22	20:32 (1)	21:45			21:18	22	20:41 (1)	20:16			19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		20:10 (1)	04:45			05:20		20:20 (1)	06:13			07:07	07:02	07:58	08:28
	16:46	17:47	18:39	20:35	21:25	21	20:31 (1)	21:45			21:17	21	20:41 (1)	20:14			18:58	16:50	16:01	15:59
29	08:04		06:01	05:44	04:54		20:10 (1)	04:46			05:22		20:20 (1)	06:15			07:09	07:04	08:01	08:28
	16:48		19:41	20:37	21:26	21	20:31 (1)	21:45			21:15	20	20:40 (1)	20:11			16:56	16:48	16:00	15:59
30	08:02		06:53	05:42	04:53		20:11 (1)	04:47			05:23		20:21 (1)	06:16			07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	20	20:31 (1)	21:45			21:13	19	20:40 (1)	20:09			16:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:11 (1)				05:25		20:22 (1)	06:18				07:08		08:29
	16:52		19:44		21:29	19	20:30 (1)				21:12	16	20:38 (1)	20:07				16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508			510			459			362	329	280	235
astr.max.mögl.Beschattung						446			119			539			28					
Red.Sonnenscheinwahrsch.						0.51			0.45			0.45			0.49					
Reduktion Betriebsdauer						0.91			0.91			0.91			0.91					
Reduktion Windrichtung						0.66			0.66			0.66			0.66					
Gesamte Reduktion						0.31			0.27			0.27			0.29					
Mat.wahrsch.Beschattung						136			32			140			8					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang		(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende		(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FA - IO157

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni			Juli			August			September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51			04:47			05:28			07:12	07:10	08:04
	16:03	16:34	17:40	19:46	20:41			21:30	16	20:31 (1)	21:44	3	20:30 (1)	21:10	13	20:38 (1)	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38			04:50		20:14 (1)	04:48		20:26 (1)	05:28		20:27 (1)	07:14	07:12	08:05
	16:04	16:36	17:50	19:48	20:42			21:31	18	20:32 (1)	21:44	6	20:32 (1)	21:08	8	20:35 (1)	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36			04:49		20:19 (1)	04:49		20:24 (1)	05:30			07:16	07:14	08:07
	16:05	16:38	17:52	19:50	20:44			21:32	17	20:31 (1)	21:44	8	20:32 (1)	21:06			18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34			04:49		20:14 (1)	04:50		20:24 (1)	05:31			07:18	07:15	08:08
	16:06	16:39	17:54	19:52	20:46			21:33	16	20:30 (1)	21:43	10	20:34 (1)	21:05			18:44	16:36	15:56
5	08:28	07:52	06:53	06:38	05:32			04:49		20:16 (1)	04:50		20:23 (1)	05:33			07:19	07:17	08:10
	16:08	17:01	17:58	19:53	20:48			21:34	15	20:31 (1)	21:43	12	20:35 (1)	21:03			18:42	16:34	15:55
6	08:27	07:50	06:51	06:38	05:30			04:47		20:16 (1)	04:51		20:23 (1)	05:35			07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50			21:35	14	20:30 (1)	21:42	13	20:36 (1)	21:01			18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28			04:46		20:17 (1)	04:52		20:22 (1)	05:36			07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51			21:36	12	20:29 (1)	21:41	15	20:37 (1)	20:58			18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26			04:46		20:18 (1)	04:53		20:22 (1)	05:38			07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53			21:37	11	20:29 (1)	21:41	15	20:37 (1)	20:57			18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24			04:45		20:19 (1)	04:54		20:22 (1)	05:40			07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55			21:38	9	20:28 (1)	21:40	16	20:38 (1)	20:55			18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22			04:45		20:20 (1)	04:55		20:21 (1)	05:42			07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57			21:39	7	20:27 (1)	21:39	18	20:39 (1)	20:53			18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		20:15 (1)	04:44		20:22 (1)	04:56		20:21 (1)	05:43			07:30	07:28	08:17
	16:16	17:13	18:07	20:04	20:58	10	20:25 (1)	21:40	4	20:26 (1)	21:38	18	20:39 (1)	20:51			18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		20:14 (1)	04:44			04:58		20:21 (1)	05:45			07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	14	20:28 (1)	21:41			21:37	19	20:40 (1)	20:49			18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		20:13 (1)	04:44			04:59		20:20 (1)	05:47			07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	17	20:29 (1)	21:41			21:37	20	20:40 (1)	20:47			18:23	16:20	15:53
14	08:22	07:36	06:32	06:17	05:15		20:12 (1)	04:43			05:00		20:20 (1)	05:49			07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	19	20:30 (1)	21:42			21:35	21	20:40 (1)	20:45			18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		20:11 (1)	04:43			05:01		20:19 (1)	05:50			07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	19	20:30 (1)	21:43			21:34	22	20:41 (1)	20:43			18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		20:11 (1)	04:43			05:03		20:19 (1)	05:52			07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	20	20:31 (1)	21:43			21:33	22	20:41 (1)	20:40			18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		20:10 (1)	04:43			05:04		20:20 (1)	05:54			07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21	20:31 (1)	21:44			21:32	22	20:42 (1)	20:38			18:14	16:14	15:53
18	08:18	07:27	06:23	06:08	05:09		20:13 (1)	04:43			05:05		20:19 (1)	05:55			07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	22	20:32 (1)	21:44			21:31	23	20:42 (1)	20:36			18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		20:09 (1)	04:43			05:07		20:19 (1)	05:57			07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	23	20:32 (1)	21:44			21:30	23	20:42 (1)	20:34			18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		20:08 (1)	04:43			05:08		20:19 (1)	05:59			07:47	07:46	08:25
	16:31	17:31	18:24	20:21	21:13	23	20:32 (1)	21:45			21:28	23	20:42 (1)	20:32			18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		20:08 (1)	04:43			05:09		20:19 (1)	06:01			07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	24	20:33 (1)	21:45			21:27	24	20:43 (1)	20:30			18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		20:09 (1)	04:43			05:11		20:19 (1)	06:02			07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	23	20:32 (1)	21:45			21:26	24	20:43 (1)	20:27			18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		20:09 (1)	04:43			05:12		20:20 (1)	06:04			07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	23	20:32 (1)	21:45			21:24	23	20:43 (1)	20:25			18:01	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		20:09 (1)	04:44			05:14		20:20 (1)	06:06			07:55	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	24	20:33 (1)	21:45			21:23	23	20:43 (1)	20:23			17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		20:10 (1)	04:44			05:15		20:19 (1)	06:08			07:57	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	23	20:33 (1)	21:45			21:21	23	20:42 (1)	20:21			17:56	16:04	15:57
26	08:09	07:09	06:03	05:50	04:58		20:10 (1)	04:44			05:17		20:20 (1)	06:09			07:59	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	23	20:33 (1)	21:45			21:20	22	20:42 (1)	20:18			17:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		20:10 (1)	04:45			05:18		20:20 (1)	06:11			08:01	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	23	20:33 (1)	21:45			21:18	22	20:42 (1)	20:16			17:52	16:02	15:58
28	08:06	07:05	05:58	05:46	04:55		20:11 (1)	04:46			05:20		20:21 (1)	06:13			08:02	07:58	08:28
	16:46	17:47	18:39	20:35	21:25	22	20:33 (1)	21:45			21:17	21	20:42 (1)	20:14			18:50	16:01	15:59
29	08:04		06:03	05:44	04:54		20:11 (1)	04:46			05:22		20:21 (1)	06:15			07:04	08:01	08:28
	16:48		19:41	20:37	21:26	21	20:32 (1)	21:45			21:15	19	20:40 (1)	20:11			18:56	16:00	15:59
30	08:02		06:53	05:42	04:53		20:12 (1)	04:47			05:23		20:23 (1)	06:16			07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	20	20:32 (1)	21:45			21:13	17	20:40 (1)	20:09			18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:12 (1)				05:25		20:23 (1)	06:18				07:08		08:29
	16:52		19:44		21:29	20	20:32 (1)				21:12	16	20:39 (1)	20:07				16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508			510			459			362	329	280	235
abstr.min.mögl.Beschattung						433			142			563			21					
Red.Sonnenscheinwahrsch.						0.51			0.45			0.45			0.49					
Reduktion Betriebsdauer						0.91			0.91			0.91			0.91					
Reduktion Windrichtung						0.65			0.65			0.65			0.65					
Gesamte Reduktion						0.31			0.27			0.27			0.29					
Mat.wahrsch.Beschattung						132			36			150			6					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang		(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende		(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FB - IO158

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	20:13 (1) 04:47	05:28	20:21 (1) 06:20	07:12	07:10	08:04
	16:03	16:34	17:40	19:40	20:41	21:30 13	20:26 (1) 21:44	21:10 16	20:37 (1) 20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:15 (1) 04:48	05:28	20:22 (1) 06:22	07:14	07:12	08:05
	16:04	16:36	17:50	19:48	20:42	21:31 11	20:26 (1) 21:44	21:08 14	20:36 (1) 20:02	18:49	16:40	15:57
3	08:29	07:56	06:58	06:43	05:36	04:49	20:16 (1) 04:49	05:30	20:24 (1) 06:23	07:16	07:14	08:07
	16:05	16:38	17:52	19:50	20:44	21:32 9	20:25 (1) 21:44	21:06 13	20:34 (1) 20:00	18:47	16:38	15:57
4	08:29	07:54	06:55	06:41	05:34	04:49	20:17 (1) 04:50	05:31	20:27 (1) 06:25	07:18	07:15	08:08
	16:06	16:39	17:54	19:52	20:46	21:33 7	20:24 (1) 21:43	21:05 3	20:30 (1) 19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:49	04:50	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:58	19:53	20:48	21:34	21:43	21:03	19:53	18:42	16:34	15:55
6	08:27	07:50	06:51	06:38	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	21:42	21:01	19:52	18:39	16:32	15:55
7	08:27	07:48	06:48	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	21:41	20:58	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	04:53 20:26 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	21:41 4 20:30 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	20:16 (1) 04:45	04:54	20:24 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55 7	20:23 (1) 21:38	21:40 8	20:32 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	20:13 (1) 04:45	04:55	20:33 (1)	05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57 12	20:25 (1) 21:39	21:39 10	20:33 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	20:11 (1) 04:44	04:56	20:22 (1)	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:07	20:04	20:58 15	20:26 (1) 21:40	21:38 12	20:34 (1)	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	20:11 (1) 04:44	04:58	20:21 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00 16	20:27 (1) 21:41	21:37 14	20:35 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	20:09 (1) 04:44	04:59	20:21 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02 19	20:28 (1) 21:41	21:37 15	20:36 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:36	06:32	06:17	05:15	20:09 (1) 04:43	05:00	20:20 (1)	05:49	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03 20	20:29 (1) 21:42	21:35 17	20:37 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	20:08 (1) 04:43	05:01	20:19 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05 21	20:29 (1) 21:43	21:34 18	20:37 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	20:08 (1) 04:43	05:03	20:19 (1)	05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07 22	20:30 (1) 21:43	21:33 19	20:38 (1)	20:40	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	20:08 (1) 04:43	05:04	20:19 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08 22	20:30 (1) 21:44	21:32 20	20:39 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	20:08 (1) 04:43	05:05	20:19 (1)	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10 22	20:30 (1) 21:44	21:31 20	20:39 (1)	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	20:07 (1) 04:43	05:07	20:18 (1)	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11 23	20:30 (1) 21:44	21:30 21	20:39 (1)	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:03	05:06	20:08 (1) 04:43	05:08	20:18 (1)	05:59	06:53	07:47	07:46	08:25
	16:31	17:31	18:24	20:21	21:13 22	20:30 (1) 21:45	21:28 21	20:39 (1)	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	20:08 (1) 04:43	05:09	20:18 (1)	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15 22	20:30 (1) 21:45	21:27 22	20:40 (1)	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	20:07 (1) 04:43	05:11	20:18 (1)	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16 23	20:30 (1) 21:45	21:26 22	20:40 (1)	20:27	19:13	18:02	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	20:08 (1) 04:43	05:12	20:18 (1)	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18 22	20:30 (1) 21:45	21:24 23	20:41 (1)	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	20:08 (1) 04:44	05:14	20:18 (1)	06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19 22	20:30 (1) 21:45	21:23 23	20:41 (1)	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:09 (1) 04:44	05:15	20:18 (1)	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21 21	20:30 (1) 21:45	21:21 22	20:40 (1)	20:21	19:06	18:56	16:04	15:57
26	08:09	07:09	06:03	05:50	04:58	20:09 (1) 04:44	05:17	20:18 (1)	06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22 21	20:30 (1) 21:45	21:20 23	20:41 (1)	20:18	19:04	18:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:10 (1) 04:45	05:18	20:18 (1)	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23 19	20:29 (1) 21:45	21:18 22	20:40 (1)	20:16	19:01	16:52	16:02	15:58
28	08:06	07:05	05:58	05:46	04:55	20:11 (1) 04:45	05:20	20:19 (1)	06:13	07:07	07:02	07:58	08:28
	16:46	17:47	18:39	20:35	21:25 18	20:28 (1) 21:45	21:17 21	20:40 (1)	20:14	18:58	18:50	16:01	15:59
29	08:04		06:03	05:44	04:54	20:11 (1) 04:46	05:22	20:19 (1)	06:15	07:08	07:04	08:01	08:28
	16:48		19:41	20:37	21:26 17	20:28 (1) 21:45	21:15 20	20:39 (1)	20:11	18:56	16:48	16:00	15:59
30	08:02		06:53	05:42	04:53	20:12 (1) 04:47	05:23	20:20 (1)	06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27 16	20:28 (1) 21:45	21:13 19	20:39 (1)	20:08	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:13 (1)	05:25	20:20 (1)	06:18		07:08		08:29
	16:52		19:44		21:29 14	20:27 (1)	21:12 18	20:38 (1)	20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508	510	459	362	329	280	235
astr.max.mögl.Beschattung					436	40	434	43				
Red.Sonnenscheinwahrsch.					0.51	0.45	0.45	0.49				
Reduktion Betriebsdauer					0.91	0.91	0.91	0.91				
Reduktion Windrichtung					0.66	0.66	0.66	0.66				
Gesamte Reduktion					0.31	0.27	0.27	0.29				
Mat.wahrsch.Beschattung					133	11	116	13				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FC - IO159

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August		September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51	20:17 (1)	04:47		05:28	20:22 (1)	06:20	07:12	07:10	08:04
	16:03	16:34	17:40	18:46	20:41		21:30	6 20:23 (1)	21:44		21:10	16 20:38 (1)	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		04:48		05:28	20:22 (1)	06:22	07:14	07:12	08:05
	16:04	16:36	17:50	19:48	20:42		21:31		21:44		21:08	15 20:37 (1)	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		04:49		05:30	20:24 (1)	06:23	07:16	07:14	08:07
	16:05	16:38	17:52	19:50	20:44		21:32		21:44		21:06	12 20:36 (1)	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		04:50		05:31	20:26 (1)	06:25	07:18	07:15	08:08
	16:06	16:39	17:54	19:52	20:46		21:33		21:43		21:05	7 20:33 (1)	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:38	05:32		04:49		04:50		05:33		06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34		21:43		21:03		19:53	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		04:51		05:35		06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35		21:42		21:01		19:52	18:39	16:32	15:55
7	08:27	07:48	06:48	06:34	05:28		04:46		04:52		05:36		06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36		21:41		20:58		19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		04:53		05:38		06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37		21:41		20:57		19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	20:15 (1)	04:45		04:54		05:40		06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	9 20:24 (1)	21:38		21:40		20:55		19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	20:13 (1)	04:45		04:55		05:42		06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	13 20:26 (1)	21:39		21:39		20:53		19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	20:11 (1)	04:44		04:58	20:07 (1)	05:43		06:37	07:30	07:28	08:17
	16:16	17:13	18:07	20:04	20:58	16 20:27 (1)	21:40		21:38	4 20:31 (1)	20:51		19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	20:11 (1)	04:44		04:58	20:25 (1)	05:45		06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	17 20:28 (1)	21:41		21:37	8 20:33 (1)	20:49		19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	20:10 (1)	04:44		04:59	20:24 (1)	05:47		06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	18 20:29 (1)	21:41		21:36	10 20:34 (1)	20:47		19:35	18:23	16:20	15:53
14	08:22	07:36	06:32	06:17	05:15	20:10 (1)	04:43		05:00	20:23 (1)	05:48		06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	19 20:29 (1)	21:42		21:35	12 20:35 (1)	20:45		19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	20:09 (1)	04:43		05:01	20:22 (1)	05:50		06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	20 20:29 (1)	21:43		21:34	14 20:36 (1)	20:43		19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	20:09 (1)	04:43		05:03	20:21 (1)	05:52		06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21 20:30 (1)	21:43		21:33	15 20:36 (1)	20:40		19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	20:08 (1)	04:43		05:04	20:21 (1)	05:54		06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	22 20:30 (1)	21:44		21:32	17 20:38 (1)	20:38		19:26	18:14	16:14	15:53
18	08:18	07:27	06:23	06:08	05:08	20:08 (1)	04:43		05:05	20:20 (1)	05:55		06:49	07:43	07:42	08:24
	16:28	17:27	18:20	20:17	21:10	23 20:30 (1)	21:44		21:31	18 20:38 (1)	20:36		19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	20:08 (1)	04:43		05:07	20:20 (1)	05:57		06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	22 20:30 (1)	21:44		21:30	19 20:39 (1)	20:34		19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:03	05:06	20:09 (1)	04:43		05:08	20:19 (1)	05:59		06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21 20:30 (1)	21:45		21:28	20 20:39 (1)	20:32		19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	20:08 (1)	04:43		05:09	20:20 (1)	06:01		06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21 20:30 (1)	21:45		21:27	20 20:40 (1)	20:30		19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	20:09 (1)	04:43		05:11	20:19 (1)	06:02		06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	20 20:29 (1)	21:45		21:26	21 20:40 (1)	20:27		19:13	18:02	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	20:09 (1)	04:43		05:12	20:20 (1)	06:04		06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	20 20:29 (1)	21:45		21:24	21 20:40 (1)	20:25		19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	20:10 (1)	04:44		05:14	20:19 (1)	06:06		07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	19 20:29 (1)	21:45		21:23	21 20:40 (1)	20:23		19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:11 (1)	04:44		05:15	20:19 (1)	06:08		07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:20	18 20:29 (1)	21:45		21:21	21 20:40 (1)	20:21		19:06	18:56	16:04	15:57
26	08:09	07:09	06:03	05:50	04:58	20:11 (1)	04:44		05:17	20:19 (1)	06:09		07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	18 20:29 (1)	21:45		21:20	22 20:41 (1)	20:18		19:04	18:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:12 (1)	04:45		05:18	20:19 (1)	06:11		07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	16 20:28 (1)	21:45		21:18	21 20:40 (1)	20:16		19:01	16:52	16:02	15:58
28	08:06	07:05	05:58	05:46	04:55	20:13 (1)	04:45		05:20	20:20 (1)	06:13		07:07	07:02	07:58	08:28
	16:46	17:47	18:39	20:35	21:25	15 20:28 (1)	21:45		21:17	20 20:40 (1)	20:14		18:58	16:50	16:01	15:59
29	08:04		06:01	05:44	04:54	20:14 (1)	04:46		05:22	20:20 (1)	06:15		07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	13 20:27 (1)	21:45		21:15	20 20:40 (1)	20:11		18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:15 (1)	04:47		05:23	20:20 (1)	06:16		07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	11 20:26 (1)	21:45		21:13	20 20:40 (1)	20:08		18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:16 (1)			05:25	20:20 (1)	06:18			07:08		08:29
	16:52		19:44		21:29	9 20:25 (1)			21:12	18 20:38 (1)	20:07			16:44		16:02
Sonnenscheinstunden	252	274	367	419	492		508		510		459		362	329	280	235
abstr.max.mögl.Beschattung						299		6		362		30				
Red.Sonnenscheinwahrsch.						0.51		0.45		0.45		0.49				
Reduktion Betriebsdauer						0.91		0.91		0.91		0.91				
Reduktion Windrichtung						0.66		0.66		0.66		0.66				
Gesamte Reduktion						0.31		0.27		0.27		0.29				
Mat.wahrsch.Beschattung						122		2		98		15				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FD - IO160

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	20:13 (1)	04:47	20:23 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30	20:36 (1)	21:44	20:40 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:15 (1)	04:48	20:23 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31	20:37 (1)	21:44	20:41 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:15 (1)	04:49	20:22 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	20:37 (1)	21:44	20:40 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:15 (1)	04:50	20:22 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	21:33	20:36 (1)	21:43	20:41 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:16 (1)	04:50	20:22 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	20:37 (1)	21:43	20:42 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:16 (1)	04:51	20:22 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	20:36 (1)	21:42	20:42 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:16 (1)	04:52	20:22 (1)	05:36	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	20:36 (1)	21:41	20:43 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:17 (1)	04:53	20:22 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	20:36 (1)	21:41	20:43 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:18 (1)	04:54	20:22 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	20:36 (1)	21:40	20:44 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:18 (1)	04:55	20:22 (1)	05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	20:35 (1)	21:39	20:44 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:19 (1)	04:57	20:22 (1)	05:43	06:37	07:30	07:28	08:17
	16:18	17:13	18:08	20:04	20:58	21:40	20:36 (1)	21:38	20:45 (1)	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:19 (1)	04:58	20:22 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	20:36 (1)	21:37	20:45 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	20:19 (1) 04:44	20:19 (1)	04:59	20:22 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	9 20:28 (1) 21:41	16 20:35 (1)	21:37	20:45 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	20:18 (1) 04:43	20:20 (1)	05:00	20:21 (1)	05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	13 20:31 (1) 21:42	15 20:35 (1)	21:36	20:45 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	20:16 (1) 04:43	20:20 (1)	05:01	20:21 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	18 20:31 (1) 21:43	15 20:35 (1)	21:34	20:45 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	20:15 (1) 04:43	20:21 (1)	05:03	20:21 (1)	05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	18 20:33 (1) 21:43	14 20:35 (1)	21:33	20:45 (1)	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	20:14 (1) 04:43	20:21 (1)	05:04	20:22 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	19 20:33 (1) 21:44	14 20:35 (1)	21:32	20:46 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	20:14 (1) 04:43	20:22 (1)	05:05	20:22 (1)	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	20 20:34 (1) 21:44	13 20:35 (1)	21:31	20:46 (1)	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	20:13 (1) 04:43	20:22 (1)	05:07	20:22 (1)	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21 20:34 (1) 21:44	13 20:35 (1)	21:30	20:46 (1)	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	20:13 (1) 04:43	20:22 (1)	05:08	20:22 (1)	05:59	06:53	07:47	07:45	08:25
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21	08:15	07:20	06:15	06:01	05:04	20:13 (1) 04:43	20:22 (1)	05:09	20:22 (1)	06:01	06:55	07:49	07:47	08:26
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22	08:14	07:18	06:12	05:59	05:03	20:12 (1) 04:43	20:23 (1)	05:11	20:22 (1)	06:02	06:56	07:51	07:49	08:26
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23	08:12	07:16	06:10	05:57	05:02	20:12 (1) 04:43	20:23 (1)	05:12	20:23 (1)	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	24 20:36 (1) 21:45	13 20:36 (1)	21:24	20:46 (1)	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	20:12 (1) 04:44	20:23 (1)	05:14	20:23 (1)	06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	24 20:36 (1) 21:45	13 20:36 (1)	21:23	20:46 (1)	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:12 (1) 04:44	20:23 (1)	05:15	20:23 (1)	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	25 20:37 (1) 21:45	14 20:37 (1)	21:21	20:45 (1)	20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:12 (1) 04:44	20:23 (1)	05:17	20:24 (1)	06:09	07:03	06:58	07:56	08:28
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27	08:07	07:07	06:00	05:48	04:56	20:12 (1) 04:45	20:23 (1)	05:18	20:25 (1)	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	25 20:37 (1) 21:45	15 20:38 (1)	21:18	20:43 (1)	20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:13 (1) 04:45	20:23 (1)	05:20	20:26 (1)	06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	24 20:37 (1) 21:45	15 20:38 (1)	21:17	20:43 (1)	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:13 (1) 04:46	20:23 (1)	05:22	20:27 (1)	06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	24 20:37 (1) 21:45	16 20:39 (1)	21:15	20:41 (1)	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:13 (1) 04:47	20:23 (1)	05:23	20:29 (1)	06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	24 20:37 (1) 21:45	16 20:39 (1)	21:13	20:40 (1)	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:13 (1)		05:25	20:31 (1)	06:18		07:08		08:29
	16:52		19:44		21:29	24 20:37 (1)		21:12	20:37 (1)	20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508	510		499	382	329	260	235	
astr.max.mögl.Beschattung					402		492	638						
Red.Sonnenscheinwahrsch.					0.51		0.45	0.45						
Reduktion Betriebsdauer					0.91		0.91	0.91						
Reduktion Windrichtung					0.65		0.65	0.65						
Gesamte Reduktion					0.30		0.27	0.27						
Mat.wahrsch.Beschattung					122		133	169						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FE - IO161

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni			Juli			August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51			20:11 (1)	04:47		20:20 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41			21:30	39		20:55 (3)	21:45	40	21:06 (3)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38			04:50			20:12 (1)	04:48		20:21 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42			21:31	39		20:57 (3)	21:44	39	21:06 (3)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36			04:49			20:12 (1)	04:49		20:20 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44			21:32	41		20:58 (3)	21:44	41	21:06 (3)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34			04:49			20:13 (1)	04:50		20:20 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46			21:33	41		20:59 (3)	21:43	41	21:06 (3)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32			04:48			20:14 (1)	04:50		20:20 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48			21:34	41		21:00 (3)	21:43	41	21:06 (3)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30			04:47			20:14 (1)	04:51		20:20 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50			21:35	41		21:00 (3)	21:42	41	21:06 (3)	21:01	19:52	18:39	16:32	15:53
7	08:27	07:49	06:48	06:34	05:28			04:46			20:14 (1)	04:52		20:20 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51			21:36	41		21:00 (3)	21:41	40	21:06 (3)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26			04:46			20:14 (1)	04:53		20:20 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53			21:37	40		21:00 (3)	21:41	41	21:06 (3)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24			04:45			20:15 (1)	04:54		20:20 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55			21:38	41		21:01 (3)	21:40	40	21:06 (3)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22			04:45			20:15 (1)	04:55		20:20 (1)	05:42	06:36	07:28	07:27	08:16
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11	08:25	07:41	06:39	06:24	05:21			04:44			20:16 (1)	04:57		20:20 (1)	05:43	06:37	07:30	07:28	08:17
	16:18	17:13	18:08	20:04	20:58			21:40	40		21:02 (3)	21:38	39	21:04 (3)	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19			04:44			20:17 (1)	04:58		20:20 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00			21:41	40		21:02 (3)	21:37	37	21:03 (3)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		20:18 (1)	04:44			20:16 (1)	04:59		20:20 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	9	20:27 (1)	21:41	40		21:02 (3)	21:37	35	21:02 (3)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		20:16 (1)	04:43			20:17 (1)	05:00		20:19 (1)	05:49	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	13	20:29 (1)	21:42	39		21:02 (3)	21:36	34	21:01 (3)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		20:14 (1)	04:43			20:18 (1)	05:01		20:19 (1)	05:50	06:44	07:38	07:36	08:21
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16	08:20	07:31	06:27	06:13	05:12		20:14 (1)	04:43			20:18 (1)	05:03		20:19 (1)	05:52	06:46	07:39	07:38	08:22
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17	08:19	07:29	06:25	06:10	05:10		20:12 (1)	04:43			20:18 (1)	05:04		20:20 (1)	05:54	06:48	07:41	07:40	08:23
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19	08:17	07:25	06:20	06:06	05:07		20:11 (1)	04:43			20:18 (1)	05:07		20:20 (1)	05:57	06:51	07:45	07:44	08:25
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22	08:14	07:18	06:12	05:59	05:03		20:10 (1)	04:43			20:20 (1)	05:11		20:20 (1)	06:02	06:56	07:51	07:49	08:26
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23	08:12	07:16	06:10	05:57	05:02		20:10 (1)	04:43			20:20 (1)	05:12		20:21 (1)	06:04	06:58	07:53	07:51	08:27
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31	08:01		06:51		04:52		20:11 (1)					05:25		20:29 (1)	06:18		07:08		08:29
	16:52		19:44		21:29	38	20:55 (3)					21:12	7	20:36 (1)	20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508				510			459	382	329	260	231
astr.mas.mögl.Beschattung						458			1166				922						
Red.Sonnenscheinwahrsch.						0.51			0.45				0.45						
Reduktion Betriebsdauer						0.91			0.91				0.91						
Reduktion Windrichtung						0.65			0.64				0.65						
Gesamte Reduktion						0.30			0.27				0.26						
Mat.wahrsch.Beschattung						139			312				243						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FF - IO162

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni			Juli			August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51			20:28 (1)	04:47		20:26 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41			21:30	25	20:45 (1)	21:44		39	21:09 (3)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38			04:50			20:23 (1)	04:48		20:27 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42			21:31	25	20:46 (1)	21:44		38	21:08 (3)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36			04:49			20:21 (1)	04:49		20:26 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44			21:32	25	20:46 (1)	21:44		37	21:08 (3)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34			04:49			20:20 (1)	04:50		20:27 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46			21:33	31	20:59 (3)	21:43		36	21:08 (3)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32			04:48			20:21 (1)	04:50		20:27 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48			21:34	32	21:00 (3)	21:43		35	21:08 (3)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30			04:47			20:21 (1)	04:51		20:27 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50			21:35	34	21:01 (3)	21:42		35	21:07 (3)	21:01	19:52	18:39	16:32	15:53
7	08:27	07:49	06:48	06:34	05:28			04:46			20:21 (1)	04:52		20:28 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51			21:36	35	21:01 (3)	21:41		32	21:07 (3)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26			04:46			20:21 (1)	04:53		20:28 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53			21:37	38	21:02 (3)	21:41		30	21:06 (3)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24			04:45			20:22 (1)	04:54		20:28 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55			21:38	37	21:04 (3)	21:40		28	21:06 (3)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22			04:45			20:22 (1)	04:55		20:28 (1)	05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57			21:39	38	21:04 (3)	21:39		25	20:53 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21			04:44			20:22 (1)	04:57		20:28 (1)	05:43	06:37	07:30	07:28	08:17
	16:18	17:13	18:08	20:04	20:58			21:40	39	21:05 (3)	21:38		25	20:53 (1)	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19			04:44			20:23 (1)	04:58		20:28 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00			21:41	40	21:06 (3)	21:37		25	20:53 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17			04:44			20:23 (1)	04:59		20:29 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02			21:41	40	21:06 (3)	21:37		24	20:53 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15			04:43			20:23 (1)	05:00		20:29 (1)	05:49	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03			21:42	39	21:06 (3)	21:36		24	20:53 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14			04:43			20:23 (1)	05:01		20:29 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05			21:43	41	21:07 (3)	21:34		24	20:53 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12			04:43			20:23 (1)	05:03		20:29 (1)	05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07			21:43	42	21:08 (3)	21:33		23	20:52 (1)	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10			04:43			20:24 (1)	05:04		20:30 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08			21:44	41	21:08 (3)	21:32		23	20:53 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09			04:43			20:24 (1)	05:05		20:31 (1)	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10			21:44	41	21:08 (3)	21:31		21	20:52 (1)	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		20:27 (1)	04:43			20:24 (1)	05:07		20:31 (1)	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	9	20:36 (1)	21:44	42	21:09 (3)	21:30		21	20:52 (1)	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		20:25 (1)	04:43			20:24 (1)	05:08		20:32 (1)	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	13	20:38 (1)	21:45	42	21:09 (3)	21:28		20	20:52 (1)	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		20:24 (1)	04:43			20:24 (1)	05:09		20:33 (1)	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	16	20:40 (1)	21:45	42	21:09 (3)	21:27		18	20:53 (1)	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		20:22 (1)	04:43			20:25 (1)	05:11		20:33 (1)	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	18	20:40 (1)	21:45	42	21:10 (3)	21:26		17	20:50 (1)	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		20:22 (1)	04:43			20:25 (1)	05:12		20:35 (1)	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	19	20:41 (1)	21:45	42	21:10 (3)	21:24		14	20:49 (1)	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		20:22 (1)	04:44			20:25 (1)	05:14		20:38 (1)	06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	20	20:42 (1)	21:45	42	21:10 (3)	21:23		12	20:48 (1)	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		20:21 (1)	04:44			20:26 (1)	05:15		20:38 (1)	06:08	07:02	07:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	22	20:43 (1)	21:45	41	21:10 (3)	21:21		7	20:45 (1)	20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58		20:21 (1)	04:44			20:26 (1)	05:17			06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	22	20:43 (1)	21:45	41	21:10 (3)	21:20				20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		20:21 (1)	04:45			20:26 (1)	05:18			06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	23	20:44 (1)	21:45	41	21:10 (3)	21:18				20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		20:21 (1)	04:45			20:26 (1)	05:20			06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	23	20:44 (1)	21:45	40	21:10 (3)	21:17				20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54		20:20 (1)	04:46			20:26 (1)	05:22			06:15	07:09	07:04	08:01	08:28
	16:48		19:41	20:37	21:26	25	20:45 (1)	21:45	40	21:10 (3)	21:15				20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		20:20 (1)	04:47			20:26 (1)	05:23			06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	25	20:45 (1)	21:45	40	21:09 (3)	21:12				20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:20 (1)				05:25				06:18		07:08		08:29
	16:52		19:44		21:29	25	20:45 (1)				21:12				20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508			510			459	382	329	260	231	
astr.max.mögl.Beschattung						260			1136			633							
Red.Sonnenscheinwahrsch.						0.51			0.45			0.45							
Reduktion Betriebsdauer						0.91			0.91			0.91							
Reduktion Windrichtung						0.65			0.84			0.84							
Gesamte Reduktion						0.30			0.27			0.26							
Mat.wahrsch.Beschattung						79			302			166							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang		(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende		(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FG - IO163

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		20:22 (1)	04:47	20:28 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	24	20:46 (1)	21:44 37	21:09 (3)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		20:22 (1)	04:48	20:28 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	25	20:47 (1)	21:44 36	21:09 (3)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		20:22 (1)	04:49	20:28 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	25	20:47 (1)	21:44 35	21:08 (3)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		20:22 (1)	04:50	20:28 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46		21:33	25	20:47 (1)	21:43 34	21:08 (3)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		20:23 (1)	04:50	20:28 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	28	21:00 (3)	21:43 34	21:08 (3)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		20:22 (1)	04:51	20:29 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	32	21:01 (3)	21:42 31	21:07 (3)	21:01	19:52	18:39	16:32	15:53
7	08:27	07:49	06:48	06:34	05:28		04:46		20:22 (1)	04:52	20:29 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	33	21:01 (3)	21:41 29	21:07 (3)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		20:23 (1)	04:53	20:29 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	33	21:02 (3)	21:41 28	20:55 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		20:23 (1)	04:54	20:30 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	36	21:04 (3)	21:40 25	20:55 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		20:23 (1)	04:55	20:30 (1)	05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	36	21:04 (3)	21:39 25	20:55 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		20:24 (1)	04:57	20:30 (1)	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58		21:40	37	21:05 (3)	21:38 25	20:55 (1)	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		20:24 (1)	04:58	20:30 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	38	21:06 (3)	21:37 25	20:55 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		20:24 (1)	04:59	20:30 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	39	21:06 (3)	21:37 25	20:55 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		20:24 (1)	05:00	20:31 (1)	05:49	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	38	21:06 (3)	21:36 23	20:54 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		20:24 (1)	05:01	20:31 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	39	21:07 (3)	21:34 23	20:54 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		20:25 (1)	05:03	20:31 (1)	05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07		21:43	39	21:08 (3)	21:33 23	20:54 (1)	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		04:43		20:25 (1)	05:04	20:32 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	40	21:08 (3)	21:32 22	20:54 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		20:25 (1)	05:05	20:33 (1)	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	40	21:08 (3)	21:31 20	20:53 (1)	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		04:43		20:25 (1)	05:07	20:33 (1)	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11		21:44	41	21:09 (3)	21:30 20	20:53 (1)	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	20:29 (1)	04:43		20:25 (1)	05:08	20:35 (1)	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	8 20:37 (1)	21:45	41	21:09 (3)	21:28 18	20:53 (1)	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	20:27 (1)	04:43		20:25 (1)	05:09	20:35 (1)	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	13 20:40 (1)	21:45	41	21:09 (3)	21:27 17	20:52 (1)	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	20:25 (1)	04:43		20:26 (1)	05:11	20:36 (1)	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	15 20:40 (1)	21:45	41	21:10 (3)	21:26 14	20:50 (1)	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	20:24 (1)	04:43		20:26 (1)	05:12	20:38 (1)	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	18 20:42 (1)	21:45	41	21:10 (3)	21:24 11	20:49 (1)	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	20:24 (1)	04:44		20:26 (1)	05:14	20:40 (1)	06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	19 20:43 (1)	21:45	41	21:10 (3)	21:23 7	20:47 (1)	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:23 (1)	04:44		20:27 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	20 20:43 (1)	21:45	40	21:10 (3)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:23 (1)	04:44		20:27 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:23	21 20:44 (1)	21:45	40	21:10 (3)	21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:23 (1)	04:45		20:28 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:25	22 20:45 (1)	21:45	38	21:10 (3)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:22 (1)	04:45		20:27 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:26	23 20:45 (1)	21:45	39	21:10 (3)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:23 (1)	04:46		20:28 (1)	05:22		06:15	07:09	07:04	08:01	08:28
	16:48		19:41	20:37	21:26	24 20:46 (1)	21:45	39	21:10 (3)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:22 (1)	04:47		20:27 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	24 20:46 (1)	21:45	38	21:09 (3)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:22 (1)				05:25		06:18		07:08		08:29
	16:52		19:44		21:29	24 20:46 (1)				21:12		20:07		16:44		16:02
Sonnenscheinstunden	152	274	367	419	492	508				510		459	382	329	260	231
astr.max.mögl.Beschattung						231		1087		585						
Red.Sonnenscheinwahrsch.						0.51		0.45		0.45						
Reduktion Betriebsdauer						0.91		0.91		0.84						
Reduktion Windrichtung						0.65		0.64		0.84						
Gesamte Reduktion						0.30		0.27		0.26						
Mat.wahrsch.Beschattung						70		289		153						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FH - IO164

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni			Juli			August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51			20:23 (1)	04:47		20:29 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41			21:30	24		20:47 (1)	21:44	36	21:09 (3)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38			04:50			20:23 (1)	04:48		20:29 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42			21:31	25		20:48 (1)	21:44	35	21:09 (3)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36			04:49			20:23 (1)	04:49		20:29 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44			21:32	25		20:48 (1)	21:44	34	21:08 (3)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34			04:49			20:23 (1)	04:50		20:29 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46			21:33	25		20:48 (1)	21:43	33	21:08 (3)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32			04:48			20:24 (1)	04:50		20:29 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48			21:34	25		20:49 (1)	21:43	33	21:08 (3)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30			04:47			20:23 (1)	04:51		20:30 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50			21:35	30		21:03 (3)	21:42	29	21:07 (3)	21:01	19:52	18:39	16:32	15:53
7	08:27	07:49	06:48	06:34	05:28			04:46			20:23 (1)	04:52		20:30 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51			21:36	30		21:03 (3)	21:41	25	20:55 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26			04:46			20:24 (1)	04:53		20:30 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53			21:37	32		21:02 (3)	21:41	25	20:55 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24			04:45			20:24 (1)	04:54		20:31 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55			21:38	35		21:04 (3)	21:40	25	20:56 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22			04:45			20:24 (1)	04:55		20:31 (1)	05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57			21:39	35		21:04 (3)	21:39	25	20:56 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21			04:44			20:25 (1)	04:57		20:31 (1)	05:43	06:37	07:30	07:28	08:17
	16:18	17:13	18:08	20:04	20:58			21:40	36		21:05 (3)	21:38	25	20:56 (1)	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19			04:44			20:25 (1)	04:58		20:31 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00			21:41	37		21:06 (3)	21:37	24	20:55 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17			04:44			20:24 (1)	04:59		20:32 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02			21:41	38		21:06 (3)	21:37	23	20:55 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15			04:43			20:25 (1)	05:00		20:32 (1)	05:49	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03			21:42	37		21:06 (3)	21:36	23	20:55 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14			04:43			20:25 (1)	05:01		20:32 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05			21:43	38		21:07 (3)	21:34	23	20:55 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12			04:43			20:26 (1)	05:03		20:32 (1)	05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07			21:43	38		21:08 (3)	21:33	22	20:54 (1)	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10			04:43			20:26 (1)	05:04		20:34 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08			21:44	39		21:08 (3)	21:32	21	20:55 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09			04:43			20:26 (1)	05:05		20:34 (1)	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10			21:44	39		21:08 (3)	21:31	20	20:54 (1)	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07			04:43			20:26 (1)	05:07		20:35 (1)	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11			21:44	40		21:09 (3)	21:30	18	20:53 (1)	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		20:32 (1)	04:43			20:26 (1)	05:08		20:36 (1)	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	4	20:36 (1)	21:45	40		21:09 (3)	21:28	17	20:53 (1)	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		20:29 (1)	04:43			20:26 (1)	05:09		20:37 (1)	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	10	20:39 (1)	21:45	40		21:09 (3)	21:27	15	20:52 (1)	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		20:27 (1)	04:43			20:27 (1)	05:11		20:38 (1)	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	13	20:40 (1)	21:45	40		21:10 (3)	21:26	12	20:50 (1)	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		20:26 (1)	04:43			20:27 (1)	05:12		20:41 (1)	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	16	20:42 (1)	21:45	40		21:10 (3)	21:24	8	20:49 (1)	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		20:25 (1)	04:44			20:27 (1)	05:14			06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	18	20:43 (1)	21:45	40		21:10 (3)	21:23			20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		20:25 (1)	04:44			20:28 (1)	05:15			06:08	07:02	07:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	19	20:44 (1)	21:45	39		21:10 (3)	21:21			20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58		20:24 (1)	04:44			20:28 (1)	05:17			06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21	20:45 (1)	21:45	39		21:10 (3)	21:20			20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		20:24 (1)	04:45			20:28 (1)	05:18			06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21	20:45 (1)	21:45	38		21:10 (3)	21:18			20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		20:24 (1)	04:45			20:28 (1)	05:20			06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	22	20:46 (1)	21:45	38		21:10 (3)	21:17			20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54		20:23 (1)	04:46			20:29 (1)	05:22			06:15	07:09	07:04	08:01	08:28
	16:48		19:41	20:37	21:26	23	20:46 (1)	21:45	37		21:10 (3)	21:15			20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		20:23 (1)	04:47			20:28 (1)	05:23			06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	24	20:47 (1)	21:45	36		21:09 (3)	21:13			20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:23 (1)					05:25			06:18		07:08		08:29
	16:52		19:44		21:29	24	20:47 (1)					21:12			20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508				510			459	382	329	260	231
astr.max.mögl.Beschattung						215			1055				551						
Red.Sonnenscheinwahrsch.						0.51			0.45				0.45						
Reduktion Betriebsdauer						0.91			0.91				0.91						
Reduktion Windrichtung						0.65			0.64				0.64						
Gesamte Reduktion						0.30			0.27				0.26						
Mat.wahrsch.Beschattung						65			280				144						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang		(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende		(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FI - IO165

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni			Juli			August		Septembe	Oktober	Novembe	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51			20:25 (1)	04:47		20:30 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41			21:30	23	20:48 (1)	21:44	23		21:09 (3)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38			04:50		20:25 (1)	04:48			20:31 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42			21:31	24	20:49 (1)	21:44	32		21:09 (3)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36			04:49		20:25 (1)	04:49			20:30 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44			21:32	24	20:49 (1)	21:44	31		21:08 (3)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34			04:49		20:25 (1)	04:50			20:31 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46			21:33	24	20:49 (1)	21:43	30		21:08 (3)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32			04:48		20:25 (1)	04:50			20:31 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48			21:34	25	20:50 (1)	21:43	28		21:08 (3)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30			04:47		20:25 (1)	04:51			20:31 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50			21:35	25	20:50 (1)	21:42	26		20:56 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28			04:46		20:25 (1)	04:52			20:32 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51			21:36	25	20:50 (1)	21:41	25		20:57 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26			04:46		20:25 (1)	04:53			20:32 (1)	05:38	06:32	07:25	07:23	08:14
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9	08:26	07:45	06:44	06:29	05:24			04:45		20:26 (1)	04:54			20:32 (1)	05:40	06:34	07:27	07:25	08:15
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10	08:25	07:43	06:41	06:27	05:22			04:45		20:25 (1)	04:55			20:33 (1)	05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57			21:39	33	21:04 (3)	21:39	24		20:57 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21			04:44		20:26 (1)	04:57			20:33 (1)	05:43	06:37	07:30	07:28	08:17
	16:18	17:13	18:08	20:04	20:58			21:40	33	21:05 (3)	21:38	24		20:57 (1)	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19			04:44		20:26 (1)	04:58			20:33 (1)	05:45	06:39	07:32	07:31	08:18
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13	08:23	07:37	06:34	06:20	05:17			04:44		20:26 (1)	04:59			20:33 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02			21:41	35	21:06 (3)	21:37	23		20:56 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15			04:43		20:26 (1)	05:00			20:34 (1)	05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03			21:42	36	21:06 (3)	21:36	22		20:56 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14			04:43		20:27 (1)	05:01			20:34 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05			21:43	36	21:07 (3)	21:34	22		20:56 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12			04:43		20:27 (1)	05:03			20:34 (1)	05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07			21:43	37	21:08 (3)	21:33	21		20:55 (1)	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10			04:43		20:27 (1)	05:04			20:36 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08			21:44	37	21:08 (3)	21:32	19		20:55 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09			04:43		20:27 (1)	05:05			20:36 (1)	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10			21:44	37	21:08 (3)	21:31	19		20:55 (1)	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07			04:43		20:28 (1)	05:07			20:37 (1)	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11			21:44	38	21:09 (3)	21:30	17		20:54 (1)	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06			04:43		20:28 (1)	05:08			20:39 (1)	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13			21:45	38	21:09 (3)	21:28	14		20:53 (1)	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		20:34 (1)	04:43		20:28 (1)	05:09			20:40 (1)	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	4	20:38 (1)	21:45	38	21:09 (3)	21:27	12		20:52 (1)	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		20:30 (1)	04:43		20:29 (1)	05:11			20:42 (1)	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	10	20:40 (1)	21:45	38	21:10 (3)	21:26	8		20:59 (1)	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		20:29 (1)	04:43		20:29 (1)	05:12				06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	13	20:42 (1)	21:45	38	21:10 (3)	21:24				20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		20:28 (1)	04:44		20:28 (1)	05:14				06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	15	20:43 (1)	21:45	39	21:10 (3)	21:23				20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		20:27 (1)	04:44		20:29 (1)	05:15				06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	18	20:45 (1)	21:45	37	21:10 (3)	21:21				20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58		20:27 (1)	04:44		20:29 (1)	05:17				06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:23	18	20:46 (1)	21:45	37	21:10 (3)	21:20				20:18	19:04	16:58	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		20:26 (1)	04:45		20:30 (1)	05:18				06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:25	20	20:46 (1)	21:45	36	21:10 (3)	21:18				20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		20:26 (1)	04:45		20:29 (1)	05:20				06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21	20:47 (1)	21:45	37	21:10 (3)	21:17				20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54		20:25 (1)	04:46		20:30 (1)	05:22				06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	22	20:47 (1)	21:45	36	21:10 (3)	21:15				20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		20:25 (1)	04:47		20:30 (1)	05:23				06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	23	20:48 (1)	21:45	34	21:09 (3)	21:13				20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:25 (1)				05:25				06:18		07:08		08:29
	16:52		19:44		21:29	23	20:48 (1)				21:12				20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508			510			499		382	329	260	235
astr.mas.mögl.Beschattung						188			995			923							
Red.Sonnenscheinwahrsch.						0.51			0.45			0.45							
Reduktion Betriebsdauer						0.91			0.91			0.84							
Reduktion Windrichtung						0.84			0.64			0.84							
Gesamte Reduktion						0.36			0.27			0.26							
Mat.wahrsch.Beschattung						57			264			131							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang		(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende		(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FJ - IO166

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		20:26 (1)	04:47	20:32 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	23	20:46 (1)	21:44	21:09 (3)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		20:27 (1)	04:48	20:32 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	23	20:50 (1)	21:44	21:09 (3)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		20:27 (1)	04:49	20:32 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	24	20:51 (1)	21:44	21:08 (3)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		20:26 (1)	04:50	20:32 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46		21:33	25	20:51 (1)	21:43	20:57 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		20:27 (1)	04:50	20:32 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	24	20:51 (1)	21:43	20:57 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		20:27 (1)	04:51	20:33 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	24	20:51 (1)	21:42	20:58 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		20:26 (1)	04:52	20:33 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	25	20:51 (1)	21:41	20:58 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		20:27 (1)	04:53	20:34 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	25	20:52 (1)	21:41	20:58 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		20:27 (1)	04:54	20:34 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	24	21:04 (3)	21:40	20:58 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		20:27 (1)	04:55	20:34 (1)	05:42	06:36	07:28	07:27	08:16
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11	08:25	07:41	06:39	06:24	05:21		04:44		20:27 (1)	04:57	20:35 (1)	05:43	06:37	07:30	07:28	08:17
	16:16	17:13	18:08	20:04	20:58		21:40	32	21:05 (3)	21:38	20:58 (1)	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		20:28 (1)	04:58	20:35 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	32	21:06 (3)	21:37	20:58 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		20:27 (1)	04:59	20:35 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	34	21:06 (3)	21:37	20:57 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		20:28 (1)	05:00	20:36 (1)	05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	33	21:06 (3)	21:36	20:57 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		20:28 (1)	05:01	20:36 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	34	21:07 (3)	21:34	20:56 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		20:28 (1)	05:03	20:37 (1)	05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07		21:43	36	21:08 (3)	21:33	20:56 (1)	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		04:43		20:29 (1)	05:04	20:38 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	35	21:08 (3)	21:32	20:56 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		20:29 (1)	05:05	20:39 (1)	05:55	06:49	07:43	07:42	08:24
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19	08:17	07:25	06:20	06:06	05:07		04:43		20:29 (1)	05:07	20:40 (1)	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11		21:44	36	21:09 (3)	21:30	20:54 (1)	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		04:43		20:29 (1)	05:08	20:42 (1)	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13		21:45	36	21:09 (3)	21:28	20:53 (1)	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		04:43		20:29 (1)	05:09	20:43 (1)	06:01	06:55	07:49	07:47	08:26
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22	08:14	07:18	06:12	05:59	05:03	20:34 (1)	04:43		20:30 (1)	05:11		04:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	3 20:39 (1)	21:45	36	21:10 (3)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	20:32 (1)	04:43		20:30 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	18 20:42 (1)	21:45	36	21:10 (3)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	20:31 (1)	04:44		20:30 (1)	05:14		06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	13 20:44 (1)	21:45	36	21:10 (3)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:36 (1)	04:44		20:31 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	13 20:45 (1)	21:45	35	21:10 (3)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:29 (1)	04:44		20:30 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:23	17 20:46 (1)	21:45	36	21:10 (3)	21:20		20:18	19:04	16:58	18:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:28 (1)	04:45		20:31 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:25	18 20:47 (1)	21:45	34	21:10 (3)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:28 (1)	04:45		20:31 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:26	20 20:48 (1)	21:45	34	21:10 (3)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:27 (1)	04:46		20:31 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21 20:48 (1)	21:45	34	21:10 (3)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:27 (1)	04:47		20:31 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	22 20:49 (1)	21:45	32	21:09 (3)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:27 (1)				05:25		06:18		07:08		08:29
	16:52		19:44		21:29	22 20:49 (1)				21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508				510	499	382	329	260	235	
astr.max.mögl.Beschattung					164		943			456						
Red.Sonnenscheinwahrsch.					0.51		0.45			0.45						
Reduktion Betriebsdauer					0.91		0.91			0.91						
Reduktion Windrichtung					0.64		0.64			0.64						
Gesamte Reduktion					0.30		0.27			0.26						
Mat.wahrsch.Beschattung					49		256			119						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FK - IO167

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	20:28 (1) 04:47	20:33 (1) 05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30 22	20:50 (1) 21:44 28	21:09 (1) 21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:29 (1) 04:46	20:34 (1) 05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31 23	20:52 (1) 21:44 25	20:59 (1) 21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:29 (1) 04:49	20:33 (1) 05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32 23	20:52 (1) 21:44 25	20:58 (1) 21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:28 (1) 04:50	20:34 (1) 05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	21:33 24	20:52 (1) 21:43 24	20:58 (1) 21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:29 (1) 04:50	20:34 (1) 05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34 24	20:53 (1) 21:43 25	20:59 (1) 21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:28 (1) 04:51	20:35 (1) 05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35 25	20:53 (1) 21:42 24	20:59 (1) 21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:28 (1) 04:52	20:35 (1) 05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36 24	20:52 (1) 21:41 24	20:59 (1) 20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:29 (1) 04:53	20:35 (1) 05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37 24	20:53 (1) 21:41 24	20:59 (1) 20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:29 (1) 04:54	20:36 (1) 05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38 25	20:54 (1) 21:40 23	20:59 (1) 20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:29 (1) 04:55	20:36 (1) 05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39 25	20:54 (1) 21:39 23	20:59 (1) 20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:29 (1) 04:57	20:37 (1) 05:43	06:37	07:30	07:28	08:17
	16:18	17:13	18:08	20:04	20:58	21:40 27	21:05 (3) 21:38 22	20:59 (1) 20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:30 (1) 04:58	20:37 (1) 05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41 29	21:06 (3) 21:37 22	20:59 (1) 20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:29 (1) 04:59	20:37 (1) 05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41 30	21:06 (3) 21:37 21	20:58 (1) 20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:29 (1) 05:00	20:38 (1) 05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42 31	21:06 (3) 21:36 20	20:58 (1) 20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:30 (1) 05:01	20:38 (1) 05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43 32	21:07 (3) 21:34 19	20:57 (1) 20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:30 (1) 05:03	20:39 (1) 05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43 33	21:08 (3) 21:33 17	20:56 (1) 20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	20:30 (1) 05:04	20:41 (1) 05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44 33	21:08 (3) 21:32 16	20:57 (1) 20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:30 (1) 05:05	20:42 (1) 05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44 33	21:08 (3) 21:31 13	20:55 (1) 20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:30 (1) 05:07	20:43 (1) 05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44 35	21:09 (3) 21:30 11	20:54 (1) 20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:30 (1) 05:08	20:46 (1) 05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45 35	21:09 (3) 21:28 7	20:53 (1) 20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:31 (1) 05:09	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45 34	21:09 (3) 21:27	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:31 (1) 05:11	04:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45 35	21:10 (3) 21:26	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	20:37 (1) 04:43	20:31 (1) 05:12	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18 1	20:48 (1) 21:45 35	21:10 (3) 21:24	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	20:24 (1) 04:44	20:31 (1) 05:14	06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19 9	20:43 (1) 21:45 35	21:10 (3) 21:23	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:33 (1) 04:44	20:32 (1) 05:15	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21 12	20:45 (1) 21:45 33	21:10 (3) 21:21	20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:32 (1) 04:44	20:32 (1) 05:17	06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:23 14	20:46 (1) 21:45 33	21:10 (3) 21:20	20:18	19:04	16:58	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:31 (1) 04:45	20:33 (1) 05:18	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:25 17	20:48 (1) 21:45 32	21:10 (3) 21:18	20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:30 (1) 04:45	20:32 (1) 05:20	06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25 18	20:48 (1) 21:45 33	21:10 (3) 21:17	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:10 (1) 04:46	20:33 (1) 05:22	06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26 19	20:49 (1) 21:45 30	21:10 (3) 21:15	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:29 (1) 04:47	20:33 (1) 05:23	06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27 21	20:50 (1) 21:45 29	21:09 (3) 21:13	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:29 (1)		05:25		07:08		08:29
	16:52		19:44		21:29 21	20:50 (1)		21:12		20:07		16:02
Sonnenscheinstunden	252	274	367	419	492	508	510	499	382	329	260	235
astr.max.mögl.Beschattung					134	886	413					
Red.Sonnenscheinwahrsch.					0.51	0.45	0.45					
Reduktion Betriebsdauer					0.91	0.91	0.91					
Reduktion Windrichtung					0.64	0.64	0.64					
Gesamte Reduktion					0.30	0.27	0.26					
Mat.wahrsch.Beschattung					40	235	108					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FL - IO168

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni			Juli			August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51			20:30 (1)	04:47		20:35 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41			21:30	21	20:51 (1)	21:44	24		20:59 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38			04:50			20:31 (1)	04:48		20:35 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42			21:31	21	20:52 (1)	21:44	25		21:00 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36			04:49		20:30 (1)	04:49			20:35 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44			21:32	23	20:53 (1)	21:44	24		20:59 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34			04:49		20:30 (1)	04:50			20:35 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46			21:33	23	20:53 (1)	21:43	25		21:00 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32			04:48		20:30 (1)	04:50			20:36 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48			21:34	24	20:54 (1)	21:43	24		21:00 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30			04:47		20:30 (1)	04:51			20:36 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50			21:35	24	20:54 (1)	21:42	24		21:00 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28			04:46		20:30 (1)	04:52			20:37 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51			21:36	23	20:53 (1)	21:41	23		21:00 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26			04:46		20:30 (1)	04:53			20:37 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53			21:37	24	20:54 (1)	21:41	23		21:00 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24			04:45		20:31 (1)	04:54			20:38 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55			21:38	24	20:55 (1)	21:40	22		21:00 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22			04:45		20:30 (1)	04:55			20:38 (1)	05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57			21:39	25	20:55 (1)	21:39	22		21:00 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21			04:44		20:31 (1)	04:57			20:38 (1)	05:43	06:37	07:30	07:28	08:17
	16:18	17:13	18:08	20:04	20:58			21:40	24	20:55 (1)	21:38	22		21:00 (1)	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19			04:44		20:31 (1)	04:58			20:39 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00			21:41	25	20:56 (1)	21:37	20		20:59 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17			04:44		20:30 (1)	04:59			20:39 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02			21:41	27	21:06 (3)	21:37	20		20:59 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15			04:43		20:31 (1)	05:00			20:40 (1)	05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03			21:42	28	21:06 (3)	21:36	18		20:58 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14			04:43		20:31 (1)	05:01			20:40 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05			21:43	29	21:07 (3)	21:34	18		20:58 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12			04:43		20:31 (1)	05:03			20:41 (1)	05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07			21:43	30	21:08 (3)	21:33	16		20:57 (1)	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10			04:43		20:31 (1)	05:04			20:43 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08			21:44	32	21:08 (3)	21:32	14		20:57 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09			04:43		20:32 (1)	05:05			20:44 (1)	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10			21:44	31	21:08 (3)	21:31	11		20:55 (1)	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07			04:43		20:32 (1)	05:07			20:46 (1)	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11			21:44	32	21:09 (3)	21:30	7		20:53 (1)	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06			04:43		20:32 (1)	05:08				05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13			21:45	32	21:09 (3)	21:28				20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04			04:43		20:32 (1)	05:09				06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15			21:45	32	21:09 (3)	21:27				20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03			04:43		20:33 (1)	05:11				06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16			21:45	32	21:10 (3)	21:26				20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02			04:43		20:33 (1)	05:12				06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18			21:45	32	21:10 (3)	21:24				20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		20:38 (1)	04:44		20:33 (1)	05:14				06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	4	20:42 (1)	21:45	32	21:10 (3)	21:23				20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		20:35 (1)	04:44		20:34 (1)	05:15				06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	10	20:45 (1)	21:45	31	21:10 (3)	21:21				20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58		20:34 (1)	04:44		20:33 (1)	05:17				06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	13	20:47 (1)	21:45	30	21:10 (3)	21:20				20:18	19:04	16:58	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		20:33 (1)	04:45		20:34 (1)	05:18				06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	15	20:48 (1)	21:45	29	21:10 (3)	21:18				20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		20:32 (1)	04:45		20:34 (1)	05:20				06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	17	20:49 (1)	21:45	29	21:10 (3)	21:17				20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54		20:32 (1)	04:46		20:34 (1)	05:22				06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	18	20:50 (1)	21:45	27	21:10 (3)	21:15				20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		20:31 (1)	04:47		20:34 (1)	05:23				06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	19	20:50 (1)	21:45	25	20:59 (1)	21:13				20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:31 (1)				05:25				06:18		07:08		08:29
	16:52		19:44		21:29	20	20:51 (1)				21:12				20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508			510			499	382	329	260	235	
astr.max.mögl.Beschattung						116			821			382							
Red.Sonnenscheinwahrsch.						0.51			0.45			0.45							
Reduktion Betriebsdauer						0.91			0.91			0.91							
Reduktion Windrichtung						0.64			0.64			0.64							
Gesamte Reduktion						0.30			0.27			0.26							
Mat.wahrsch.Beschattung						35			218			99							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FM - IO169

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		04:47		05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	19	21:44	24	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		04:48		05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	20	21:44	24	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		04:49		05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	21	21:44	24	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		04:50		05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46		21:33	21	21:43	23	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		04:50		05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	22	21:43	23	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		04:51		05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	22	21:42	23	21:02	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		04:52		05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	23	21:41	23	21:02	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		04:53		05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	23	21:41	22	21:02	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		04:54		05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	24	21:40	22	21:02	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		04:55		05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	23	21:39	20	21:01	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		04:57		05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58		21:40	24	21:38	20	21:01	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		04:58		05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	25	21:37	19	21:01	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		04:59		05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	24	21:37	17	21:00	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		05:00		05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	25	21:36	16	20:59	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	25	21:34	14	20:59	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		05:03		05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07		21:43	24	21:33	12	20:57	20:41	19:28	18:16	16:15	15:52
17	08:19	07:29	06:25	06:10	05:10		04:43		05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	24	21:32	8	20:56	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	25	21:31	1	20:52	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		04:43		05:07			05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11		21:44	25	21:30			20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		04:43		05:08			05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13		21:45	25	21:28			20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		04:43		05:09			06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15		21:45	25	21:27			20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		04:43		05:11			06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16		21:45	25	21:25			20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		04:43		05:12			06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18		21:45	25	21:24			20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		04:44		05:14			06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19		21:45	25	21:23			20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		04:44		05:15			06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21		21:45	25	21:21			20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:39 (1)	04:45		05:17			06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	7 20:48 (1)	21:45	24	21:20			20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:37 (1)	04:45		05:18			06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	11 20:48 (1)	21:45	25	21:18			20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:36 (1)	04:45		05:20			06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	13 20:49 (1)	21:45	25	21:17			20:14	18:59	16:50	16:01	15:59
29	08:04		08:55	05:44	04:54	20:35 (1)	04:46		05:22			06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	15 20:50 (1)	21:45	24	21:15			20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:34 (1)	04:47		05:23			06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	17 20:51 (1)	21:45	24	21:13			20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:34 (1)			05:25			06:18		07:08		08:29
	16:52		19:44		21:29	18 20:52 (1)			21:12			20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492		508		510		459	382	329	268	205
astr.max.mögl.Beschattung						81		711		335					
Red.Sonnenscheinwahrsch.						0.51		0.45		0.45					
Reduktion Betriebsdauer						0.91		0.91		0.91					
Reduktion Windrichtung						0.84		0.84		0.84					
Gesamte Reduktion						0.30		0.27		0.26					
Mat.wahrsch.Beschattung						24		189		87					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FN - IO170

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		20:35 (1)	04:47	20:38 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	18	20:53 (1)	21:44	21:02 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		20:35 (1)	04:48	20:39 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	19	20:54 (1)	21:44	21:02 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		20:34 (1)	04:49	20:38 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	21	20:55 (1)	21:44	21:02 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		20:34 (1)	04:50	20:39 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46		21:33	21	20:55 (1)	21:43	21:02 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		20:34 (1)	04:50	20:40 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	22	20:56 (1)	21:43	21:02 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		20:34 (1)	04:51	20:40 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	22	20:56 (1)	21:42	21:02 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		20:33 (1)	04:52	20:41 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	23	20:56 (1)	21:41	21:02 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		20:34 (1)	04:53	20:41 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	23	20:57 (1)	21:41	21:02 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		20:34 (1)	04:54	20:42 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	23	20:57 (1)	21:40	21:02 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		20:34 (1)	04:55	20:42 (1)	05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	23	20:57 (1)	21:39	21:02 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		20:34 (1)	04:57	20:43 (1)	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58		21:40	24	20:58 (1)	21:38	21:01 (1)	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		20:34 (1)	04:58	20:43 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	24	20:58 (1)	21:37	21:01 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		20:34 (1)	04:59	20:44 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	24	20:58 (1)	21:37	21:00 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		20:34 (1)	05:00	20:45 (1)	05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	24	20:58 (1)	21:36	20:59 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		20:34 (1)	05:01	20:46 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	25	20:59 (1)	21:34	20:59 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		20:35 (1)	05:03	20:47 (1)	05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07		21:43	24	20:59 (1)	21:33	20:57 (1)	20:41	19:28	18:16	16:15	15:52
17	08:19	07:29	06:25	06:10	05:10		04:43		20:35 (1)	05:04	20:51 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	24	20:59 (1)	21:32	20:55 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		20:35 (1)	05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	24	20:59 (1)	21:31		20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		04:43		20:35 (1)	05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11		21:44	25	21:00 (1)	21:30		20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		04:43		20:35 (1)	05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13		21:45	25	21:00 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		04:43		20:35 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15		21:45	25	21:00 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		04:43		20:36 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16		21:45	25	21:01 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		04:43		20:36 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18		21:45	25	21:01 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		04:44		20:36 (1)	05:14		06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19		21:45	25	21:01 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		04:44		20:37 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21		21:45	24	21:01 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58		04:45		20:37 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22		21:45	24	21:01 (1)	21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:40 (1)	04:45		20:37 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	7 20:47 (1)	21:45	25	21:02 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:38 (1)	04:45		20:37 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	11 20:49 (1)	21:45	24	21:01 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:17 (1)	04:46		20:38 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	13 20:50 (1)	21:45	24	21:02 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:36 (1)	04:47		20:38 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	15 20:51 (1)	21:45	24	21:02 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:35 (1)				05:25		06:18		07:08		08:29
	16:52		19:44		21:29	17 20:52 (1)				21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492		508			510		459	382	329	260	235
astr.max.mögl.Beschattung						63		703		312						
Red.Sonnenscheinwahrsch.						0.51		0.45		0.45						
Reduktion Betriebsdauer						0.91		0.91		0.91						
Reduktion Windrichtung						0.64		0.64		0.64						
Gesamte Reduktion						0.30		0.26		0.26						
Mat.wahrsch.Beschattung						19		186		81						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FO - IO171

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	Septembe	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		20:17 (1)	04:47	20:40 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	16	20:53 (1)	21:44	21:03 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		20:38 (1)	04:48	20:41 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	17	20:55 (1)	21:44	21:04 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		20:37 (1)	04:49	20:40 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	18	20:55 (1)	21:44	21:03 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		20:36 (1)	04:50	20:41 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46		21:33	20	20:56 (1)	21:43	21:03 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		20:37 (1)	04:50	20:42 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	20	20:57 (1)	21:43	21:03 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		20:36 (1)	04:51	20:42 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	21	20:57 (1)	21:42	21:03 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		20:36 (1)	04:52	20:43 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	21	20:57 (1)	21:41	21:03 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		20:36 (1)	04:53	20:43 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	22	20:58 (1)	21:41	21:03 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		20:36 (1)	04:54	20:44 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	23	20:59 (1)	21:40	21:03 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		20:36 (1)	04:55	20:45 (1)	05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	22	20:58 (1)	21:39	21:03 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		20:36 (1)	04:57	20:45 (1)	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58		21:40	23	20:59 (1)	21:38	21:02 (1)	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		20:36 (1)	04:58	20:46 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	24	21:00 (1)	21:37	21:01 (1)	20:48	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		20:36 (1)	04:59	20:47 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	23	20:59 (1)	21:37	21:01 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		20:36 (1)	05:00	20:48 (1)	05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	24	21:00 (1)	21:35	20:59 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		20:36 (1)	05:01	20:50 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	24	21:00 (1)	21:34	20:58 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		20:37 (1)	05:03		05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07		21:43	23	21:00 (1)	21:33		20:41	19:28	18:16	16:15	15:52
17	08:19	07:29	06:25	06:10	05:10		04:43		20:37 (1)	05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	24	21:01 (1)	21:32		20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		20:37 (1)	05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	24	21:01 (1)	21:31		20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		04:43		20:37 (1)	05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11		21:44	24	21:01 (1)	21:30		20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		04:43		20:37 (1)	05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13		21:45	24	21:01 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		04:43		20:37 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15		21:45	24	21:01 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		04:43		20:38 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16		21:45	24	21:02 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		04:43		20:38 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18		21:45	24	21:02 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		04:44		20:38 (1)	05:14		06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19		21:45	24	21:02 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		04:44		20:39 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21		21:45	24	21:03 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58		04:45		20:39 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22		21:45	23	21:02 (1)	21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		04:45		20:39 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23		21:45	24	21:03 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:42 (1)	04:45		20:39 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	6 20:49 (1)	21:45	24	21:03 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		05:55	05:44	04:54	20:40 (1)	04:46		20:40 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	10 20:50 (1)	21:45	23	21:03 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		05:53	05:42	04:53	20:39 (1)	04:47		20:40 (1)	05:23		06:18	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	13 20:52 (1)	21:45	23	21:03 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		05:51		04:52	20:38 (1)				05:25		06:18		07:08		08:29
	16:52		19:44		21:29	15 20:53 (1)				21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492		508			510		459	382	329	268	235
astr.max.mögl.Beschattung						44		674		275						
Red.Sonnenscheinwahrsch.						0.51		0.45		0.45						
Reduktion Betriebsdauer						0.91		0.91		0.91						
Reduktion Windrichtung						0.84		0.64		0.84						
Gesamte Reduktion						0.30		0.26		0.26						
Mat.wahrsch.Beschattung						13		178		71						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FP - IO172

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	20:40 (1) 04:47	20:42 (1) 05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30 14	20:54 (1) 21:44 22	21:04 (1) 21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:40 (1) 04:48	20:43 (1) 05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31 15	20:55 (1) 21:44 22	21:05 (1) 21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:39 (1) 04:49	20:42 (1) 05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32 17	20:56 (1) 21:44 22	21:04 (1) 21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:39 (1) 04:50	20:43 (1) 05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	21:33 17	20:56 (1) 21:43 21	21:04 (1) 21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:39 (1) 04:50	20:44 (1) 05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34 19	20:58 (1) 21:43 20	21:04 (1) 21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:38 (1) 04:51	20:44 (1) 05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35 20	20:58 (1) 21:42 20	21:04 (1) 21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:38 (1) 04:52	20:45 (1) 05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36 20	20:58 (1) 21:41 19	21:04 (1) 20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:38 (1) 04:53	20:45 (1) 05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37 21	20:59 (1) 21:41 18	21:04 (1) 20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:38 (1) 04:54	20:46 (1) 05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38 22	21:00 (1) 21:40 18	21:04 (1) 20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:38 (1) 04:55	20:47 (1) 05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39 21	20:59 (1) 21:39 16	21:03 (1) 20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:38 (1) 04:57	20:48 (1) 05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40 22	21:00 (1) 21:38 14	21:02 (1) 20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:38 (1) 04:58	20:49 (1) 05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:45 23	21:01 (1) 21:37 13	21:02 (1) 20:48	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:38 (1) 04:59	20:50 (1) 05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41 22	21:00 (1) 21:37 10	21:00 (1) 20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:38 (1) 05:00	20:52 (1) 05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42 23	21:01 (1) 21:35 7	20:59 (1) 20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:38 (1) 05:01	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43 23	21:01 (1) 21:34	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:38 (1) 05:03	05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43 23	21:01 (1) 21:33	20:41	19:28	18:16	16:15	15:52
17	08:19	07:29	06:25	06:10	05:10	04:43	20:39 (1) 05:04	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44 23	21:02 (1) 21:32	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:39 (1) 05:05	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44 23	21:02 (1) 21:31	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:39 (1) 05:07	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44 23	21:02 (1) 21:30	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:39 (1) 05:08	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45 23	21:02 (1) 21:28	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:39 (1) 05:09	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45 23	21:02 (1) 21:27	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:40 (1) 05:11	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45 23	21:03 (1) 21:26	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	20:40 (1) 05:12	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45 23	21:03 (1) 21:24	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	20:40 (1) 05:14	06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	21:45 23	21:03 (1) 21:23	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	20:41 (1) 05:15	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45 23	21:04 (1) 21:21	20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45	20:40 (1) 05:17	06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45 24	21:04 (1) 21:20	20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	20:41 (1) 05:18	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45 23	21:04 (1) 21:18	20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45	20:41 (1) 05:20	06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45 23	21:04 (1) 21:17	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:45 (1) 04:46	20:42 (1) 05:22	06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	23:26 4	20:49 (1) 21:45 22	21:04 (1) 21:15	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:42 (1) 04:47	20:41 (1) 05:23	06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	23:27 9	20:51 (1) 21:45 23	21:04 (1) 21:13	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:41 (1)	06:25	06:18		07:08		08:29
	16:52		19:44		21:29 12	20:53 (1)	21:12	20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508	510	459	382	329	268	235
astr.max.mögl.Beschattung					25	844	242					
Red.Sonnenscheinwahrsch.					0.51	0.45	0.45					
Reduktion Betriebsdauer					0.91	0.91	0.91					
Reduktion Windrichtung					0.84	0.64	0.84					
Gesamte Reduktion					0.30	0.26	0.26					
Mat.wahrsch.Beschattung					7	170	62					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FQ - IO173

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	Septembe	Oktober	Novembe	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		20:44 (1)	04:47	20:45 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	9	20:53 (1)	21:44 21	21:06 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		20:44 (1)	04:48	20:46 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	11	20:55 (1)	21:44 20	21:06 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		20:43 (1)	04:49	20:45 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	13	20:56 (1)	21:44 20	21:05 (1)	21:08	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		20:42 (1)	04:50	20:46 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46		21:33	15	20:57 (1)	21:43 19	21:05 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		20:42 (1)	04:50	20:47 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	16	20:58 (1)	21:43 18	21:05 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		20:41 (1)	04:51	20:47 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	18	20:59 (1)	21:42 18	21:05 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		20:41 (1)	04:52	20:48 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	18	20:59 (1)	21:41 17	21:05 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		20:41 (1)	04:53	20:49 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	19	21:00 (1)	21:41 16	21:05 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		20:41 (1)	04:54	20:50 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	20	21:01 (1)	21:40 14	21:04 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		20:40 (1)	04:55	20:51 (1)	05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	20	21:00 (1)	21:39 12	21:03 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		20:41 (1)	04:57	20:52 (1)	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58		21:40	20	21:01 (1)	21:38 10	21:02 (1)	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		20:41 (1)	04:58	20:54 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	21	21:02 (1)	21:37 7	21:01 (1)	20:48	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		20:40 (1)	04:59		05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	21	21:01 (1)	21:37		20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		20:40 (1)	05:00		05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	22	21:02 (1)	21:35		20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		20:41 (1)	05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	21	21:02 (1)	21:34		20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		20:41 (1)	05:03		05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07		21:43	22	21:03 (1)	21:33		20:41	19:28	18:16	16:15	15:52
17	08:19	07:29	06:25	06:10	05:10		04:43		20:41 (1)	05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	22	21:03 (1)	21:32		20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		20:41 (1)	05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	22	21:03 (1)	21:31		20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		04:43		20:41 (1)	05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11		21:44	23	21:04 (1)	21:30		20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		04:43		20:41 (1)	05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13		21:45	23	21:04 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		04:43		20:41 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15		21:45	23	21:04 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		04:43		20:42 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16		21:45	23	21:05 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		04:43		20:42 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18		21:45	23	21:05 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		04:44		20:42 (1)	05:14		06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19		21:45	22	21:04 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		04:44		20:43 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21		21:45	22	21:05 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58		04:45		20:43 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22		21:45	22	21:05 (1)	21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		04:45		20:44 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23		21:45	22	21:06 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		04:45		20:44 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25		21:45	21	21:05 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54		04:46		20:44 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26		21:45	22	21:06 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		04:47		20:44 (1)	05:23		06:18	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27		21:45	21	21:05 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:46 (1)				05:25		06:18		07:08		08:29
	16:52		19:44		21:29	5 20:51 (1)				21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492		508			510		459	382	329	260	205
astr.max.mögl.Beschattung					5		597			592						
Red.Sonnenscheinwahrsch.					0.51		0.45			0.45						
Reduktion Betriebsdauer					0.91		0.91			0.91						
Reduktion Windrichtung					0.83		0.83			0.83						
Gesamte Reduktion					0.30		0.26			0.26						
Mat.wahrsch.Beschattung					1		157			49						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FR - IO174

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	20:48 (1)	04:47	20:46 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	18:46	20:41	21:30	4 20:52 (1)	21:44 20	21:06 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:46 (1)	04:48	20:47 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	18:48	20:42	21:31	9 20:55 (1)	21:44 19	21:06 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:45 (1)	04:49	20:47 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	11 20:56 (1)	21:44 19	21:06 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:44 (1)	04:50	20:48 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	21:33	13 20:57 (1)	21:43 18	21:06 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:44 (1)	04:50	20:48 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	15 20:59 (1)	21:43 18	21:06 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:43 (1)	04:51	20:49 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	16 20:59 (1)	21:42 16	21:05 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:42 (1)	04:52	20:50 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	17 20:59 (1)	21:41 15	21:05 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:43 (1)	04:53	20:51 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	17 21:00 (1)	21:41 14	21:05 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:43 (1)	04:54	20:52 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	18 21:01 (1)	21:40 12	21:04 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:42 (1)	04:55	20:53 (1)	05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	19 21:01 (1)	21:39 10	21:03 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:42 (1)	04:57	20:55 (1)	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	20 21:02 (1)	21:38 7	21:02 (1)	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:43 (1)	04:58		05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	20 21:03 (1)	21:37		20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:42 (1)	04:59		05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	20 21:02 (1)	21:37		20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:42 (1)	05:00		05:49	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	21 21:03 (1)	21:35		20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:42 (1)	05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	21 21:03 (1)	21:34		20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:42 (1)	05:03		05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	22 21:04 (1)	21:33		20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	20:43 (1)	05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	21 21:04 (1)	21:32		20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:43 (1)	05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	21 21:04 (1)	21:31		20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:43 (1)	05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	21 21:04 (1)	21:30		20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:43 (1)	05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	21 21:04 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:43 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	21 21:04 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:44 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	21 21:05 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	20:44 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	21 21:05 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	20:44 (1)	05:14		06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	21 21:05 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	20:45 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	21 21:06 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45	20:44 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	22 21:06 (1)	21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	20:45 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	21 21:06 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45	20:45 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	21 21:06 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	20:46 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	20 21:06 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	20:46 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	21:45	20 21:06 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52			05:25		06:18		07:08		08:29
	16:52		19:44		21:29			21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508		510	459	382	329	260	235	
astr.max.mögl.Beschattung							556	168						
Red.Sonnenscheinwahrsch.							0.45	0.45						
Reduktion Betriebsdauer							0.91	0.91						
Reduktion Windrichtung							0.63	0.63						
Gesamte Reduktion							0.26	0.26						
Met.wahrsch.Beschattung							146	43						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FS - IO175

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51		04:47		20:48 (1) 05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30		21:44	19	21:07 (1) 21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50		20:51 (1) 04:48		20:49 (1) 05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31	2	20:53 (1) 21:44	18	21:07 (1) 21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49		20:48 (1) 04:49		20:49 (1) 05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	8	20:56 (1) 21:44	17	21:06 (1) 21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49		20:47 (1) 04:50		20:50 (1) 05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	21:33	10	20:57 (1) 21:43	16	21:06 (1) 21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48		20:46 (1) 04:50		20:51 (1) 05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	13	20:59 (1) 21:43	15	21:06 (1) 21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47		20:45 (1) 04:51		20:51 (1) 05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	14	20:59 (1) 21:42	15	21:06 (1) 21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46		20:44 (1) 04:52		20:52 (1) 05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	15	20:59 (1) 21:41	13	21:05 (1) 20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46		20:45 (1) 04:53		20:53 (1) 05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	16	21:01 (1) 21:41	12	21:05 (1) 20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45		20:45 (1) 04:54		20:55 (1) 05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	17	21:02 (1) 21:40	9	21:04 (1) 20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45		20:44 (1) 04:55		20:57 (1) 05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	18	21:02 (1) 21:39	5	21:02 (1) 20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44		20:44 (1) 04:57		05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	18	21:02 (1) 21:38		20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44		20:44 (1) 04:58		05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	19	21:03 (1) 21:37		20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44		20:44 (1) 04:59		05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	19	21:03 (1) 21:37		20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43		20:44 (1) 05:00		05:49	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	19	21:03 (1) 21:35		20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43		20:44 (1) 05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	20	21:04 (1) 21:34		20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43		20:44 (1) 05:03		05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	20	21:04 (1) 21:33		20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43		20:44 (1) 05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	21	21:05 (1) 21:32		20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43		20:44 (1) 05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	21	21:05 (1) 21:31		20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43		20:44 (1) 05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	21	21:05 (1) 21:30		20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43		20:44 (1) 05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	21	21:05 (1) 21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43		20:44 (1) 05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	21	21:05 (1) 21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43		20:45 (1) 05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	21	21:06 (1) 21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43		20:45 (1) 05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	21	21:06 (1) 21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44		20:45 (1) 05:14		06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	21	21:06 (1) 21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44		20:46 (1) 05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	21	21:07 (1) 21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45		20:46 (1) 05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	20	21:06 (1) 21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45		20:47 (1) 05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	20	21:07 (1) 21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45		20:47 (1) 05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	20	21:07 (1) 21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46		20:48 (1) 05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	19	21:07 (1) 21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47		20:47 (1) 05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	21:45	19	21:06 (1) 21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52			05:25		06:18		07:08		08:29
	16:52		19:44		21:29			21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508		510		459	382	329	260	235
astr.max.mögl.Beschattung							515		139					
Red.Sonnenscheinwahrsch.							0.45		0.45					
Reduktion Betriebsdauer							0.91		0.91					
Reduktion Windrichtung							0.63		0.63					
Gesamte Reduktion							0.26		0.26					
Met.wahrsch.Beschattung							135		36					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FT - IO176

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51		04:47		20:51 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	18:46	20:41	21:30		21:44	18	21:07 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50		04:48		20:51 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	18:48	20:42	21:31		21:44	16	21:07 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49		04:49		20:51 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32		21:44	15	21:06 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49		20:51 (1)	04:50	20:52 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	21:33	5	20:56 (1)	21:43	21:06 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48		20:50 (1)	04:50	20:53 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	8	20:58 (1)	21:43	21:06 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47		20:48 (1)	04:51	20:54 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	11	20:59 (1)	21:42	21:06 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46		20:47 (1)	04:52	20:56 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	13	21:00 (1)	21:41	21:05 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46		20:47 (1)	04:53	20:57 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	14	21:01 (1)	21:41	21:04 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45		20:47 (1)	04:54		05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	15	21:02 (1)	21:40		20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45		20:46 (1)	04:55		05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	16	21:02 (1)	21:39		20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44		20:47 (1)	04:57		05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	16	21:03 (1)	21:38		20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44		20:47 (1)	04:58		05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	17	21:04 (1)	21:37		20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44		20:46 (1)	04:59		05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	17	21:03 (1)	21:37		20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43		20:46 (1)	05:00		05:49	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	18	21:04 (1)	21:35		20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43		20:46 (1)	05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	19	21:05 (1)	21:34		20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43		20:46 (1)	05:03		05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	19	21:05 (1)	21:33		20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43		20:46 (1)	05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	19	21:05 (1)	21:32		20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43		20:46 (1)	05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	20	21:06 (1)	21:31		20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43		20:47 (1)	05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	19	21:06 (1)	21:30		20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43		20:47 (1)	05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	19	21:06 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43		20:47 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	19	21:06 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43		20:48 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	19	21:07 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43		20:48 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	19	21:07 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44		20:47 (1)	05:14		06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	20	21:07 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44		20:48 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	19	21:07 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45		20:48 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	19	21:07 (1)	21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45		20:49 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	19	21:08 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45		20:49 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	18	21:07 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46		20:50 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	18	21:08 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47		20:50 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	21:45	17	21:07 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52				05:25		06:18		07:08		08:29
	16:52		19:44		21:29				21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508			510		459	382	329	260	235
astr.max.mögl.Beschattung							452		102						
Red.Sonnenscheinwahrsch.							0.45		0.45						
Reduktion Betriebsdauer							0.91		0.91						
Reduktion Windrichtung							0.63		0.63						
Gesamte Reduktion							0.26		0.26						
Met.wahrsch.Beschattung							118		26						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FU - IO177

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	20:44 (1)	04:47	20:44 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	18:46	20:41	21:30	8 20:52 (1)	21:44	21 21:05 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:44 (1)	04:48	20:45 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	18:48	20:42	21:31	10 20:54 (1)	21:44	20 21:05 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:43 (1)	04:49	20:45 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	12 20:55 (1)	21:44	19 21:04 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:42 (1)	04:50	20:45 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	21:33	14 20:56 (1)	21:43	20 21:05 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:42 (1)	04:50	20:46 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	16 20:58 (1)	21:43	18 21:04 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:41 (1)	04:51	20:47 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	17 20:58 (1)	21:42	17 21:04 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:40 (1)	04:52	20:48 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	18 20:58 (1)	21:41	16 21:04 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:40 (1)	04:53	20:49 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	19 20:59 (1)	21:41	15 21:04 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:41 (1)	04:54	20:50 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	19 21:00 (1)	21:40	13 21:03 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:40 (1)	04:55	20:51 (1)	05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	20 21:00 (1)	21:39	11 21:02 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:40 (1)	04:57	20:52 (1)	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	21 21:01 (1)	21:38	9 21:01 (1)	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:40 (1)	04:58	20:54 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	21 21:01 (1)	21:37	5 20:59 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:40 (1)	04:59		05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	21 21:01 (1)	21:37		20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:40 (1)	05:00		05:49	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	22 21:02 (1)	21:36		20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:40 (1)	05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	22 21:02 (1)	21:34		20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:40 (1)	05:03		05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	22 21:02 (1)	21:33		20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	20:40 (1)	05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	23 21:03 (1)	21:32		20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:41 (1)	05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	22 21:03 (1)	21:31		20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:41 (1)	05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	22 21:03 (1)	21:30		20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:41 (1)	05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	22 21:03 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:41 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	22 21:03 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:42 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	22 21:04 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	20:42 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	22 21:04 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	20:42 (1)	05:14		06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	22 21:04 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	20:42 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	23 21:05 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45	20:42 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	22 21:04 (1)	21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	20:43 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	22 21:05 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45	20:43 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	22 21:05 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	20:44 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	21 21:05 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	20:44 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45	21 21:05 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52			05:25		06:18		07:08		08:29
	16:52		19:44		21:29			21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508		510		459	382	329	260	235
astr.max.mögl.Beschattung							590	184						
Red.Sonnenscheinwahrsch.							0.45	0.45						
Reduktion Betriebsdauer							0.91	0.91						
Reduktion Windrichtung							0.63	0.63						
Gesamte Reduktion							0.26	0.26						
Met.wahrsch.Beschattung							155	47						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FV - IO178

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	20:16 (1)	04:47	20:25 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30	23 20:39 (1)	21:44 18	20:43 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:17 (1)	04:48	20:25 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31	23 20:40 (1)	21:44 18	20:43 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:17 (1)	04:49	20:24 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	22 20:39 (1)	21:44 19	20:43 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:17 (1)	04:50	20:24 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	21:33	22 20:39 (1)	21:43 20	20:44 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:18 (1)	04:50	20:25 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	21 20:39 (1)	21:43 19	20:44 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:18 (1)	04:51	20:25 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	21 20:39 (1)	21:42 20	20:45 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:18 (1)	04:52	20:25 (1)	05:36	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	20 20:38 (1)	21:41 21	20:46 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:19 (1)	04:53	20:25 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	20 20:39 (1)	21:41 21	20:46 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:20 (1)	04:54	20:25 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	19 20:39 (1)	21:40 21	20:46 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:20 (1)	04:55	20:25 (1)	05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	18 20:38 (1)	21:39 22	20:47 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:21 (1)	04:57	20:24 (1)	05:43	06:37	07:30	07:28	08:17
	16:18	17:13	18:08	20:04	20:58	21:40	18 20:39 (1)	21:38 23	20:47 (1)	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:21 (1)	04:58	20:24 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	18 20:39 (1)	21:37 23	20:47 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:21 (1)	04:59	20:24 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	17 20:38 (1)	21:37 24	20:48 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	20:23 (1)	04:43	22:22 (1)	05:00	20:24 (1)	05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	8 20:31 (1)	21:42	16 20:38 (1)	21:35 24	20:48 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	20:28 (1)	04:43	22:22 (1)	05:01	20:24 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	12 20:32 (1)	21:43	16 20:38 (1)	21:34 24	20:48 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	20:19 (1)	04:43	22:23 (1)	05:03	20:24 (1)	05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	15 20:24 (1)	21:43	15 20:38 (1)	21:33 24	20:48 (1)	20:40	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	20:18 (1)	04:43	22:23 (1)	05:04	20:25 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	17 20:15 (1)	21:44	15 20:38 (1)	21:32 24	20:49 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	20:17 (1)	04:43	22:23 (1)	05:05	20:25 (1)	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	19 20:36 (1)	21:44	15 20:38 (1)	21:31 23	20:49 (1)	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	20:16 (1)	04:43	22:24 (1)	05:07	20:24 (1)	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	20 20:36 (1)	21:44	15 20:38 (1)	21:30 24	20:48 (1)	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	20:16 (1)	04:43	22:24 (1)	05:08	20:24 (1)	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21 20:37 (1)	21:45	15 20:38 (1)	21:28 24	20:48 (1)	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	20:16 (1)	04:43	22:24 (1)	05:09	20:25 (1)	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	22 20:38 (1)	21:45	15 20:38 (1)	21:27 23	20:48 (1)	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	20:15 (1)	04:43	22:25 (1)	05:11	20:25 (1)	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	22 20:37 (1)	21:45	15 20:40 (1)	21:26 23	20:48 (1)	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	20:15 (1)	04:43	22:25 (1)	05:12	20:26 (1)	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	23 20:38 (1)	21:45	15 20:40 (1)	21:24 22	20:48 (1)	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	20:15 (1)	04:44	22:24 (1)	05:14	20:26 (1)	06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	23 20:38 (1)	21:45	15 20:39 (1)	21:23 21	20:47 (1)	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:15 (1)	04:44	22:25 (1)	05:15	20:27 (1)	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	24 20:39 (1)	21:45	15 20:40 (1)	21:21 19	20:46 (1)	20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:15 (1)	04:44	22:25 (1)	05:17	20:28 (1)	06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:23	24 20:39 (1)	21:45	15 20:40 (1)	21:20 18	20:46 (1)	20:18	19:04	16:58	18:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:15 (1)	04:45	22:25 (1)	05:18	20:28 (1)	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:25	24 20:39 (1)	21:45	16 20:41 (1)	21:18 17	20:45 (1)	20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:15 (1)	04:45	22:25 (1)	05:20	20:30 (1)	06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	24 20:39 (1)	21:45	16 20:41 (1)	21:17 14	20:44 (1)	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:16 (1)	04:46	22:25 (1)	05:22	20:31 (1)	06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	23 20:39 (1)	21:45	17 20:42 (1)	21:15 11	20:42 (1)	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:16 (1)	04:47	22:25 (1)	05:23	20:35 (1)	06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	23 20:39 (1)	21:45	17 20:42 (1)	21:13 4	20:39 (1)	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:16 (1)			05:25		06:18		07:08		08:29
	16:52		19:44		21:29	23 20:39 (1)			21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508			510		459	382	329	260	235
astr.max.mögl.Beschattung					367		525		608						
Red.Sonnenscheinwahrsch.					0.51		0.45		0.45						
Reduktion Betriebsdauer					0.91		0.91		0.91						
Reduktion Windrichtung					0.65		0.65		0.65						
Gesamte Reduktion					0.30		0.27		0.26						
Mat.wahrsch.Beschattung					112		142		161						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FW - IO179

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		04:47		05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	23	21:44	24	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		04:48		05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	24	21:44	23	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		04:49		05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	24	21:44	24	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		04:50		05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46		21:33	24	21:43	24	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		04:50		05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	24	21:43	24	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		04:51		05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	24	21:42	24	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		04:52		05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	24	21:41	24	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		04:53		05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	24	21:41	25	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		04:54		05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	23	21:40	24	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		04:55		05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	24	21:39	24	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		04:57		05:43	06:37	07:30	07:28	08:17
	16:18	17:13	18:08	20:04	20:58		21:40	23	21:38	24	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		04:58		05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	23	21:37	24	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		04:59		05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	23	21:37	24	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		05:00		05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	22	21:35	24	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	23	21:34	23	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		05:03		05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07		21:43	23	21:33	22	20:40	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		04:43		05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	22	21:32	22	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	22	21:31	21	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	20:39 (1)	04:43		05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	9 20:38 (1)	21:44	22	21:30	21	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	20:27 (1)	04:43		05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	13 20:40 (1)	21:45	22	21:28	19	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	20:26 (1)	04:43		05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	15 20:41 (1)	21:45	22	21:27	18	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	20:25 (1)	04:43		05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	17 20:42 (1)	21:45	22	21:26	16	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	20:24 (1)	04:43		05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	18 20:43 (1)	21:45	22	21:24	14	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	20:24 (1)	04:44		05:14		06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	20 20:44 (1)	21:45	22	21:23	11	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:24 (1)	04:44		05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	20 20:44 (1)	21:45	22	21:21	7	20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:23 (1)	04:44		05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	22 20:45 (1)	21:45	23	21:20		20:18	19:04	16:58	18:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:23 (1)	04:45		05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	22 20:45 (1)	21:45	23	21:18		20:16	19:01	16:52	18:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:23 (1)	04:45		05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	23 20:46 (1)	21:45	23	21:17		20:14	18:59	16:50	18:01	15:59
29	08:04		06:55	05:44	04:54	20:23 (1)	04:46		05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	23 20:46 (1)	21:45	23	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:23 (1)	04:47		05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	23 20:46 (1)	21:45	23	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:23 (1)			05:25		06:18		07:08		08:29
	16:52		19:44		21:29	23 20:46 (1)			21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508			510		459	382	329	260	235
astr.max.mögl.Beschattung					249	688			530						
Red.Sonnenscheinwahrsch.					0.51	0.45			0.45						
Reduktion Betriebsdauer					0.91	0.91			0.91						
Reduktion Windrichtung					0.65	0.65			0.65						
Gesamte Reduktion					0.30	0.27			0.26						
Mat.wahrsch.Beschattung					75	185			139						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FX - IO180

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		20:24 (1)	04:47	20:31 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	24	20:48 (1)	21:44 23	20:54 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		20:25 (1)	04:48	20:31 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	24	20:49 (1)	21:44 24	20:55 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		20:25 (1)	04:49	20:30 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	24	20:49 (1)	21:44 24	20:54 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		20:25 (1)	04:50	20:31 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46		21:33	23	20:48 (1)	21:43 24	20:55 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		20:25 (1)	04:50	20:31 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	24	20:49 (1)	21:43 24	20:55 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		20:25 (1)	04:51	20:31 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	24	20:49 (1)	21:42 24	20:55 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		20:25 (1)	04:52	20:32 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	24	20:49 (1)	21:41 24	20:56 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		20:26 (1)	04:53	20:32 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	23	20:49 (1)	21:41 24	20:56 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		20:26 (1)	04:54	20:32 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	24	20:50 (1)	21:40 24	20:56 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		20:26 (1)	04:55	20:32 (1)	05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	23	20:49 (1)	21:39 24	20:56 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		20:26 (1)	04:57	20:32 (1)	05:43	06:37	07:30	07:28	08:17
	16:16	17:13	18:08	20:04	20:58		21:40	24	20:50 (1)	21:38 24	20:56 (1)	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		20:27 (1)	04:58	20:33 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	23	20:50 (1)	21:37 23	20:56 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		20:26 (1)	04:59	20:33 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	24	20:50 (1)	21:37 23	20:56 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		20:27 (1)	05:00	20:33 (1)	05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	23	20:50 (1)	21:35 23	20:56 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		20:27 (1)	05:01	20:33 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	23	20:50 (1)	21:34 23	20:56 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		20:28 (1)	05:03	20:33 (1)	05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07		21:43	23	20:50 (1)	21:33 22	20:55 (1)	20:40	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		04:43		20:28 (1)	05:04	20:35 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	23	20:51 (1)	21:32 21	20:56 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		20:28 (1)	05:05	20:35 (1)	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	23	20:51 (1)	21:31 20	20:55 (1)	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	20:33 (1)	04:43		20:28 (1)	05:07	20:35 (1)	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	3 20:36 (1)	21:44	23	20:51 (1)	21:30 19	20:54 (1)	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	20:10 (1)	04:43		20:28 (1)	05:08	20:37 (1)	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	10 20:40 (1)	21:45	23	20:51 (1)	21:28 17	20:54 (1)	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	20:29 (1)	04:43		20:28 (1)	05:09	20:37 (1)	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	13 20:42 (1)	21:45	23	20:51 (1)	21:27 16	20:53 (1)	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	20:27 (1)	04:43		20:29 (1)	05:11	20:38 (1)	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	15 20:42 (1)	21:45	23	20:52 (1)	21:26 14	20:52 (1)	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	20:26 (1)	04:43		20:29 (1)	05:12	20:40 (1)	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	17 20:43 (1)	21:45	23	20:52 (1)	21:24 11	20:51 (1)	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	20:28 (1)	04:44		20:29 (1)	05:14	20:42 (1)	06:06	07:00	07:56	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	18 20:44 (1)	21:45	23	20:52 (1)	21:23 7	20:49 (1)	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:26 (1)	04:44		20:30 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	19 20:45 (1)	21:45	23	20:53 (1)	21:21		20:21	19:56	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:25 (1)	04:44		20:30 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:23	21 20:46 (1)	21:45	23	20:52 (1)	21:20		20:18	19:04	16:58	18:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:25 (1)	04:45		20:30 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:25	21 20:46 (1)	21:45	23	20:53 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:25 (1)	04:45		20:30 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:26	22 20:47 (1)	21:45	23	20:53 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:25 (1)	04:46		20:31 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	22 20:47 (1)	21:45	23	20:54 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:24 (1)	04:47		20:30 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	23 20:47 (1)	21:45	23	20:53 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:24 (1)				05:25		06:18		07:08		08:29
	16:52		19:44		21:29	24 20:48 (1)				21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508				510		459	382	329	260	235
astr.max.mögl.Beschattung					228		697			552						
Red.Sonnenscheinwahrsch.					0.51		0.45			0.45						
Reduktion Betriebsdauer					0.91		0.91			0.91						
Reduktion Windrichtung					0.65		0.65			0.65						
Gesamte Reduktion					0.30		0.27			0.26						
Mat.wahrsch.Beschattung					69		187			132						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FY - IO181

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		04:47		05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	23	21:44	24	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		04:48		05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	23	21:44	23	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		04:49		05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	23	21:44	24	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		04:50		05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46		21:33	24	21:43	24	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		04:50		05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	24	21:43	24	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		04:51		05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	24	21:42	24	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		04:52		05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	23	21:41	24	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		04:53		05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	24	21:41	23	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		04:54		05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	24	21:40	24	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		04:55		05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	24	21:39	24	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		04:57		05:43	06:37	07:30	07:29	08:17
	16:18	17:13	18:08	20:04	20:58		21:40	24	21:38	24	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		04:58		05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	24	21:37	23	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		04:59		05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	24	21:37	22	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		05:00		05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	24	21:35	22	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	23	21:34	22	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		05:03		05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07		21:43	23	21:33	20	20:40	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		04:43		05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	24	21:32	20	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	24	21:31	19	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		04:43		05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11		21:44	23	21:30	17	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		04:43		05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13		21:45	23	21:28	16	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	20:33 (1)	04:43		05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	8 20:41 (1)	21:45	23	21:27	14	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	20:30 (1)	04:43		05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	12 20:42 (1)	21:45	23	21:26	11	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	20:29 (1)	04:43		05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	15 20:44 (1)	21:45	23	21:24	6	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	20:29 (1)	04:44		05:14		06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	16 20:45 (1)	21:45	23	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:28 (1)	04:44		05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	18 20:46 (1)	21:45	24	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:28 (1)	04:44		05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:23	18 20:47 (1)	21:45	23	21:20		20:18	19:04	16:58	18:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:27 (1)	04:45		05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:25	21 20:48 (1)	21:45	23	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:27 (1)	04:45		05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21 20:48 (1)	21:45	24	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:27 (1)	04:46		05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21 20:48 (1)	21:45	24	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:26 (1)	04:47		05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	23 20:49 (1)	21:45	23	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:26 (1)			05:25		06:18		07:08		08:29
	16:52		19:44		21:29	23 20:49 (1)			21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508			510		499	382	329	260	235
astr.max.mögl.Beschattung						197		705		474					
Red.Sonnenscheinwahrsch.						0.51		0.45		0.45					
Reduktion Betriebsdauer						0.91		0.91		0.91					
Reduktion Windrichtung						0.64		0.64		0.64					
Gesamte Reduktion						0.30		0.27		0.26					
Mat.wahrsch.Beschattung						59		188		124					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** FZ - IO182

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni			Juli			August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51			20:27 (1)	04:47		20:33 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41			21:30	23	20:50 (1)	21:44		24	20:57 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38			04:50		20:27 (1)	04:48			20:33 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42			21:31	24	20:51 (1)	21:44		24	20:57 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36			04:49		20:27 (1)	04:49			20:33 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44			21:32	24	20:51 (1)	21:44		24	20:57 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34			04:49		20:27 (1)	04:50			20:33 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46			21:33	24	20:51 (1)	21:43		24	20:57 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32			04:48		20:28 (1)	04:50			20:33 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48			21:34	24	20:52 (1)	21:43		24	20:57 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30			04:47		20:27 (1)	04:51			20:34 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50			21:35	24	20:51 (1)	21:42		24	20:58 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28			04:46		20:27 (1)	04:52			20:34 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51			21:36	24	20:51 (1)	21:41		24	20:58 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26			04:46		20:28 (1)	04:53			20:34 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53			21:37	24	20:52 (1)	21:41		24	20:58 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24			04:45		20:28 (1)	04:54			20:35 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55			21:38	24	20:52 (1)	21:40		23	20:58 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22			04:45		20:28 (1)	04:55			20:35 (1)	05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57			21:39	24	20:52 (1)	21:39		23	20:58 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21			04:44		20:28 (1)	04:57			20:35 (1)	05:43	06:37	07:30	07:28	08:17
	16:18	17:13	18:08	20:04	20:58			21:40	24	20:52 (1)	21:38		23	20:58 (1)	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19			04:44		20:29 (1)	04:58			20:35 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00			21:41	24	20:53 (1)	21:37		23	20:58 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17			04:44		20:28 (1)	04:59			20:36 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02			21:41	24	20:52 (1)	21:37		22	20:58 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15			04:43		20:28 (1)	05:00			20:36 (1)	05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03			21:42	24	20:53 (1)	21:35		21	20:57 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14			04:43		20:29 (1)	05:01			20:36 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05			21:43	24	20:53 (1)	21:34		21	20:57 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12			04:43		20:29 (1)	05:03			20:37 (1)	05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07			21:43	24	20:53 (1)	21:33		20	20:57 (1)	20:40	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10			04:43		20:30 (1)	05:04			20:38 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08			21:44	23	20:53 (1)	21:32		19	20:57 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09			04:43		20:30 (1)	05:05			20:38 (1)	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10			21:44	24	20:54 (1)	21:31		18	20:56 (1)	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07			04:43		20:30 (1)	05:07			20:38 (1)	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11			21:44	24	20:54 (1)	21:30		16	20:55 (1)	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06			04:43		20:30 (1)	05:08			20:41 (1)	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13			21:45	24	20:54 (1)	21:28		14	20:55 (1)	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		20:35 (1)	04:43		20:30 (1)	05:09			20:42 (1)	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	5	20:40 (1)	21:45	24	20:54 (1)	21:27		11	20:53 (1)	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		20:32 (1)	04:43		20:31 (1)	05:11			20:43 (1)	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	10	20:42 (1)	21:45	24	20:55 (1)	21:26		8	20:51 (1)	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		20:31 (1)	04:43		20:31 (1)	05:12				06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	13	20:44 (1)	21:45	24	20:55 (1)	21:24				20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		20:30 (1)	04:44		20:31 (1)	05:14				06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	15	20:45 (1)	21:45	24	20:55 (1)	21:23				20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		20:29 (1)	04:44		20:32 (1)	05:15				06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	17	20:46 (1)	21:45	23	20:55 (1)	21:21				20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58		20:29 (1)	04:44		20:31 (1)	05:17				06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:23	18	20:47 (1)	21:45	24	20:55 (1)	21:20				20:18	19:04	16:58	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		20:28 (1)	04:45		20:32 (1)	05:18				06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:25	20	20:48 (1)	21:45	24	20:56 (1)	21:18				20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		20:28 (1)	04:45		20:32 (1)	05:20				06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	23	20:48 (1)	21:45	24	20:56 (1)	21:17				20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54		20:28 (1)	04:46		20:32 (1)	05:22				06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21	20:49 (1)	21:45	24	20:56 (1)	21:15				20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		20:27 (1)	04:47		20:32 (1)	05:23				06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	22	20:49 (1)	21:45	24	20:56 (1)	21:13				20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:27 (1)				05:25				06:18		07:08		08:29
	16:52		19:44		21:29	22	20:49 (1)				21:12				20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508			510			499	382	329	260	235	
astr.max.mögl.Beschattung						183			717			454							
Red.Sonnenscheinwahrsch.						0.51			0.45			0.45							
Reduktion Betriebsdauer						0.91			0.91			0.91							
Reduktion Windrichtung						0.64			0.64			0.64							
Gesamte Reduktion						0.30			0.27			0.26							
Mat.wahrsch.Beschattung						55			191			119							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GA - IO183

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		20:39 (1)	04:47	20:34 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	22	20:51 (1)	21:44	20:58 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		20:38 (1)	04:48	20:35 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	22	20:52 (1)	21:44	20:59 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		20:38 (1)	04:49	20:34 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	23	20:52 (1)	21:44	20:58 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		20:38 (1)	04:50	20:35 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46		21:33	23	20:52 (1)	21:43	20:59 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		20:38 (1)	04:50	20:35 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	23	20:53 (1)	21:43	20:59 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		20:38 (1)	04:51	20:36 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	24	20:53 (1)	21:42	20:59 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		20:38 (1)	04:52	20:36 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	24	20:53 (1)	21:41	20:59 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		20:38 (1)	04:53	20:36 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	23	20:53 (1)	21:41	21:00 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		20:38 (1)	04:54	20:37 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	24	20:54 (1)	21:40	21:00 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		20:38 (1)	04:55	20:37 (1)	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	24	20:54 (1)	21:39	21:00 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		20:38 (1)	04:57	20:37 (1)	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58		21:40	24	20:54 (1)	21:38	21:00 (1)	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		20:38 (1)	04:58	20:38 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	24	20:55 (1)	21:37	20:59 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		20:38 (1)	04:59	20:38 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	24	20:54 (1)	21:37	20:59 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		20:38 (1)	05:00	20:38 (1)	05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	23	20:54 (1)	21:35	20:59 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		20:38 (1)	05:01	20:39 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	24	20:55 (1)	21:34	20:59 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		20:38 (1)	05:03	20:39 (1)	05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07		21:43	24	20:55 (1)	21:33	20:58 (1)	20:40	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		04:43		20:38 (1)	05:04	20:41 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	24	20:55 (1)	21:32	20:58 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		20:38 (1)	05:05	20:41 (1)	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	23	20:55 (1)	21:31	20:57 (1)	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		04:43		20:38 (1)	05:07	20:42 (1)	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11		21:44	24	20:56 (1)	21:30	20:58 (1)	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		04:43		20:38 (1)	05:08	20:44 (1)	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13		21:45	24	20:56 (1)	21:28	20:55 (1)	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		04:43		20:38 (1)	05:09	20:46 (1)	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15		21:45	24	20:56 (1)	21:27	20:53 (1)	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	20:37 (1)	04:43		20:38 (1)	05:11		04:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	3 20:48 (1)	21:45	24	20:57 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	20:34 (1)	04:43		20:38 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	18 20:44 (1)	21:45	24	20:57 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	20:33 (1)	04:44		20:38 (1)	05:14		06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	12 20:45 (1)	21:45	23	20:56 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:32 (1)	04:44		20:38 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	15 20:47 (1)	21:45	23	20:57 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:31 (1)	04:44		20:38 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:23	17 20:48 (1)	21:45	24	20:57 (1)	21:20		20:18	19:04	16:58	18:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:31 (1)	04:45		20:38 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:25	18 20:49 (1)	21:45	24	20:58 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:30 (1)	04:45		20:38 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:26	19 20:49 (1)	21:45	24	20:58 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:30 (1)	04:46		20:38 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	20 20:50 (1)	21:45	24	20:58 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:30 (1)	04:47		20:38 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	21 20:50 (1)	21:45	24	20:58 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:29 (1)				05:25		06:18		07:08		08:29
	16:52		19:44		21:29	22 20:51 (1)				21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492		508			510		499	382	329	260	235
astr.max.mögl.Beschattung						156		708		425						
Red.Sonnenscheinwahrsch.						0.51		0.45		0.45						
Reduktion Betriebsdauer						0.91		0.91		0.91						
Reduktion Windrichtung						0.64		0.64		0.64						
Gesamte Reduktion						0.30		0.27		0.26						
Mat.wahrsch.Beschattung						47		189		111						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GB - IO184

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		20:31 (1)	04:47	20:38 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	21	20:52 (1)	21:44 24	21:00 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		20:32 (1)	04:48	20:37 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	21	20:53 (1)	21:44 24	21:01 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		20:33 (1)	04:49	20:36 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	21	20:54 (1)	21:44 24	21:00 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		20:33 (1)	04:50	20:37 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46		21:33	21	20:54 (1)	21:43 23	21:00 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		20:32 (1)	04:50	20:37 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	21	20:55 (1)	21:43 24	21:01 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		20:31 (1)	04:51	20:38 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	21	20:54 (1)	21:42 23	21:01 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		20:31 (1)	04:52	20:38 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	21	20:54 (1)	21:41 23	21:01 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		20:31 (1)	04:53	20:38 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	24	20:55 (1)	21:41 23	21:01 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		20:32 (1)	04:54	20:39 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	24	20:56 (1)	21:40 22	21:01 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		20:32 (1)	04:55	20:39 (1)	05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	23	20:55 (1)	21:39 22	21:01 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		20:32 (1)	04:57	20:39 (1)	05:43	06:37	07:30	07:28	08:17
	16:18	17:13	18:08	20:04	20:58		21:40	24	20:56 (1)	21:38 22	21:01 (1)	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		20:32 (1)	04:58	20:40 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	24	20:56 (1)	21:37 21	21:01 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		20:32 (1)	04:59	20:40 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	24	20:56 (1)	21:37 20	21:00 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		20:32 (1)	05:00	20:41 (1)	05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	24	20:56 (1)	21:35 19	21:00 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		20:33 (1)	05:01	20:41 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	23	20:56 (1)	21:34 18	20:59 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		20:33 (1)	05:03	20:42 (1)	05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07		21:43	24	20:57 (1)	21:33 16	20:58 (1)	20:40	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		04:43		20:33 (1)	05:04	20:44 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	24	20:57 (1)	21:32 14	20:58 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		20:33 (1)	05:05	20:44 (1)	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	24	20:57 (1)	21:31 13	20:57 (1)	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		04:43		20:33 (1)	05:07	20:46 (1)	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11		21:44	24	20:57 (1)	21:30 10	20:56 (1)	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		04:43		20:33 (1)	05:08	20:49 (1)	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13		21:45	24	20:57 (1)	21:28 5	20:54 (1)	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		04:43		20:34 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15		21:45	23	20:57 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		04:43		20:35 (1)	05:11		04:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16		21:45	23	20:58 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		04:43		20:34 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18		21:45	24	20:58 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	20:37 (1)	04:44		20:34 (1)	05:14		06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	8 20:45 (1)	21:45	24	20:58 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:35 (1)	04:44		20:35 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	12 20:47 (1)	21:45	24	20:59 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:34 (1)	04:44		20:35 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	14 20:48 (1)	21:45	24	20:59 (1)	21:20		20:18	19:04	16:58	18:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:34 (1)	04:45		20:36 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	15 20:49 (1)	21:45	24	21:00 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:33 (1)	04:45		20:35 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	17 20:50 (1)	21:45	24	20:59 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:32 (1)	04:46		20:36 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	19 20:51 (1)	21:45	24	21:00 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:32 (1)	04:47		20:36 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	19 20:51 (1)	21:45	24	21:00 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:32 (1)				05:25		06:18		07:08		08:29
	16:52		19:44		21:29	20 20:52 (1)				21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508				510	499	382	329	260	235	
astr.max.mögl.Beschattung					124	705				780						
Red.Sonnenscheinwahrsch.					0.51	0.45				0.45						
Reduktion Betriebsdauer					0.91	0.91				0.91						
Reduktion Windrichtung					0.64	0.64				0.64						
Gesamte Reduktion					0.30	0.27				0.26						
Mat.wahrsch.Beschattung					37	187				201						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GC - IO185

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		04:47		05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	10	21:44	23	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		04:48		05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	10	21:44	24	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		04:49		05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	22	21:44	23	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		04:50		05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46		21:33	22	21:43	23	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		04:50		05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	23	21:43	23	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		04:51		05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	23	21:42	23	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		04:52		05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	22	21:41	22	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		04:53		05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	23	21:41	22	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		04:54		05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	23	21:40	22	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		04:55		05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	24	21:39	21	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		04:57		05:43	06:37	07:30	07:28	08:17
	16:18	17:13	18:08	20:04	20:58		21:40	23	21:38	21	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		04:58		05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	24	21:37	19	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		04:59		05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	24	21:37	19	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		05:00		05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	23	21:35	17	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	24	21:34	17	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		05:03		05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07		21:43	24	21:33	15	20:40	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		04:43		05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	24	21:32	13	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	24	21:31	10	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		04:43		05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11		21:44	24	21:30	4	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		04:43		05:08			06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13		21:45	24	21:28			19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		04:43		05:09			06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15		21:45	24	21:27			19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		04:43		05:11			06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16		21:45	24	21:26			19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		04:43		05:12			06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18		21:45	24	21:24			19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		04:44		05:14			06:00	07:55	07:52	08:27
	16:38	17:39	18:32	20:28	21:19		21:45	24	21:23			19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:39 (1)	04:44		05:15			07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	7 20:46 (1)	21:45	23	21:21			19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:37 (1)	04:44		05:17			06:59	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	11 20:48 (1)	21:45	24	21:20			19:04	16:58	18:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:36 (1)	04:45		05:18			06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	14 20:50 (1)	21:45	24	21:18			20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:35 (1)	04:45		05:20			06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	16 20:51 (1)	21:45	24	21:17			20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:35 (1)	04:46		05:22			06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	17 20:52 (1)	21:45	24	21:15			20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:34 (1)	04:47		05:23			06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	18 20:52 (1)	21:45	24	21:13			20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:34 (1)			05:25			06:18		07:08		08:29
	16:52		19:44		21:29	19 20:53 (1)			21:12			20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492		508		510		459	382	329	260	235
astr.mas.mögl.Beschattung						102		699		361					
Red.Sonnenscheinwahrsch.						0.51		0.45		0.45					
Reduktion Betriebsdauer						0.91		0.91		0.91					
Reduktion Windrichtung						0.64		0.64		0.64					
Gesamte Reduktion						0.30		0.27		0.26					
Mat.wahrsch.Beschattung						31		185		94					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GD - IO186

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	20:36 (1) 04:47	20:40 (1) 05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30 18	20:54 (1) 21:44 23	21:03 (1) 21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:36 (1) 04:48	20:40 (1) 05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31 19	20:55 (1) 21:44 23	21:03 (1) 21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:36 (1) 04:49	20:40 (1) 05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32 20	20:56 (1) 21:44 23	21:03 (1) 21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:35 (1) 04:58	20:40 (1) 05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	21:33 21	20:56 (1) 21:43 23	21:03 (1) 21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:36 (1) 04:50	20:41 (1) 05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34 21	20:57 (1) 21:43 22	21:03 (1) 21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:35 (1) 04:51	20:41 (1) 05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35 22	20:57 (1) 21:42 22	21:03 (1) 21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:35 (1) 04:52	20:42 (1) 05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36 22	20:57 (1) 21:41 21	21:03 (1) 20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:35 (1) 04:53	20:42 (1) 05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37 23	20:58 (1) 21:41 21	21:03 (1) 20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:36 (1) 04:54	20:43 (1) 05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38 22	20:58 (1) 21:40 20	21:03 (1) 20:55	19:45	18:32	16:27	15:54
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	16:18	17:15	18:09	20:06	21:00	21:41 23	20:59 (1) 21:37 18	21:02 (1) 20:48	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:35 (1) 04:59	20:45 (1) 05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41 24	20:59 (1) 21:37 17	21:02 (1) 20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:36 (1) 05:00	20:46 (1) 05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42 23	20:59 (1) 21:35 15	21:01 (1) 20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:36 (1) 05:01	20:46 (1) 05:50	06:44	07:38	07:36	08:21
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17	08:19	07:29	06:25	06:10	05:10	04:43	20:36 (1) 05:04	20:50 (1) 05:54	06:48	07:41	07:40	08:23
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18	08:18	07:27	06:22	06:08	05:09	04:43	20:37 (1) 05:05	20:52 (1) 05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44 23	21:00 (1) 21:31 3	20:55 (1) 20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:37 (1) 05:07		06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44 23	21:00 (1) 21:30		20:34	19:21	18:09	16:11	15:54
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	16:31	17:31	18:24	20:21	21:13	21:45 23	21:00 (1) 21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:37 (1) 05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45 23	21:00 (1) 21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:38 (1) 05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45 23	21:01 (1) 21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	20:38 (1) 05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45 23	21:01 (1) 21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	20:38 (1) 05:14		06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	21:45 23	21:01 (1) 21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	20:38 (1) 05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45 24	21:02 (1) 21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:41 (1) 04:44	20:39 (1) 05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22 7	20:48 (1) 21:45 24	21:02 (1) 21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:39 (1) 04:45	20:39 (1) 05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23 11	20:53 (1) 21:45 24	21:03 (1) 21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:38 (1) 04:45	20:39 (1) 05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25 13	20:51 (1) 21:45 23	21:02 (1) 21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		05:55	05:44	04:54	20:37 (1) 04:46	20:39 (1) 05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26 15	20:52 (1) 21:45 24	21:03 (1) 21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:37 (1) 04:47	20:39 (1) 05:23		06:18	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27 16	20:53 (1) 21:45 23	21:02 (1) 21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:36 (1)	06:25		06:18		07:08		08:29
	16:52		19:44		21:29 18	20:54 (1)	21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508	510	459	382	329	260	205
astr.max.mögl.Beschattung					80	678	324					
Red.Sonnenscheinwahrsch.					0.51	0.45	0.45					
Reduktion Betriebsdauer					0.91	0.91	0.91					
Reduktion Windrichtung					0.84	0.64	0.84					
Gesamte Reduktion					0.30	0.26	0.26					
Mat.wahrsch.Beschattung					24	180	84					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GE - IO187

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	20:17 (1) 04:47	20:41 (1) 05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30 18 20:55 (1) 21:44 23	21:04 (1) 21:10	20:04	18:51	16:42	15:58	
2	08:28	07:57	07:00	06:46	05:38	04:50	20:17 (1) 04:48	20:41 (1) 05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31 19 20:56 (1) 21:44 23	21:04 (1) 21:08	20:02	18:49	16:40	15:57	
3	08:28	07:56	06:58	06:43	05:36	04:49	20:17 (1) 04:49	20:41 (1) 05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32 19 20:56 (1) 21:44 22	21:03 (1) 21:06	20:00	18:47	16:38	15:57	
4	08:28	07:54	06:55	06:41	05:34	04:49	20:36 (1) 04:58	20:41 (1) 05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	21:33 20 20:56 (1) 21:43 23	21:04 (1) 21:05	19:57	18:44	16:36	15:56	
5	08:28	07:52	06:53	06:39	05:32	04:48	20:17 (1) 04:50	20:42 (1) 05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34 20 20:57 (1) 21:43 22	21:04 (1) 21:03	19:55	18:42	16:34	15:55	
6	08:27	07:50	06:51	06:36	05:30	04:47	20:36 (1) 04:51	20:42 (1) 05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35 21 20:57 (1) 21:42 22	21:04 (1) 21:01	19:52	18:39	16:32	15:55	
7	08:27	07:49	06:48	06:34	05:28	04:46	20:36 (1) 04:52	20:43 (1) 05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36 21 20:57 (1) 21:41 21	21:04 (1) 20:59	19:50	18:37	16:30	15:54	
8	08:26	07:47	06:46	06:31	05:26	04:46	20:36 (1) 04:53	20:43 (1) 05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37 22 20:58 (1) 21:41 21	21:04 (1) 20:57	19:48	18:35	16:28	15:54	
9	08:26	07:45	06:44	06:29	05:24	04:45	20:37 (1) 04:54	20:44 (1) 05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38 22 20:59 (1) 21:40 20	21:04 (1) 20:55	19:45	18:32	16:27	15:54	
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	16:15	17:11	18:06	20:03	20:57	21:39 23 20:59 (1) 21:39 20	21:04 (1) 20:53	19:43	18:30	16:25	15:53	
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	16:16	17:13	18:08	20:04	20:58	21:40 23 20:59 (1) 21:38 18	21:03 (1) 20:51	19:40	18:27	16:23	15:53	
12	08:24	07:39	06:37	06:22	05:19	04:44	20:37 (1) 04:58	20:46 (1) 05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41 23 21:00 (1) 21:37 17	21:03 (1) 20:48	19:38	18:25	16:22	15:53	
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	16:19	17:17	18:11	20:08	21:02	21:41 23 20:59 (1) 21:37 16	21:02 (1) 20:47	19:35	18:23	16:20	15:53	
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	16:21	17:19	18:13	20:10	21:03	21:42 23 21:00 (1) 21:35 14	21:01 (1) 20:45	19:33	18:21	16:18	15:53	
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	16:22	17:21	18:15	20:12	21:05	21:43 23 21:00 (1) 21:34 12	21:00 (1) 20:43	19:30	18:18	16:17	15:53	
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	16:38	17:39	18:32	20:28	21:19	21:45 24 21:02 (1) 21:23	20:23	19:08	17:58	16:05	15:56	
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	16:44	17:45	18:37	20:33	21:23 7	20:49 (1) 21:45 23	21:03 (1) 21:18	20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:40 (1) 04:45	20:40 (1) 05:20	06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25 11	20:51 (1) 21:45 23	21:03 (1) 21:17	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:39 (1) 04:46	20:40 (1) 05:22	06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26 13	20:52 (1) 21:45 24	21:04 (1) 21:15	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:38 (1) 04:47	20:40 (1) 05:23	06:18	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27 13	20:53 (1) 21:45 23	21:03 (1) 21:13	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:37 (1)	06:25	06:18		07:08		08:29
	16:52		19:44		21:29 17	20:54 (1)	21:12	20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508	510	459	382	329	268	235
astr.max.mögl.Beschattung					63	671	309					
Red.Sonnenscheinwahrsch.					0.51	0.45	0.45					
Reduktion Betriebsdauer					0.91	0.91	0.91					
Reduktion Windrichtung					0.84	0.64	0.84					
Gesamte Reduktion					0.30	0.26	0.26					
Mat.wahrsch.Beschattung					19	177	80					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GF - IO188

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	20:40 (1) 04:47	20:43 (1) 05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30 15	20:55 (1) 21:44 22	21:05 (1) 21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:40 (1) 04:48	20:44 (1) 05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31 17	20:57 (1) 21:44 21	21:05 (1) 21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:40 (1) 04:49	20:43 (1) 05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32 17	20:57 (1) 21:44 22	21:05 (1) 21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:39 (1) 04:50	20:44 (1) 05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	21:33 19	20:58 (1) 21:43 21	21:05 (1) 21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:39 (1) 04:50	20:44 (1) 05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34 20	20:59 (1) 21:43 21	21:05 (1) 21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:39 (1) 04:51	20:45 (1) 05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35 20	20:59 (1) 21:42 20	21:05 (1) 21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:38 (1) 04:52	20:46 (1) 05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36 21	20:59 (1) 21:41 19	21:05 (1) 20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:39 (1) 04:53	20:46 (1) 05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37 21	21:00 (1) 21:41 19	21:05 (1) 20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:39 (1) 04:54	20:47 (1) 05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38 21	21:00 (1) 21:40 18	21:05 (1) 20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:38 (1) 04:55	20:47 (1) 05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39 22	21:00 (1) 21:39 18	21:05 (1) 20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:39 (1) 04:57	20:48 (1) 05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40 22	21:01 (1) 21:38 16	21:04 (1) 20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:39 (1) 04:58	20:49 (1) 05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41 22	21:01 (1) 21:37 14	21:03 (1) 20:48	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:39 (1) 04:59	20:50 (1) 05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41 22	21:01 (1) 21:37 12	21:02 (1) 20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:39 (1) 05:00	20:51 (1) 05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42 22	21:01 (1) 21:35 10	21:01 (1) 20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:39 (1) 05:01	20:53 (1) 05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43 23	21:02 (1) 21:34 7	21:00 (1) 20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:39 (1) 05:03	05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43 23	21:02 (1) 21:33	20:40	19:28	18:16	16:15	15:52
17	08:19	07:29	06:25	06:10	05:10	04:43	20:40 (1) 05:04	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44 22	21:02 (1) 21:32	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:40 (1) 05:05	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44 23	21:03 (1) 21:31	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:40 (1) 05:07	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44 23	21:03 (1) 21:30	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:40 (1) 05:08	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45 23	21:03 (1) 21:28	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:40 (1) 05:09	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45 23	21:03 (1) 21:27	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:41 (1) 05:11	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45 23	21:04 (1) 21:26	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	20:41 (1) 05:12	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45 23	21:04 (1) 21:24	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	20:41 (1) 05:14	06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	21:45 23	21:04 (1) 21:23	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	20:42 (1) 05:15	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45 23	21:05 (1) 21:21	20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45	20:41 (1) 05:17	06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45 23	21:04 (1) 21:20	20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	20:42 (1) 05:18	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45 23	21:05 (1) 21:18	20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55 20:45 (1)	04:45	20:42 (1) 05:20	06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25 5 20:50 (1)	21:45 23	21:05 (1) 21:17	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54 20:43 (1)	04:46	20:43 (1) 05:22	06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26 9 20:52 (1)	21:45 22	21:05 (1) 21:15	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53 20:42 (1)	04:47	20:42 (1) 05:23	06:18	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27 12 20:54 (1)	21:45 23	21:05 (1) 21:13	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52 20:41 (1)		06:25	06:18		07:08		08:29
	16:52		19:44		21:29 13 20:54 (1)		21:12	20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508	510	459	382	329	268	235
astr.max.mögl.Beschattung					39	847	260					
Red.Sonnenscheinwahrsch.					0.51	0.45	0.45					
Reduktion Betriebsdauer					0.91	0.91	0.91					
Reduktion Windrichtung					0.84	0.84	0.84					
Gesamte Reduktion					0.30	0.26	0.26					
Mat.wahrsch.Beschattung					12	171	67					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GG - IO189

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29 16:03	07:59 16:54	07:02 17:49	06:48 19:46	05:40 20:41	04:51 21:30	20:42 (1) 20:55 (1)	20:44 (1) 21:06 (1)	05:26 21:10	06:20 20:04	07:12 18:51	07:10 16:42	08:04 15:58
2	08:28 16:04	07:57 16:56	07:00 17:50	06:46 19:48	05:38 20:42	04:50 21:31	20:42 (1) 20:57 (1)	20:45 (1) 21:06 (1)	05:28 21:08	06:22 20:02	07:14 18:49	07:12 16:40	08:05 15:57
3	08:28 16:05	07:56 16:58	06:58 17:52	06:43 19:50	05:36 20:44	04:49 21:32	20:41 (1) 20:58 (1)	20:44 (1) 21:05 (1)	05:30 21:08	06:23 20:00	07:16 18:47	07:14 16:38	08:07 15:57
4	08:28 16:06	07:54 16:59	06:55 17:54	06:41 19:52	05:34 20:46	04:49 21:33	20:40 (1) 20:58 (1)	20:45 (1) 21:06 (1)	05:31 21:05	06:25 19:57	07:18 18:44	07:15 16:36	08:08 15:56
5	08:28 16:08	07:52 17:01	06:53 17:56	06:39 19:53	05:32 20:48	04:48 21:34	20:41 (1) 20:59 (1)	20:46 (1) 21:06 (1)	05:33 21:03	06:27 19:55	07:19 18:42	07:17 16:34	08:10 15:55
6	08:27 16:09	07:50 17:03	06:51 17:58	06:36 19:55	05:30 20:50	04:47 21:35	20:40 (1) 20:59 (1)	20:46 (1) 21:06 (1)	05:35 21:01	06:29 19:52	07:21 18:39	07:19 16:32	08:11 15:55
7	08:27 16:10	07:49 17:05	06:48 18:00	06:34 19:57	05:28 20:51	04:46 21:36	20:39 (1) 20:59 (1)	20:47 (1) 21:06 (1)	05:37 20:59	06:30 19:50	07:23 18:37	07:21 16:30	08:12 15:54
8	08:26 16:12	07:47 17:07	06:46 18:02	06:31 19:59	05:26 20:53	04:46 21:37	20:40 (1) 21:00 (1)	20:47 (1) 21:06 (1)	05:38 20:57	06:32 19:48	07:25 18:35	07:23 16:28	08:14 15:54
9	08:26 16:13	07:45 17:09	06:44 18:04	06:29 20:01	05:24 20:55	04:45 21:38	20:40 (1) 21:01 (1)	20:48 (1) 21:05 (1)	05:40 20:55	06:34 19:45	07:27 18:32	07:25 16:27	08:13 15:54
10	08:25 16:15	07:43 17:11	06:41 18:06	06:27 20:03	05:22 20:57	04:45 21:39	20:40 (1) 21:01 (1)	20:49 (1) 21:05 (1)	05:42 20:53	06:36 19:43	07:28 18:30	07:27 16:25	08:16 15:53
11	08:25 16:18	07:41 17:13	06:39 18:08	06:24 20:04	05:21 20:58	04:44 21:40	20:40 (1) 21:02 (1)	20:50 (1) 21:04 (1)	05:43 20:51	06:37 19:40	07:30 18:27	07:29 16:23	08:17 15:53
12	08:24 16:18	07:39 17:15	06:37 18:09	06:22 20:06	05:19 21:00	04:44 21:41	20:40 (1) 21:02 (1)	20:50 (1) 21:03 (1)	05:45 20:48	06:39 19:38	07:32 18:25	07:31 16:22	08:18 15:53
13	08:23 16:19	07:37 17:17	06:34 18:11	06:20 20:08	05:17 21:02	04:44 21:41	20:40 (1) 21:02 (1)	20:52 (1) 21:02 (1)	05:47 20:47	06:41 19:35	07:34 18:23	07:33 16:20	08:19 15:53
14	08:22 16:21	07:35 17:19	06:32 18:13	06:17 20:10	05:15 21:03	04:43 21:42	20:40 (1) 21:02 (1)	20:53 (1) 21:01 (1)	05:48 20:45	06:42 19:33	07:36 18:21	07:34 16:18	08:20 15:53
15	08:21 16:22	07:33 17:21	06:29 18:15	06:15 20:12	05:14 21:05	04:43 21:43	20:40 (1) 21:03 (1)	20:56 (1) 20:59 (1)	05:50 20:43	06:44 19:30	07:38 18:18	07:36 16:17	08:21 15:53
16	08:20 16:24	07:31 17:23	06:27 18:17	06:13 20:13	05:12 21:07	04:43 21:43	20:40 (1) 21:03 (1)		05:52 20:40	06:46 19:28	07:39 18:16	07:38 16:15	08:22 15:52
17	08:19 16:26	07:29 17:25	06:25 18:19	06:10 20:15	05:10 21:08	04:43 21:44	20:41 (1) 21:03 (1)		05:54 20:38	06:48 19:26	07:41 18:14	07:40 16:14	08:23 15:53
18	08:18 16:28	07:27 17:27	06:22 18:21	06:08 20:17	05:09 21:10	04:43 21:44	20:41 (1) 21:03 (1)		05:55 20:36	06:49 19:23	07:43 18:11	07:42 16:12	08:24 15:53
19	08:17 16:29	07:25 17:29	06:20 18:22	06:06 20:19	05:07 21:11	04:43 21:44	20:41 (1) 21:04 (1)		05:57 20:34	06:51 19:21	07:45 18:09	07:44 16:11	08:25 15:54
20	08:16 16:31	07:22 17:31	06:17 18:24	06:04 20:21	05:06 21:13	04:43 21:45	20:41 (1) 21:04 (1)		05:59 20:32	06:53 19:18	07:47 18:07	07:45 16:10	08:25 15:54
21	08:15 16:33	07:20 17:33	06:15 18:26	06:01 20:23	05:04 21:15	04:43 21:45	20:41 (1) 21:04 (1)		06:01 20:30	06:55 19:16	07:49 18:05	07:47 16:08	08:26 15:54
22	08:14 16:35	07:18 17:35	06:12 18:28	05:59 20:24	05:03 21:16	04:43 21:45	20:42 (1) 21:05 (1)		06:02 20:27	06:56 19:13	07:51 18:03	07:49 16:07	08:26 15:55
23	08:12 16:36	07:16 17:37	06:10 18:30	05:57 20:26	05:02 21:18	04:43 21:45	20:42 (1) 21:05 (1)		06:04 20:25	06:58 19:11	07:53 18:00	07:51 16:06	08:27 15:55
24	08:11 16:38	07:14 17:39	06:08 18:32	05:55 20:28	05:00 21:19	04:44 21:45	20:42 (1) 21:04 (1)		06:06 20:23	07:00 19:08	07:54 17:58	07:52 16:05	08:27 15:56
25	08:10 16:40	07:11 17:41	06:05 18:33	05:52 20:30	04:59 21:21	04:44 21:45	20:43 (1) 21:05 (1)		06:08 20:21	07:02 19:06	07:56 17:56	07:54 16:04	08:28 15:57
26	08:08 16:42	07:09 17:43	06:03 18:35	05:50 20:32	04:58 21:22	04:45 21:45	20:43 (1) 21:05 (1)		06:09 20:18	07:03 19:04	07:58 17:54	07:56 16:03	08:28 15:57
27	08:07 16:44	07:07 17:45	06:00 18:37	05:48 20:33	04:56 21:23	04:45 21:45	20:43 (1) 21:06 (1)		06:11 20:16	07:05 19:01	07:00 17:52	07:58 16:02	08:28 15:58
28	08:05 16:46	07:05 17:47	05:58 18:39	05:46 20:35	04:55 21:25	04:45 21:45	20:43 (1) 21:05 (1)		06:13 20:14	07:07 18:59	07:02 17:50	07:59 16:01	08:28 15:59
29	08:04 16:48		06:55 19:41	05:44 20:37	04:54 21:26 7	20:45 (1) 20:52 (1)	04:46 21:45	20:44 (1) 21:06 (1)	05:22 21:15	06:15 20:11	07:09 18:56	07:04 16:48	08:01 16:00	08:29 16:00
30	08:02 16:50		06:53 19:42	05:42 20:39	04:53 21:27 10	20:44 (1) 20:54 (1)	04:47 21:45 21	20:44 (1) 21:05 (1)	05:23 21:13	06:16 20:09	07:11 18:54	07:06 16:46	08:02 15:59	08:29 16:01
31	08:01 16:52		06:51 19:44		04:52 21:29 12	20:42 (1) 20:54 (1)			05:25 21:12	06:18 20:07		07:08 18:44		08:29 16:02
Sonnenscheinstunden	252	274	367	419	492	508	510		459	382	329	260	205	
astr.max.mögl.Beschattung					29	629	244							
Red.Sonnenscheinwahrsch.					0.51	0.45	0.45							
Reduktion Betriebsdauer					0.91	0.91	0.91							
Reduktion Windrichtung					0.63	0.63	0.63							
Gesamte Reduktion					0.30	0.26	0.26							
Met.wahrsch.Beschattung					9	166	63							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GH - IO190

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	20:45 (1)	04:47	20:46 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30	10 20:55 (1)	21:44	21 21:07 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:45 (1)	04:48	20:47 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31	12 20:57 (1)	21:44	20 21:07 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:44 (1)	04:49	20:47 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	14 20:58 (1)	21:44	19 21:08 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:43 (1)	04:50	20:47 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	21:33	16 20:59 (1)	21:43	20 21:07 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:43 (1)	04:50	20:48 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	17 21:00 (1)	21:43	19 21:07 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:43 (1)	04:51	20:49 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	17 21:00 (1)	21:42	18 21:07 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:42 (1)	04:52	20:49 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	18 21:00 (1)	21:41	18 21:07 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:42 (1)	04:53	20:50 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	19 21:01 (1)	21:41	16 21:06 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:43 (1)	04:54	20:51 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	19 21:02 (1)	21:40	15 21:06 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:42 (1)	04:55	20:52 (1)	05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	20 21:02 (1)	21:39	13 21:05 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:42 (1)	04:57	20:53 (1)	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	21 21:03 (1)	21:38	11 21:04 (1)	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:43 (1)	04:58	20:54 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:45	20 21:03 (1)	21:37	9 21:03 (1)	20:48	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:42 (1)	04:59	20:56 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	21 21:03 (1)	21:37	6 21:02 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:42 (1)	05:00		05:48	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	21 21:03 (1)	21:35		20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:42 (1)	05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	22 21:04 (1)	21:34		20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:42 (1)	05:03		05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	22 21:04 (1)	21:33		20:40	19:28	18:16	16:15	15:52
17	08:19	07:29	06:25	06:10	05:10	04:43	20:43 (1)	05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	21 21:04 (1)	21:32		20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:43 (1)	05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	22 21:05 (1)	21:31		20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:43 (1)	05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	22 21:05 (1)	21:30		20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:43 (1)	05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	22 21:05 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:43 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	22 21:05 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:44 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	22 21:06 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	20:44 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	22 21:06 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	20:44 (1)	05:14		06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	22 21:06 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	20:45 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	22 21:07 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45	20:45 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	21 21:06 (1)	21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	20:45 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	22 21:07 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45	20:45 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	22 21:07 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	20:46 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	21 21:07 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:49 (1)	04:47	20:46 (1)	05:23	06:18	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	2 20:51 (1)	21:45	21 21:07 (1)	21:13	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:46 (1)			06:25	06:18		07:08		08:29
	16:52		19:44		21:29	8 20:54 (1)			21:12	20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508		510		459	382	329	260	205
astr.max.mögl.Beschattung					10		593		205					
Red.Sonnenscheinwahrsch.					0.51		0.45		0.45					
Reduktion Betriebsdauer					0.91		0.91		0.91					
Reduktion Windrichtung					0.63		0.63		0.63					
Gesamte Reduktion					0.30		0.26		0.26					
Mat.wahrsch.Beschattung					3		156		53					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GI - IO191

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli		August		September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	20:49 (1)	04:47	20:48 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	18:46	20:41	21:30	6 20:55 (1)	21:44	20 21:08 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:48 (1)	04:48	20:49 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	18:48	20:42	21:31	9 20:57 (1)	21:44	19 21:08 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:47 (1)	04:49	20:49 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	11 20:58 (1)	21:44	18 21:07 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:46 (1)	04:50	20:50 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	21:33	13 20:59 (1)	21:43	17 21:07 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:46 (1)	04:50	20:50 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	14 21:00 (1)	21:43	17 21:07 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:45 (1)	04:51	20:51 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	16 21:01 (1)	21:42	16 21:07 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:44 (1)	04:52	20:52 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	17 21:01 (1)	21:41	15 21:07 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:45 (1)	04:53	20:53 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	17 21:02 (1)	21:41	13 21:06 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:45 (1)	04:54	20:54 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	18 21:03 (1)	21:40	12 21:06 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:44 (1)	04:55	20:55 (1)	05:42	06:36	07:28	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	19 21:03 (1)	21:39	10 21:05 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:44 (1)	04:57	20:56 (1)	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	20 21:04 (1)	21:38	8 21:04 (1)	20:51	19:40	18:27	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:45 (1)	04:58	20:59 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	19 21:04 (1)	21:37	2 21:01 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:44 (1)	04:59		05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	20 21:04 (1)	21:37		20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:44 (1)	05:00		05:49	06:42	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	20 21:04 (1)	21:35		20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:44 (1)	05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	21 21:05 (1)	21:34		20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:45 (1)	05:03		05:52	06:46	07:39	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	20 21:05 (1)	21:33		20:40	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	20:45 (1)	05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	20 21:05 (1)	21:32		20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:45 (1)	05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	21 21:06 (1)	21:31		20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:45 (1)	05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	21 21:06 (1)	21:30		20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:45 (1)	05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	21 21:06 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:45 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	21 21:06 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:46 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	21 21:07 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	20:46 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	21 21:07 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	20:46 (1)	05:14		06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	21 21:07 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	20:47 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	21 21:08 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45	20:47 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	20 21:07 (1)	21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	20:47 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	21 21:08 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45	20:47 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	21 21:08 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	20:48 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	20 21:08 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	20:48 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:42	20:39	21:27	21:45	19 21:07 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52			05:25		06:18		07:08		08:29
	16:52		19:44		21:29			21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508		510		459	382	329	260	235
astr.max.mögl.Beschattung						549		167						
Red.Sonnenscheinwahrsch.						0.45		0.45						
Reduktion Betriebsdauer						0.91		0.91						
Reduktion Windrichtung						0.63		0.63						
Gesamte Reduktion						0.26		0.26						
Met.wahrsch.Beschattung						144		43						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GJ - IO192

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29 16:03	07:59 16:54	07:02 17:49	06:48 19:46	05:40 20:41	04:51 21:30	20:26 (1) 20:47 (1)	20:29 (1) 20:57 (1)	05:26 21:10	06:20 20:04	07:12 18:51	08:04 16:42
2	08:28 16:04	07:57 16:56	07:00 17:50	06:46 19:48	05:38 20:42	04:50 21:31	20:26 (1) 20:48 (1)	20:30 (1) 20:57 (1)	05:28 21:08	06:22 20:02	07:14 18:49	08:05 16:40
3	08:28 16:05	07:56 16:58	06:58 17:52	06:43 19:50	05:36 20:44	04:49 21:32	20:26 (1) 20:49 (1)	20:29 (1) 20:56 (1)	05:30 21:06	06:23 20:00	07:16 18:47	08:07 16:38
4	08:28 16:06	07:54 16:59	06:55 17:54	06:41 19:52	05:34 20:46	04:49 21:33	20:25 (1) 20:49 (1)	20:30 (1) 20:57 (1)	05:31 21:05	06:25 19:57	07:18 18:44	08:08 16:36
5	08:28 16:08	07:52 17:01	06:53 17:56	06:39 19:53	05:32 20:48	04:48 21:34	20:26 (1) 20:50 (1)	20:31 (1) 20:57 (1)	05:33 21:03	06:27 19:55	07:19 18:42	08:10 16:34
6	08:27 16:09	07:50 17:03	06:51 17:58	06:36 19:55	05:30 20:50	04:47 21:35	20:25 (1) 20:50 (1)	20:31 (1) 20:57 (1)	05:35 21:01	06:29 19:52	07:21 18:39	08:11 16:33
7	08:27 16:10	07:49 17:05	06:48 18:00	06:34 19:57	05:28 20:51	04:46 21:36	20:24 (1) 20:50 (1)	20:32 (1) 20:57 (1)	05:37 20:59	06:30 19:50	07:23 18:37	08:12 16:30
8	08:26 16:12	07:47 17:07	06:46 18:02	06:31 19:59	05:26 20:53	04:46 21:37	20:25 (1) 20:51 (1)	20:32 (1) 20:57 (1)	05:38 20:57	06:32 19:48	07:25 18:35	08:14 16:29
9	08:26 16:13	07:45 17:09	06:44 18:04	06:29 20:01	05:24 20:55	04:45 21:38	20:25 (1) 20:52 (1)	20:33 (1) 20:56 (1)	05:40 20:55	06:34 19:45	07:27 18:32	08:15 16:27
10	08:25 16:15	07:43 17:11	06:41 18:06	06:27 20:03	05:22 20:57	04:45 21:39	20:25 (1) 20:52 (1)	20:34 (1) 20:56 (1)	05:42 20:53	06:36 19:43	07:29 18:30	07:27 16:25	08:16 15:53
11	08:25 16:18	07:41 17:13	06:39 18:08	06:24 20:04	05:21 20:58	04:44 21:40	20:25 (1) 20:53 (1)	20:34 (1) 20:58 (1)	05:43 20:51	06:37 19:40	07:30 18:28	07:29 16:23	08:17 15:53
12	08:24 16:18	07:39 17:15	06:37 18:09	06:22 20:06	05:19 21:00	04:44 21:41	20:25 (1) 20:53 (1)	20:35 (1) 20:55 (1)	05:45 20:48	06:39 19:38	07:32 18:25	07:31 16:22	08:18 15:53
13	08:23 16:19	07:37 17:17	06:34 18:11	06:20 20:08	05:17 21:02	04:44 21:41	20:25 (1) 20:53 (1)	20:36 (1) 20:54 (1)	05:47 20:47	06:41 19:35	07:34 18:23	07:33 16:20	08:19 15:53
14	08:22 16:21	07:35 17:19	06:32 18:13	06:17 20:10	05:15 21:03	04:43 21:42	20:25 (1) 20:53 (1)	20:37 (1) 20:53 (1)	05:48 20:45	06:43 19:33	07:36 18:21	07:34 16:18	08:20 15:53
15	08:21 16:22	07:33 17:21	06:29 18:15	06:15 20:12	05:14 21:05	04:43 21:43	20:25 (1) 20:54 (1)	20:38 (1) 20:52 (1)	05:50 20:43	06:44 19:30	07:38 18:18	07:36 16:17	08:21 15:53
16	08:20 16:24	07:31 17:23	06:27 18:17	06:13 20:13	05:12 21:07	04:43 21:43	20:25 (1) 20:54 (1)	20:39 (1) 20:50 (1)	05:52 20:41	06:46 19:28	07:40 18:16	07:38 16:15	08:22 15:52
17	08:19 16:26	07:29 17:25	06:25 18:19	06:10 20:15	05:10 21:08	04:43 21:44	20:25 (1) 20:54 (1)	20:43 (1) 20:49 (1)	05:54 20:38	06:48 19:26	07:41 18:14	07:40 16:14	08:23 15:53
18	08:18 16:28	07:27 17:27	06:22 18:21	06:08 20:17	05:09 21:10	04:43 21:44	20:26 (1) 20:55 (1)		05:55 20:36	06:49 19:23	07:43 18:11	07:42 16:12	08:24 15:53
19	08:17 16:29	07:25 17:29	06:20 18:22	06:06 20:19	05:07 21:11	04:43 21:44	20:26 (1) 20:55 (1)		05:57 20:34	06:51 19:21	07:45 18:09	07:44 16:11	08:25 15:54
20	08:16 16:31	07:22 17:31	06:17 18:24	06:04 20:21	05:06 21:13	04:43 21:45	20:26 (1) 20:55 (1)		05:59 20:32	06:53 19:18	07:47 18:07	07:45 16:10	08:25 15:54
21	08:15 16:33	07:20 17:33	06:15 18:26	06:01 20:23	05:04 21:15	04:43 21:45	20:26 (1) 20:55 (1)		06:01 20:30	06:55 19:16	07:49 18:05	07:47 16:08	08:26 15:54
22	08:14 16:35	07:18 17:35	06:12 18:28	05:59 20:24	05:03 21:16	04:43 21:45	20:27 (1) 20:56 (1)		06:02 20:27	06:56 19:13	07:51 18:03	07:49 16:07	08:26 15:55
23	08:12 16:36	07:16 17:37	06:10 18:30	05:57 20:26	05:02 21:18	04:43 21:45	20:27 (1) 20:56 (1)		06:04 20:25	06:58 19:11	07:53 18:00	07:51 16:06	08:27 15:55
24	08:11 16:38	07:14 17:39	06:08 18:32	05:55 20:28	05:00 21:19	04:44 21:45	20:27 (1) 20:56 (1)		06:06 20:23	07:00 19:08	07:54 17:58	07:53 16:05	08:27 15:56
25	08:10 16:40	07:11 17:41	06:05 18:33	05:52 20:30	04:59 21:21	04:44 21:45	20:27 (1) 20:56 (1)		06:08 20:21	07:02 19:06	07:56 16:56	07:54 16:04	08:28 15:57
26	08:08 16:42	07:09 17:43	06:03 18:35	05:50 20:32	04:58 21:22	04:45 21:45	20:27 (1) 20:56 (1)		06:09 20:18	07:03 19:04	06:58 16:54	07:56 16:03	08:28 15:57
27	08:07 16:44	07:07 17:45	06:00 18:37	05:48 20:33	04:56 21:23	20:32 (1) 9 20:41 (1)	04:45 21:45	20:28 (1) 20:57 (1)	06:11 20:16	07:05 19:01	07:00 16:52	07:58 16:02	08:28 15:58
28	08:05 16:46	07:05 17:47	05:58 18:39	05:46 20:35	04:55 21:25	20:30 (1) 13 20:43 (1)	04:45 21:45	20:28 (1) 20:56 (1)	06:13 20:14	07:07 18:59	07:02 16:50	07:59 16:01	08:28 15:59
29	08:04 16:48		05:55 19:41	05:44 20:37	04:54 21:26	20:29 (1) 15 20:44 (1)	04:46 21:45	20:29 (1) 20:57 (1)	06:15 20:11	07:09 18:56	07:04 16:48	08:01 16:00	08:29 16:00
30	08:02 16:50		06:53 19:43	05:42 20:39	04:53 21:27	20:28 (1) 17 20:45 (1)	04:47 21:45	20:28 (1) 20:56 (1)	06:16 20:09	07:11 18:54	07:06 16:46	08:02 15:59	08:29 16:01
31	08:01 16:52		06:51 19:44		04:52 21:29	20:27 (1) 19 20:48 (1)		06:25 21:12	06:18 20:07		07:08 16:44		08:29 16:02
Sonnenscheinstunden	252	274	367	419	492	508	510	459	382	329	260	235	
astr.max.mögl.Beschattung					73	818	363						
Red.Sonnenscheinwahrsch.					0.51	0.45	0.45						
Reduktion Betriebsdauer					0.91	0.91	0.91						
Reduktion Windrichtung					0.84	0.84	0.84						
Gesamte Reduktion					0.30	0.27	0.26						
Mat.wahrsch.Beschattung					22	218	95						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GK - IO193

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	20:40 (1) 04:47	20:37 (1) 05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	18:46	20:41	21:30	5 20:45 (1) 21:45	23 21:00 (1) 21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:38 (1) 04:48	20:38 (1) 05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	18:48	20:42	21:31	10 20:48 (1) 21:44	22 21:00 (1) 21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:37 (1) 04:49	20:38 (1) 05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	12 20:49 (1) 21:44	21 20:59 (1) 21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:35 (1) 04:50	20:39 (1) 05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	21:33	15 20:50 (1) 21:43	20 20:59 (1) 21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:35 (1) 04:50	20:40 (1) 05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	17 20:52 (1) 21:43	19 20:59 (1) 21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:34 (1) 04:51	20:41 (1) 05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	18 20:52 (1) 21:42	18 20:59 (1) 21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:34 (1) 04:52	20:41 (1) 05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	19 20:53 (1) 21:41	18 20:59 (1) 20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:34 (1) 04:53	20:42 (1) 05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	20 20:54 (1) 21:41	16 20:58 (1) 20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:34 (1) 04:54	20:44 (1) 05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	21 20:55 (1) 21:40	13 20:57 (1) 20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:33 (1) 04:55	20:45 (1) 05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	22 20:55 (1) 21:39	11 20:56 (1) 20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:33 (1) 04:57	20:47 (1) 05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	23 20:56 (1) 21:38	8 20:55 (1) 20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:33 (1) 04:58	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	23 20:56 (1) 21:37	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:33 (1) 04:59	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	23 20:56 (1) 21:37	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:33 (1) 05:00	05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	24 20:57 (1) 21:36	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:33 (1) 05:01	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	24 20:57 (1) 21:34	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:33 (1) 05:03	05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	25 20:58 (1) 21:33	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	20:33 (1) 05:04	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	25 20:58 (1) 21:32	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:33 (1) 05:05	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	25 20:58 (1) 21:31	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:33 (1) 05:07	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	25 20:58 (1) 21:30	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:33 (1) 05:08	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	26 20:59 (1) 21:28	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:33 (1) 05:09	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	26 20:59 (1) 21:27	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:34 (1) 05:11	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	26 21:00 (1) 21:26	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	20:34 (1) 05:12	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	25 20:59 (1) 21:24	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	20:34 (1) 05:14	06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	25 20:59 (1) 21:23	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	20:35 (1) 05:15	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	25 21:00 (1) 21:21	20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45	20:35 (1) 05:17	06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	25 21:00 (1) 21:20	20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	20:36 (1) 05:18	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	24 21:00 (1) 21:18	20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45	20:36 (1) 05:20	06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	24 21:00 (1) 21:17	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	20:37 (1) 05:22	06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	23 21:00 (1) 21:15	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	20:37 (1) 05:23	06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45	23 21:00 (1) 21:13	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		05:25	06:18		07:08		08:29
	16:52		19:44		21:29		21:12	20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508	510	459	382	329	260	235
astr.max.mögl.Beschattung						648	189					
Red.Sonnenscheinwahrsch.						0.45	0.45					
Reduktion Betriebsdauer						0.91	0.91					
Reduktion Windrichtung						0.64	0.64					
Gesamte Reduktion						0.26	0.26					
Met.wahrsch.Beschattung						171	49					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GL - IO194

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		04:47		05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	23	21:45	30	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		04:48		05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	25	21:44	29	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		04:49		05:29	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	26	21:44	29	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		04:50		05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46		21:33	26	21:43	29	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		04:50		05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	27	21:43	28	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		04:51		05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	27	21:42	28	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		04:52		05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	28	21:42	27	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		04:53		05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	28	21:41	27	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		04:54		05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	29	21:40	26	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		04:55		05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	29	21:39	25	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		04:57		05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58		21:40	29	21:38	24	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		04:58		05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	30	21:37	24	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		04:59		05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	30	21:37	22	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		05:00		05:48	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	30	21:36	20	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	30	21:34	18	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		05:03		05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07		21:43	30	21:33	17	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		04:43		05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	30	21:32	14	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	30	21:31	11	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		04:43		05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11		21:44	30	21:30	5	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		04:43		05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13		21:45	30	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		04:43		05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15		21:45	31	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		04:43		05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16		21:45	30	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		04:43		05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18		21:45	30	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		04:44		05:14		06:06	07:00	07:56	07:53	08:27
	16:38	17:39	18:32	20:28	21:19		21:45	30	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:29 (1)	04:44		05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	8 20:37 (1)	21:45	30	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:27 (1)	04:45		05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	13 20:40 (1)	21:45	30	21:20		20:18	19:04	16:58	18:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:25 (1)	04:45		05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	16 20:41 (1)	21:45	31	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:24 (1)	04:45		05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	18 20:42 (1)	21:45	30	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:24 (1)	04:46		05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	19 20:43 (1)	21:45	30	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:23 (1)	04:47		05:25		06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21 20:44 (1)	21:45	29	20:54 (1)		21:13		16:46	15:59	16:01
31	08:01		06:51		04:52	20:22 (1)					05:25		07:08		08:29
	16:52		19:44		21:29	23 20:45 (1)					21:12		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492		508				510	459	382	329	260	235
astr.mas.mögl.Beschattung						118		868		433						
Red.Sonnenscheinwahrsch.						0.51		0.45		0.45						
Reduktion Betriebsdauer						0.91		0.91		0.91						
Reduktion Windrichtung						0.64		0.64		0.64						
Gesamte Reduktion						0.30		0.27		0.26						
Mat.wahrsch.Beschattung						35		232		113						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GM - IO195

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	20:37 (1)	04:47	20:35 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	18:46	20:41	21:30	7 20:44 (1)	21:45 23	20:58 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:36 (1)	04:48	20:36 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	18:48	20:42	21:31	11 20:47 (1)	21:44 23	20:59 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:34 (1)	04:49	20:35 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	14 20:48 (1)	21:44 23	20:58 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:33 (1)	04:50	20:36 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	17:00	17:54	19:52	20:46	21:33	16 20:49 (1)	21:43 22	20:58 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:33 (1)	04:50	20:37 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	17 20:50 (1)	21:43 21	20:58 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:32 (1)	04:51	20:38 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	19 20:51 (1)	21:42 19	20:57 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:31 (1)	04:52	20:39 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	20 20:51 (1)	21:42 18	20:57 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:31 (1)	04:53	20:40 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	21 20:52 (1)	21:41 17	20:57 (1)	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:31 (1)	04:54	20:41 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	22 20:53 (1)	21:40 15	20:56 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:31 (1)	04:55	20:42 (1)	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	22 20:53 (1)	21:39 13	20:55 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:31 (1)	04:57	20:44 (1)	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	23 20:54 (1)	21:38 9	20:53 (1)	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:31 (1)	04:58	20:47 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	24 20:55 (1)	21:37 4	20:51 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:30 (1)	04:59		05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	25 20:55 (1)	21:37		20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:30 (1)	05:00		05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	25 20:55 (1)	21:36		20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:30 (1)	05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	26 20:56 (1)	21:34		20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:31 (1)	05:03		05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	25 20:56 (1)	21:33		20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	20:31 (1)	05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	25 20:56 (1)	21:32		20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:31 (1)	05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	26 20:57 (1)	21:31		20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:31 (1)	05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	26 20:57 (1)	21:30		20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:31 (1)	05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	26 20:57 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:31 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	26 20:57 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:32 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	26 20:58 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	20:32 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	26 20:58 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	20:32 (1)	05:14		06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	26 20:58 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	20:33 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	26 20:59 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45	20:33 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	25 20:58 (1)	21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	20:34 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	25 20:59 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45	20:33 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	25 20:58 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	20:34 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	25 20:59 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	20:34 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45	24 20:58 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52			05:25		06:18		07:08		08:29
	16:52		19:44		21:29			21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508		510	459	382	329	260	235	
astr.max.mögl.Beschattung							674	207						
Red.Sonnenscheinwahrsch.							0.45	0.45						
Reduktion Betriebsdauer							0.91	0.91						
Reduktion Windrichtung							0.64	0.64						
Gesamte Reduktion							0.26	0.26						
Met.wahrsch.Beschattung							178	54						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GN - IO196

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		20:19 (1)	04:47	20:23 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	26	20:45 (1)	21:45	20:53 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		20:20 (1)	04:48	20:24 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	26	20:46 (1)	21:44	20:54 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		20:19 (1)	04:49	20:23 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	27	20:46 (1)	21:44	20:53 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		20:19 (1)	04:50	20:24 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46		21:33	27	20:46 (1)	21:43	20:53 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		20:19 (1)	04:50	20:25 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	28	20:47 (1)	21:43	20:54 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		20:19 (1)	04:51	20:25 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	28	20:47 (1)	21:42	20:54 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		20:18 (1)	04:52	20:26 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	29	20:47 (1)	21:42	20:54 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		20:19 (1)	04:53	20:26 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	29	20:48 (1)	21:41	20:54 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		20:19 (1)	04:54	20:27 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	30	20:49 (1)	21:40	20:54 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		20:19 (1)	04:55	20:27 (1)	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	30	20:49 (1)	21:39	20:54 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		20:19 (1)	04:57	20:28 (1)	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58		21:40	30	20:49 (1)	21:38	20:53 (1)	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		20:19 (1)	04:58	20:28 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	31	20:50 (1)	21:37	20:53 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		20:19 (1)	04:59	20:28 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	30	20:49 (1)	21:37	20:52 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		20:19 (1)	05:00	20:28 (1)	05:48	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	31	20:50 (1)	21:36	20:52 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		20:19 (1)	05:01	20:28 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	31	20:50 (1)	21:34	20:52 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		20:20 (1)	05:03	20:31 (1)	05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07		21:43	30	20:50 (1)	21:33	20:50 (1)	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		04:43		20:20 (1)	05:04	20:33 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	31	20:51 (1)	21:32	20:50 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		20:20 (1)	05:05	20:34 (1)	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	31	20:51 (1)	21:31	20:48 (1)	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		04:43		20:20 (1)	05:07	20:33 (1)	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11		21:44	31	20:51 (1)	21:30	20:47 (1)	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		04:43		20:20 (1)	05:08	20:39 (1)	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13		21:45	31	20:51 (1)	21:28	20:45 (1)	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		04:43		20:20 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15		21:45	31	20:51 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		04:43		20:21 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16		21:45	31	20:52 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		04:43		20:21 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18		21:45	31	20:52 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	20:27 (1)	04:44		20:21 (1)	05:14		06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19	9 20:36 (1)	21:45	31	20:52 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:25 (1)	04:44		20:22 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	13 20:38 (1)	21:45	31	20:53 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:24 (1)	04:45		20:22 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	18 20:40 (1)	21:45	31	20:53 (1)	21:20		20:18	19:04	16:58	18:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:23 (1)	04:45		20:22 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	18 20:41 (1)	21:45	31	20:53 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:22 (1)	04:45		20:22 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	20 20:42 (1)	21:45	31	20:53 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:21 (1)	04:46		20:23 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	22 20:43 (1)	21:45	31	20:54 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:20 (1)	04:47		20:23 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	24 20:44 (1)	21:45	30	20:53 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:20 (1)				05:25		06:18		07:08		08:29
	16:52		19:44		21:29	24 20:44 (1)				21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508				510	499	382	329	260	235	
astr.max.mögl.Beschattung					146		896			472						
Red.Sonnenscheinwahrsch.					0.51		0.45			0.45						
Reduktion Betriebsdauer					0.91		0.91			0.94						
Reduktion Windrichtung					0.64		0.64			0.64						
Gesamte Reduktion					0.30		0.27			0.26						
Mat.wahrsch.Beschattung					44		240			124						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)	
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)	

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GO - IO197

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		20:10 (1)	04:47	20:24 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	25	20:45 (1)	21:45	20:54 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		20:21 (1)	04:48	20:24 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	25	20:46 (1)	21:44	20:54 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		20:20 (1)	04:49	20:24 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	26	20:46 (1)	21:44	20:54 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		20:19 (1)	04:50	20:25 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46		21:33	28	20:47 (1)	21:43	20:54 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		20:20 (1)	04:50	20:25 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	28	20:48 (1)	21:43	20:54 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		20:19 (1)	04:51	20:26 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	29	20:48 (1)	21:42	20:54 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		20:19 (1)	04:52	20:26 (1)	05:37	06:30	07:23	07:21	08:12
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8	08:26	07:47	06:46	06:31	05:26		04:46		20:19 (1)	04:53	20:27 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	29	20:48 (1)	21:41	20:54 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		20:20 (1)	04:54	20:27 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	29	20:49 (1)	21:40	20:54 (1)	20:55	19:45	18:32	16:27	15:54
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	16:15	17:11	18:06	20:03	20:57		21:39	30	20:49 (1)	21:39	20:54 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		20:20 (1)	04:57	20:28 (1)	05:43	06:37	07:30	07:29	08:17
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12	08:24	07:39	06:37	06:22	05:19		04:44		20:20 (1)	04:58	20:29 (1)	05:45	06:39	07:32	07:31	08:18
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13	08:23	07:37	06:34	06:20	05:17		04:44		20:19 (1)	04:59	20:29 (1)	05:47	06:41	07:34	07:33	08:19
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14	08:22	07:35	06:32	06:17	05:15		04:43		20:20 (1)	05:00	20:30 (1)	05:48	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	30	20:50 (1)	21:36	20:52 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		20:20 (1)	05:01	20:31 (1)	05:50	06:44	07:38	07:36	08:21
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16	08:20	07:31	06:27	06:13	05:12		04:43		20:20 (1)	05:03	20:32 (1)	05:52	06:46	07:40	07:38	08:22
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17	08:19	07:29	06:25	06:10	05:10		04:43		20:20 (1)	05:04	20:34 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	31	20:51 (1)	21:32	20:49 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		20:20 (1)	05:05	20:35 (1)	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	31	20:51 (1)	21:31	20:48 (1)	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		04:43		20:21 (1)	05:07	20:37 (1)	05:57	06:51	07:45	07:44	08:25
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20	08:16	07:22	06:17	06:04	05:06		04:43		20:21 (1)	05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13		21:45	31	20:52 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		04:43		20:21 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15		21:45	31	20:52 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		04:43		20:22 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16		21:45	31	20:53 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		04:43		20:22 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18		21:45	31	20:53 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	20:10 (1)	04:44		20:23 (1)	05:14		06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19	4 20:34 (1)	21:45	31	20:52 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:27 (1)	04:44		20:22 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	10 20:57 (1)	21:45	31	20:53 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:25 (1)	04:45		20:22 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	14 20:39 (1)	21:45	31	20:53 (1)	21:20		20:18	19:04	16:58	18:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:24 (1)	04:45		20:23 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	17 20:43 (1)	21:45	31	20:54 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:23 (1)	04:45		20:23 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	19 20:42 (1)	21:45	30	20:53 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:23 (1)	04:46		20:23 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21 20:43 (1)	21:45	31	20:54 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:21 (1)	04:47		20:23 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	23 20:44 (1)	21:45	30	20:53 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:21 (1)				05:25		06:18		07:08		08:29
	16:52		19:44		21:29	33 20:44 (1)				21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508				510	459	382	329	260	235	
astr.max.mögl.Beschattung					131		893			452						
Red.Sonnenscheinwahrsch.					0.51		0.45			0.45						
Reduktion Betriebsdauer					0.91		0.91			0.91						
Reduktion Windrichtung					0.64		0.64			0.64						
Gesamte Reduktion					0.30		0.27			0.26						
Mat.wahrsch.Beschattung					39		239			118						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GP - IO198

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	20:36 (1)	04:47	20:34 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	18:46	20:41	21:30	8 20:44 (1)	21:45	24 20:58 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:35 (1)	04:48	20:35 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	18:48	20:42	21:31	12 20:47 (1)	21:44	23 20:58 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:33 (1)	04:49	20:35 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	15 20:48 (1)	21:44	23 20:58 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:32 (1)	04:50	20:36 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	17:00	17:54	19:52	20:46	21:33	17 20:49 (1)	21:43	22 20:58 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:32 (1)	04:50	20:37 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	18 20:50 (1)	21:43	20 20:57 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:31 (1)	04:51	20:37 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	20 20:51 (1)	21:42	20 20:57 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:30 (1)	04:52	20:38 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	21 20:51 (1)	21:42	19 20:57 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:31 (1)	04:53	20:39 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	21 20:52 (1)	21:41	17 20:56 (1)	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:31 (1)	04:54	20:40 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	22 20:53 (1)	21:40	18 20:56 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:30 (1)	04:55	20:42 (1)	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	23 20:53 (1)	21:39	13 20:55 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:30 (1)	04:57	20:43 (1)	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	24 20:54 (1)	21:38	10 20:53 (1)	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:30 (1)	04:58	20:46 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	25 20:55 (1)	21:37	5 20:51 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:30 (1)	04:59		05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	24 20:54 (1)	21:37		20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:30 (1)	05:00		05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	25 20:55 (1)	21:36		20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:30 (1)	05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	25 20:55 (1)	21:34		20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:30 (1)	05:03		05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	26 20:56 (1)	21:33		20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	20:30 (1)	05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	26 20:56 (1)	21:32		20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:30 (1)	05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	26 20:56 (1)	21:31		20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:30 (1)	05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	27 20:57 (1)	21:30		20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:30 (1)	05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	27 20:57 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:30 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	27 20:57 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:31 (1)	05:11		06:02	06:56	07:51	07:49	08:26
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	16:36	17:37	18:30	20:26	21:18	21:45	27 20:58 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	20:31 (1)	05:14		06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	26 20:57 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	20:32 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	26 20:58 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45	20:32 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	26 20:58 (1)	21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	20:33 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	26 20:59 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45	20:33 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	25 20:58 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	20:34 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	25 20:59 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	20:33 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45	25 20:58 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52			05:25		06:18		07:08		08:29
	16:52		19:44		21:29			21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508		510		459	382	329	260	235
astr.max.mögl.Beschattung						692		212						
Red.Sonnenscheinwahrsch.						0.45		0.45						
Reduktion Betriebsdauer						0.91		0.91						
Reduktion Windrichtung						0.64		0.64						
Gesamte Reduktion						0.26		0.26						
Met.wahrsch.Beschattung						183		55						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GQ - IO199

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	20:37 (1) | 04:47	20:34 (1) | 05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	18:46	20:41	21:30	6 20:43 (1) | 21:45 24	20:58 (1) | 21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:36 (1) | 04:48	20:35 (1) | 05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31	10 20:46 (1) | 21:44 23	20:58 (1) | 21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:34 (1) | 04:49	20:35 (1) | 05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	13 20:47 (1) | 21:44 22	20:57 (1) | 21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:33 (1) | 04:50	20:36 (1) | 05:31	06:25	07:18	07:15	08:08
	16:06	17:00	17:54	19:52	20:46	21:33	15 20:48 (1) | 21:43 21	20:57 (1) | 21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:33 (1) | 04:50	20:37 (1) | 05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	17 20:50 (1) | 21:43 20	20:57 (1) | 21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:32 (1) | 04:51	20:38 (1) | 05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	18 20:50 (1) | 21:42 19	20:57 (1) | 21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:31 (1) | 04:52	20:39 (1) | 05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	20 20:51 (1) | 21:42 17	20:56 (1) | 20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:31 (1) | 04:53	20:40 (1) | 05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	21 20:52 (1) | 21:41 16	20:56 (1) | 20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:31 (1) | 04:54	20:41 (1) | 05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	22 20:53 (1) | 21:40 14	20:55 (1) | 20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:30 (1) | 04:55	20:42 (1) | 05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	23 20:53 (1) | 21:39 12	20:54 (1) | 20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:30 (1) | 04:57	20:44 (1) | 05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	24 20:54 (1) | 21:38 8	20:52 (1) | 20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:31 (1) | 04:58	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	23 20:54 (1) | 21:37	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:30 (1) | 04:59	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	24 20:54 (1) | 21:37	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:30 (1) | 05:00	05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	25 20:55 (1) | 21:36	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:30 (1) | 05:01	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	25 20:55 (1) | 21:34	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:30 (1) | 05:03	05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	26 20:56 (1) | 21:33	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	20:30 (1) | 05:04	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	26 20:56 (1) | 21:32	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:30 (1) | 05:05	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	26 20:56 (1) | 21:31	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:30 (1) | 05:07	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	26 20:56 (1) | 21:30	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:31 (1) | 05:08	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	26 20:57 (1) | 21:28	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:31 (1) | 05:09	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	26 20:57 (1) | 21:27	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:32 (1) | 05:11	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	26 20:58 (1) | 21:26	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	20:31 (1) | 05:12	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	26 20:57 (1) | 21:24	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	20:31 (1) | 05:14	06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	26 20:57 (1) | 21:23	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	20:32 (1) | 05:15	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	26 20:58 (1) | 21:21	20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45	20:32 (1) | 05:17	06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	26 20:58 (1) | 21:20	20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	20:33 (1) | 05:18	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	25 20:58 (1) | 21:18	20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45	20:33 (1) | 05:20	06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	25 20:58 (1) | 21:17	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	20:34 (1) | 05:22	06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	24 20:58 (1) | 21:15	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	20:34 (1) | 05:23	06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45	24 20:58 (1) | 21:13	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		| 05:25	06:18		07:08		08:29
	16:52		19:44		21:29		| 21:12	20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508	510	459	382	329	260	235
astr.max.mögl.Beschattung						670	196					
Red.Sonnenscheinwahrsch.						0.45	0.45					
Reduktion Betriebsdauer						0.91	0.91					
Reduktion Windrichtung						0.64	0.64					
Gesamte Reduktion						0.26	0.26					
Met.wahrsch.Beschattung						177	51					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GR - IO200

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		20:18 (1)	04:47	20:22 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	26	20:44 (1)	21:45	20:53 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		20:19 (1)	04:48	20:23 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	26	20:45 (1)	21:44	20:53 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		20:18 (1)	04:49	20:22 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	27	20:45 (1)	21:44	20:53 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		20:18 (1)	04:50	20:23 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46		21:33	28	20:46 (1)	21:43	20:53 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		20:18 (1)	04:50	20:23 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	29	20:47 (1)	21:43	20:53 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		20:18 (1)	04:51	20:24 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	29	20:47 (1)	21:42	20:53 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		20:17 (1)	04:52	20:24 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	30	20:47 (1)	21:42	20:53 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		20:18 (1)	04:53	20:25 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	29	20:47 (1)	21:41	20:53 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		20:18 (1)	04:54	20:25 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	30	20:48 (1)	21:40	20:53 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		20:18 (1)	04:55	20:26 (1)	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	30	20:48 (1)	21:39	20:53 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		20:18 (1)	04:57	20:27 (1)	05:43	06:37	07:30	07:28	08:17
	16:16	17:13	18:08	20:04	20:58		21:40	31	20:49 (1)	21:38	20:52 (1)	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		20:18 (1)	04:58	20:27 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	31	20:48 (1)	21:37	20:52 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		20:18 (1)	04:59	20:28 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	31	20:49 (1)	21:37	20:52 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		20:18 (1)	05:00	20:28 (1)	05:48	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	31	20:49 (1)	21:36	20:51 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		20:18 (1)	05:01	20:29 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	32	20:50 (1)	21:34	20:50 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		20:18 (1)	05:03	20:30 (1)	05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07		21:43	32	20:50 (1)	21:33	20:49 (1)	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		04:43		20:19 (1)	05:04	20:32 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	31	20:50 (1)	21:32	20:49 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		20:19 (1)	05:05	20:33 (1)	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	31	20:50 (1)	21:31	20:47 (1)	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		04:43		20:19 (1)	05:07	20:34 (1)	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11		21:44	32	20:51 (1)	21:30	20:45 (1)	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		04:43		20:19 (1)	05:08	20:35 (1)	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13		21:45	32	20:51 (1)	21:28	20:43 (1)	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		04:43		20:19 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15		21:45	32	20:51 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		04:43		20:20 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16		21:45	32	20:52 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		04:43		20:20 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18		21:45	32	20:52 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	20:26 (1)	04:44		20:20 (1)	05:14		06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19	9 20:35 (1)	21:45	31	20:51 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:24 (1)	04:44		20:21 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	13 20:37 (1)	21:45	31	20:52 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:23 (1)	04:45		20:21 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	18 20:39 (1)	21:45	31	20:52 (1)	21:20		20:18	19:04	16:58	18:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:22 (1)	04:45		20:21 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	18 20:40 (1)	21:45	32	20:53 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:21 (1)	04:45		20:21 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	20 20:41 (1)	21:45	31	20:52 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		08:55	05:44	04:54	20:20 (1)	04:46		20:22 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	22 20:42 (1)	21:45	31	20:53 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:19 (1)	04:47		20:21 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	24 20:43 (1)	21:45	31	20:52 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:19 (1)				05:25		06:18		07:08		08:29
	16:52		19:44		21:29	24 20:43 (1)				21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508				510		459	382	329	260	235
astr.max.mögl.Beschattung						146		912		476						
Red.Sonnenscheinwahrsch.						0.51		0.45		0.45						
Reduktion Betriebsdauer						0.91		0.91		0.91						
Reduktion Windrichtung						0.65		0.65		0.65						
Gesamte Reduktion						0.30		0.27		0.26						
Mat.wahrsch.Beschattung						44		244		125						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GS - IO201

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		20:19 (1)	04:47	20:22 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	25	20:44 (1)	21:45	20:53 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		20:19 (1)	04:48	20:23 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	26	20:45 (1)	21:44	20:53 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		20:19 (1)	04:49	20:23 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	27	20:46 (1)	21:44	20:53 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		20:18 (1)	04:50	20:23 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46		21:33	28	20:46 (1)	21:43	20:53 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		20:19 (1)	04:50	20:24 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	28	20:47 (1)	21:43	20:53 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		20:18 (1)	04:51	20:24 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	29	20:47 (1)	21:42	20:53 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		20:18 (1)	04:52	20:25 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	29	20:47 (1)	21:42	20:53 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		20:18 (1)	04:53	20:25 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	30	20:48 (1)	21:41	20:53 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		20:18 (1)	04:54	20:26 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	30	20:48 (1)	21:40	20:53 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		20:18 (1)	04:55	20:26 (1)	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	30	20:48 (1)	21:39	20:53 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		20:18 (1)	04:57	20:27 (1)	05:43	06:37	07:30	07:28	08:17
	16:16	17:13	18:08	20:04	20:58		21:40	31	20:49 (1)	21:38	20:52 (1)	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		20:19 (1)	04:58	20:28 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	30	20:48 (1)	21:37	20:52 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		20:18 (1)	04:59	20:28 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	31	20:49 (1)	21:37	20:52 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		20:18 (1)	05:00	20:28 (1)	05:48	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	31	20:49 (1)	21:36	20:51 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		20:18 (1)	05:01	20:28 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	32	20:50 (1)	21:34	20:50 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		20:19 (1)	05:03	20:28 (1)	05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07		21:43	31	20:50 (1)	21:33	20:48 (1)	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		04:43		20:19 (1)	05:04	20:32 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	31	20:50 (1)	21:32	20:49 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		20:19 (1)	05:05	20:34 (1)	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	32	20:51 (1)	21:31	20:47 (1)	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		04:43		20:19 (1)	05:07	20:36 (1)	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11		21:44	32	20:51 (1)	21:30	20:45 (1)	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		04:43		20:19 (1)	05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13		21:45	32	20:51 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		04:43		20:19 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15		21:45	32	20:51 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		04:43		20:20 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16		21:45	32	20:52 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		04:43		20:20 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18		21:45	32	20:52 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	20:28 (1)	04:44		20:20 (1)	05:14		06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19	5 20:33 (1)	21:45	32	20:52 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:25 (1)	04:44		20:21 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	12 20:37 (1)	21:45	31	20:52 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:24 (1)	04:45		20:21 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	14 20:38 (1)	21:45	31	20:52 (1)	21:20		20:18	19:04	16:58	18:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:22 (1)	04:45		20:22 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	18 20:48 (1)	21:45	31	20:53 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:21 (1)	04:45		20:23 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	20 20:41 (1)	21:45	32	20:53 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:21 (1)	04:46		20:22 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21 20:42 (1)	21:45	31	20:53 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:20 (1)	04:47		20:22 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	23 20:43 (1)	21:45	31	20:53 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:19 (1)				05:25		06:18		07:08		08:29
	16:52		19:44		21:29	24 20:43 (1)				21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492		508			510		459	382	329	260	235
astr.max.mögl.Beschattung						137		910		462						
Red.Sonnenscheinwahrsch.						0.51		0.45		0.45						
Reduktion Betriebsdauer						0.91		0.91		0.91						
Reduktion Windrichtung						0.64		0.64		0.64						
Gesamte Reduktion						0.30		0.27		0.26						
Mat.wahrsch.Beschattung						41		245		121						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GT - IO202

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		20:33 (1)	04:47	20:32 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	10	20:43 (1)	21:45	20:57 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		20:33 (1)	04:48	20:33 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	13	20:46 (1)	21:44	20:57 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		20:31 (1)	04:49	20:33 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	16	20:47 (1)	21:44	20:56 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		20:30 (1)	04:50	20:34 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	17:00	17:54	19:52	20:46		21:33	17	20:47 (1)	21:43	20:56 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		20:30 (1)	04:50	20:34 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	19	20:49 (1)	21:43	20:56 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		20:29 (1)	04:51	20:35 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	20	20:49 (1)	21:42	20:56 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		20:28 (1)	04:52	20:36 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	22	20:50 (1)	21:42	20:56 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		20:29 (1)	04:53	20:37 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	22	20:51 (1)	21:41	20:55 (1)	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		20:29 (1)	04:54	20:38 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	23	20:52 (1)	21:40	20:54 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		20:28 (1)	04:55	20:39 (1)	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	24	20:52 (1)	21:39	20:54 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		20:28 (1)	04:57	20:41 (1)	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58		21:40	25	20:53 (1)	21:38	20:52 (1)	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		20:28 (1)	04:58	20:43 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	25	20:53 (1)	21:37	20:50 (1)	20:48	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		20:28 (1)	04:59		05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	25	20:53 (1)	21:37		20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		20:28 (1)	05:00		05:48	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	26	20:54 (1)	21:36		20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		20:28 (1)	05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	26	20:54 (1)	21:34		20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		20:28 (1)	05:03		05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07		21:43	27	20:55 (1)	21:33		20:41	19:28	18:16	16:15	15:52
17	08:19	07:29	06:25	06:10	05:10		04:43		20:28 (1)	05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	27	20:55 (1)	21:32		20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		20:28 (1)	05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	27	20:55 (1)	21:31		20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		04:43		20:28 (1)	05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11		21:44	27	20:55 (1)	21:30		20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		04:43		20:28 (1)	05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13		21:45	27	20:55 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		04:43		20:28 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15		21:45	28	20:56 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		04:43		20:29 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16		21:45	28	20:57 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		04:43		20:29 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18		21:45	27	20:56 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		04:44		20:29 (1)	05:14		06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19		21:45	27	20:56 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		04:44		20:30 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21		21:45	27	20:57 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58		04:45		20:30 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22		21:45	27	20:57 (1)	21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		04:45		20:31 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23		21:45	26	20:57 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		04:45		20:31 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25		21:45	26	20:57 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		05:55	05:44	04:54		04:46		20:32 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26		21:45	25	20:57 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		04:47		20:31 (1)	05:23		06:18	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27		21:45	26	20:57 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:36 (1)				05:25		06:18		07:08		08:29
	16:52		19:44		21:29	4 20:40 (1)				21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492		508		510		459	382	329	260	205	
astr.max.mögl.Beschattung						4		715		224						
Red.Sonnenscheinwahrsch.						0.51		0.45		0.45						
Reduktion Betriebsdauer						0.91		0.91		0.91						
Reduktion Windrichtung						0.84		0.64		0.84						
Gesamte Reduktion						0.30		0.26		0.26						
Mat.wahrsch.Beschattung						1		189		58						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GU - IO203

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	Septembe	Oktober	Novembe	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		20:19 (1)	04:47	20:22 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	25	20:44 (1)	21:45	20:53 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		20:19 (1)	04:48	20:23 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	26	20:45 (1)	21:44	20:53 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		20:19 (1)	04:49	20:23 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	26	20:45 (1)	21:44	20:53 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		20:18 (1)	04:50	20:23 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46		21:33	28	20:46 (1)	21:43	20:53 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		20:19 (1)	04:50	20:24 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	28	20:47 (1)	21:43	20:53 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		20:18 (1)	04:51	20:24 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	29	20:47 (1)	21:42	20:53 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		20:18 (1)	04:52	20:25 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	29	20:47 (1)	21:42	20:53 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		20:18 (1)	04:53	20:25 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	30	20:48 (1)	21:41	20:53 (1)	20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		20:18 (1)	04:54	20:26 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	30	20:48 (1)	21:40	20:53 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		20:18 (1)	04:55	20:27 (1)	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	30	20:48 (1)	21:39	20:53 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		20:18 (1)	04:57	20:27 (1)	05:43	06:37	07:30	07:28	08:17
	16:16	17:13	18:08	20:04	20:58		21:40	31	20:49 (1)	21:38	20:52 (1)	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		20:19 (1)	04:58	20:28 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	30	20:48 (1)	21:37	20:52 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		20:18 (1)	04:59	20:28 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	31	20:49 (1)	21:37	20:51 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		20:18 (1)	05:00	20:28 (1)	05:48	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	31	20:49 (1)	21:36	20:50 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		20:18 (1)	05:01	20:28 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	32	20:50 (1)	21:34	20:50 (1)	20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		20:19 (1)	05:03	20:31 (1)	05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07		21:43	31	20:50 (1)	21:33	20:48 (1)	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		04:43		20:19 (1)	05:04	20:33 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	31	20:50 (1)	21:32	20:48 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		20:19 (1)	05:05	20:35 (1)	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	32	20:51 (1)	21:31	20:48 (1)	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		04:43		20:19 (1)	05:07	20:38 (1)	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11		21:44	32	20:51 (1)	21:30	20:43 (1)	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		04:43		20:19 (1)	05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13		21:45	32	20:51 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		04:43		20:19 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15		21:45	32	20:51 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		04:43		20:20 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16		21:45	32	20:52 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		04:43		20:20 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18		21:45	32	20:52 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		04:44		20:20 (1)	05:14		06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19		21:45	32	20:52 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:26 (1)	04:44		20:21 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	9 20:35 (1)	21:45	32	20:53 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:24 (1)	04:45		20:21 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	14 20:38 (1)	21:45	31	20:52 (1)	21:20		20:18	19:04	16:58	18:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:23 (1)	04:45		20:22 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	16 20:39 (1)	21:45	31	20:53 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:22 (1)	04:45		20:23 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	19 20:41 (1)	21:45	32	20:53 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		08:55	05:44	04:54	20:21 (1)	04:46		20:22 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21 20:42 (1)	21:45	31	20:53 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:20 (1)	04:47		20:22 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	22 20:42 (1)	21:45	31	20:53 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:20 (1)				05:25		06:18		07:08		08:29
	16:52		19:44		21:29	23 20:43 (1)				21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492		508			510		459	382	329	260	235
astr.max.mögl.Beschattung						124		010		449						
Red.Sonnenscheinwahrsch.						0.51		0.45		0.45						
Reduktion Betriebsdauer						0.91		0.91		0.91						
Reduktion Windrichtung						0.84		0.64		0.64						
Gesamte Reduktion						0.39		0.27		0.26						
Mat.wahrsch.Beschattung						37		243		118						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GV - IO204

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		20:31 (1)	04:47	20:31 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	12	20:43 (1)	21:45	20:56 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		20:31 (1)	04:48	20:32 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	15	20:46 (1)	21:44	20:57 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		20:29 (1)	04:49	20:33 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	18	20:47 (1)	21:44	20:56 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		20:28 (1)	04:50	20:32 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	17:00	17:54	19:52	20:46		21:33	19	20:47 (1)	21:43	20:56 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		20:29 (1)	04:50	20:33 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	20	20:48 (1)	21:43	20:56 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		20:28 (1)	04:51	20:34 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	21	20:49 (1)	21:42	20:56 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		20:27 (1)	04:52	20:35 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	22	20:49 (1)	21:42	20:55 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		20:27 (1)	04:53	20:35 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	23	20:50 (1)	21:41	20:55 (1)	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		20:27 (1)	04:54	20:36 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	24	20:51 (1)	21:40	20:54 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		20:26 (1)	04:55	20:38 (1)	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	25	20:51 (1)	21:39	20:54 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		20:27 (1)	04:57	20:39 (1)	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58		21:40	25	20:52 (1)	21:38	20:53 (1)	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		20:27 (1)	04:58	20:40 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	26	20:53 (1)	21:37	20:51 (1)	20:48	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		20:26 (1)	04:59	20:43 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	27	20:53 (1)	21:37	20:49 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		20:26 (1)	05:00		05:48	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	27	20:53 (1)	21:36		20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		20:26 (1)	05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	28	20:54 (1)	21:34		20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		20:27 (1)	05:03		05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07		21:43	27	20:54 (1)	21:33		20:41	19:28	18:16	16:15	15:52
17	08:19	07:29	06:25	06:10	05:10		04:43		20:27 (1)	05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	27	20:54 (1)	21:32		20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		20:27 (1)	05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	28	20:55 (1)	21:31		20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		04:43		20:27 (1)	05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11		21:44	28	20:55 (1)	21:30		20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		04:43		20:27 (1)	05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13		21:45	28	20:55 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		04:43		20:27 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15		21:45	28	20:55 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		04:43		20:28 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16		21:45	28	20:56 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		04:43		20:28 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18		21:45	28	20:56 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		04:44		20:28 (1)	05:14		06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19		21:45	28	20:56 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		04:44		20:29 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21		21:45	27	20:56 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58		04:45		20:29 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22		21:45	27	20:56 (1)	21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		04:45		20:30 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23		21:45	27	20:57 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		04:45		20:29 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25		21:45	27	20:56 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54		04:46		20:30 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26		21:45	27	20:57 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		04:47		20:30 (1)	05:23		06:18	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27		21:45	26	20:56 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:33 (1)				05:25		06:18		07:08		08:29
	16:52		19:44		21:29	9 20:42 (1)				21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492		508		510		459	382	329	260	205	
astr.max.mögl.Beschattung						9		743		749						
Red.Sonnenscheinwahrsch.						0.51		0.45		0.45						
Reduktion Betriebsdauer						0.91		0.91		0.91						
Reduktion Windrichtung						0.84		0.84		0.84						
Gesamte Reduktion						0.30		0.27		0.26						
Mat.wahrsch.Beschattung						3		197		65						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GW - IO205

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	04:47		20:34 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30	21:45	23	20:57 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:36 (1)	04:48	20:35 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31	7 20:43 (1)	21:44	22 20:57 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:34 (1)	04:49	20:35 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	11 20:45 (1)	21:44	21 20:56 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:33 (1)	04:50	20:35 (1)	05:31	06:25	07:18	07:15	08:08
	16:07	17:00	17:54	19:52	20:46	21:33	14 20:47 (1)	21:43	21 20:56 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:32 (1)	04:50	20:36 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	16 20:48 (1)	21:43	20 20:56 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:31 (1)	04:51	20:37 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	18 20:49 (1)	21:42	19 20:56 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:30 (1)	04:52	20:38 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	19 20:49 (1)	21:42	17 20:55 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:30 (1)	04:53	20:40 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	21 20:51 (1)	21:41	14 20:54 (1)	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:31 (1)	04:54	20:41 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	21 20:52 (1)	21:40	12 20:53 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:30 (1)	04:55	20:43 (1)	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	22 20:52 (1)	21:39	9 20:52 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:30 (1)	04:57	20:46 (1)	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	23 20:53 (1)	21:38	3 20:49 (1)	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:30 (1)	04:58		05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	23 20:53 (1)	21:37		20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:29 (1)	04:59		05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	24 20:53 (1)	21:37		20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:29 (1)	05:00		05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	25 20:54 (1)	21:36		20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:29 (1)	05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	25 20:54 (1)	21:34		20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:29 (1)	05:03		05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:14	21:07	21:43	26 20:55 (1)	21:33		20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	20:30 (1)	05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	25 20:55 (1)	21:32		20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:30 (1)	05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	25 20:55 (1)	21:31		20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:30 (1)	05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	26 20:56 (1)	21:30		20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:30 (1)	05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	26 20:56 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:30 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	26 20:56 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:31 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	26 20:57 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	20:31 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	26 20:57 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	20:31 (1)	05:14		06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	25 20:56 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	20:32 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	25 20:57 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45	20:32 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	25 20:57 (1)	21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	20:32 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	25 20:57 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45	20:32 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	25 20:57 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	20:33 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	24 20:57 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	20:33 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45	24 20:57 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52			05:25		06:18		07:08		08:29
	16:52		19:44		21:29			21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508		510	459	382	329	260	235	
astr.max.mögl.Beschattung						648		181						
Red.Sonnenscheinwahrsch.						0.45		0.45						
Reduktion Betriebsdauer						0.91		0.91						
Reduktion Windrichtung						0.64		0.64						
Gesamte Reduktion						0.26		0.26						
Met.wahrsch.Beschattung						171		47						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GX - IO206

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51		04:47		20:36 (1) 05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30		21:45	22	20:58 (1) 21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50		04:48		20:37 (1) 05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31		21:44	21	20:58 (1) 21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:37 (1)	04:49		20:37 (1) 05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	8 20:45 (1)	21:44	20	20:37 (1) 21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:35 (1)	04:50		20:38 (1) 05:31	06:25	07:18	07:15	08:08
	16:07	17:00	17:54	19:52	20:46	21:33	12 20:47 (1)	21:43	19	20:37 (1) 21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:35 (1)	04:50		20:39 (1) 05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	14 20:49 (1)	21:43	18	20:37 (1) 21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:34 (1)	04:51		20:40 (1) 05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	16 20:50 (1)	21:42	16	20:36 (1) 21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:33 (1)	04:52		20:41 (1) 05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	17 20:50 (1)	21:42	15	20:36 (1) 20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:33 (1)	04:53		20:42 (1) 05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	18 20:51 (1)	21:41	13	20:35 (1) 20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:33 (1)	04:54		20:44 (1) 05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	19 20:52 (1)	21:40	10	20:34 (1) 20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:32 (1)	04:55		20:46 (1) 05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	20 20:52 (1)	21:39	5	20:51 (1) 20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:32 (1)	04:57		05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	21 20:53 (1)	21:38		20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:32 (1)	04:58		05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	22 20:54 (1)	21:37		20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:31 (1)	04:59		05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	23 20:54 (1)	21:37		20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:31 (1)	05:00		05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	24 20:55 (1)	21:36		20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:31 (1)	05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	24 20:55 (1)	21:34		20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:31 (1)	05:03		05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	25 20:56 (1)	21:33		20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	20:32 (1)	05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	24 20:56 (1)	21:32		20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:32 (1)	05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	24 20:56 (1)	21:31		20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:32 (1)	05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	24 20:56 (1)	21:30		20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:32 (1)	05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	25 20:57 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:32 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	25 20:57 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:33 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	25 20:58 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	20:33 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	25 20:58 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	20:33 (1)	05:14		06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	24 20:57 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	20:34 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	24 20:58 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45	20:33 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	25 20:58 (1)	21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	20:34 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	24 20:58 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45	20:34 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	24 20:58 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	20:35 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	23 20:58 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	20:35 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45	23 20:58 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52			05:25		06:18		07:08		08:29
	16:52		19:44		21:29			21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508		510		459	382	329	260	235
astr.max.mögl.Beschattung							602		159					
Red.Sonnenscheinwahrsch.							0.45		0.45					
Reduktion Betriebsdauer							0.91		0.91					
Reduktion Windrichtung							0.64		0.64					
Gesamte Reduktion							0.26		0.26					
Met.wahrsch.Beschattung							159		41					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GY - IO207

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	04:47		20:36 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30	21:45	22	20:58 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:40 (1)	04:48	20:37 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31	3 20:43 (1)	21:44	21 20:58 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:37 (1)	04:49	20:37 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	9 20:46 (1)	21:44	20 20:57 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:35 (1)	04:50	20:38 (1)	05:31	06:25	07:18	07:15	08:08
	16:07	17:00	17:54	19:52	20:46	21:33	12 20:47 (1)	21:43	19 20:57 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:35 (1)	04:50	20:39 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	14 20:49 (1)	21:43	18 20:57 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:34 (1)	04:51	20:40 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	16 20:50 (1)	21:42	17 20:57 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:33 (1)	04:52	20:41 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	17 20:50 (1)	21:42	15 20:56 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:33 (1)	04:53	20:42 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	19 20:52 (1)	21:41	13 20:55 (1)	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:33 (1)	04:54	20:43 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	20 20:53 (1)	21:40	11 20:54 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:32 (1)	04:55	20:46 (1)	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	21 20:53 (1)	21:39	6 20:52 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:32 (1)	04:57		05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	22 20:54 (1)	21:38		20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:32 (1)	04:58		05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	23 20:55 (1)	21:37		20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:31 (1)	04:59		05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	23 20:54 (1)	21:37		20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:31 (1)	05:00		05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	24 20:55 (1)	21:36		20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:32 (1)	05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	23 20:55 (1)	21:34		20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:32 (1)	05:03		05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	24 20:56 (1)	21:33		20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	20:32 (1)	05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	24 20:56 (1)	21:32		20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:32 (1)	05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	25 20:57 (1)	21:31		20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:32 (1)	05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	25 20:57 (1)	21:30		20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:32 (1)	05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	25 20:57 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:32 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	25 20:57 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:33 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	25 20:58 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	20:33 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	25 20:58 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	20:33 (1)	05:14		06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	25 20:58 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	20:34 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	24 20:58 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45	20:34 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	24 20:58 (1)	21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	20:35 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	24 20:59 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45	20:34 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	24 20:58 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	20:35 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	24 20:59 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	20:35 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45	23 20:58 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52			05:25		06:18		07:08		08:29
	16:52		19:44		21:29			21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508		510		459	382	329	260	235
astr.max.mögl.Beschattung						612		162						
Red.Sonnenscheinwahrsch.						0.45		0.45						
Reduktion Betriebsdauer						0.91		0.91						
Reduktion Windrichtung						0.64		0.64						
Gesamte Reduktion						0.26		0.26						
Met.wahrsch.Beschattung						162		42						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** GZ - IO208

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51		04:47		20:37 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30		21:45	22	20:59 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50		04:48		20:38 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31	5	21:44	21	20:59 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49		04:49		20:38 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	10	21:44	20	20:58 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49		04:50		20:38 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	17:00	17:54	19:52	20:46	21:33	12	21:43	20	20:58 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48		04:50		20:39 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	14	21:43	19	20:58 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47		04:51		20:40 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	17	21:42	17	20:57 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46		04:52		20:41 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	18	21:42	16	20:57 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46		04:53		20:43 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	19	21:41	13	20:56 (1)	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45		04:54		20:44 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	20	21:40	11	20:55 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45		04:55		20:46 (1)	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	21	21:39	7	20:53 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44		04:57			05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	21	21:38			20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44		04:58			05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	22	21:37			20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44		04:59			05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	23	21:37			20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43		05:00			05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	24	21:36			20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43		05:01			05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	24	21:34			20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43		05:03			05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	24	21:33			20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43		05:04			05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	24	21:32			20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43		05:05			05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	24	21:31			20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43		05:07			05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	24	21:30			20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43		05:08			05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	25	21:28			20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43		05:09			06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	25	21:27			20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43		05:11			06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	25	21:26			20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43		05:12			06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	24	21:24			20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44		05:14			06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	24	21:23			20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44		05:15			06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	24	21:21			20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45		05:17			06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	24	21:20			20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45		05:18			06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	24	21:18			20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45		05:20			06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	24	21:17			20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46		05:22			06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	23	21:15			20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47		05:23			06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45	23	21:13			20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52			05:25			06:18		07:08		08:29
	16:52		19:44		21:29			21:12			20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508		510		459	382	329	260	235
astr.max.mögl.Beschattung							611		166					
Red.Sonnenscheinwahrsch.							0.45		0.45					
Reduktion Betriebsdauer							0.91		0.91					
Reduktion Windrichtung							0.64		0.64					
Gesamte Reduktion							0.26		0.26					
Met.wahrsch.Beschattung							161		43					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HA - IO209

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51		04:47		20:40 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	18:46	20:41	21:30		21:45	21	21:01 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50		04:48		20:41 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31		21:44	20	21:01 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:41 (1)	04:49		20:40 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	7 20:48 (1)	21:44	20	21:00 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:39 (1)	04:50		20:41 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	21:33	11 20:50 (1)	21:43	19	21:00 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:38 (1)	04:50		20:42 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	14 20:52 (1)	21:43	18	21:00 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:37 (1)	04:51		20:43 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	16 20:53 (1)	21:42	16	20:59 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:36 (1)	04:52		20:44 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	17 20:53 (1)	21:41	15	20:59 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:36 (1)	04:53		20:46 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	18 20:54 (1)	21:41	12	20:58 (1)	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:36 (1)	04:54		20:47 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	19 20:55 (1)	21:40	10	20:57 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:35 (1)	04:55		20:48 (1)	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	20 20:55 (1)	21:39	6	20:55 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:36 (1)	04:57			05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	20 20:56 (1)	21:38			20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:36 (1)	04:58			05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	21 20:57 (1)	21:37			20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:35 (1)	04:59			05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	22 20:57 (1)	21:37			20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:35 (1)	05:00			05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	22 20:57 (1)	21:36			20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:35 (1)	05:01			05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	23 20:58 (1)	21:34			20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:35 (1)	05:03			05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	23 20:58 (1)	21:33			20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	20:35 (1)	05:04			05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	24 20:59 (1)	21:32			20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:35 (1)	05:05			05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	24 20:59 (1)	21:31			20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:36 (1)	05:07			05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	23 20:59 (1)	21:30			20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:36 (1)	05:08			05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	23 20:59 (1)	21:28			20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:36 (1)	05:09			06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	23 20:59 (1)	21:27			20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:37 (1)	05:11			06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	23 21:00 (1)	21:26			20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	20:37 (1)	05:12			06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	23 21:00 (1)	21:24			20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	20:37 (1)	05:14			06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	23 21:00 (1)	21:23			20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	20:37 (1)	05:15			06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	24 21:01 (1)	21:21			20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45	20:37 (1)	05:17			06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	23 21:00 (1)	21:20			20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	20:38 (1)	05:18			06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	23 21:01 (1)	21:18			20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45	20:38 (1)	05:20			06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	23 21:01 (1)	21:17			20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	20:39 (1)	05:22			06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	22 21:01 (1)	21:15			20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	20:39 (1)	05:23			06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45	21 21:00 (1)	21:13			20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52			05:25			06:18		07:08		08:29
	16:52		19:44		21:29			21:12			20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508		510		459	382	329	260	235	
astr.max.mögl.Beschattung							575		157						
Red.Sonnenscheinwahrsch.							0.45		0.45						
Reduktion Betriebsdauer							0.91		0.91						
Reduktion Windrichtung							0.64		0.64						
Gesamte Reduktion							0.26		0.26						
Met.wahrsch.Beschattung							152		41						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HB - IO210

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51		04:47		20:42 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30		21:45	19	21:01 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50		04:48		20:43 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31		21:44	18	21:01 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49		04:49		20:43 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32		21:44	17	21:00 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:42 (1)	04:50		20:43 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	17:00	17:54	19:52	20:46	21:33	7 20:49 (1)	21:43	17	21:00 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:41 (1)	04:50		20:45 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	10 20:51 (1)	21:43	15	21:00 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:40 (1)	04:51		20:46 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	12 20:52 (1)	21:42	13	20:59 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:39 (1)	04:52		20:47 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	14 20:53 (1)	21:41	11	20:58 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:39 (1)	04:53		20:49 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	15 20:54 (1)	21:41	8	20:57 (1)	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:38 (1)	04:54		20:51 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	17 20:56 (1)	21:40	4	20:55 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:38 (1)	04:55			05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	18 20:56 (1)	21:39			20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:38 (1)	04:57			05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40	19 20:57 (1)	21:38			20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:38 (1)	04:58			05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	19 20:57 (1)	21:37			20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:37 (1)	04:59			05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	20 20:57 (1)	21:37			20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:37 (1)	05:00			05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	21 20:58 (1)	21:36			20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:37 (1)	05:01			05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	21 20:58 (1)	21:34			20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:37 (1)	05:03			05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	22 20:59 (1)	21:33			20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	20:37 (1)	05:04			05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	22 20:59 (1)	21:32			20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:37 (1)	05:05			05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	23 21:00 (1)	21:31			20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:37 (1)	05:07			05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	23 21:00 (1)	21:30			20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:37 (1)	05:08			05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45	23 21:00 (1)	21:28			20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:37 (1)	05:09			06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45	23 21:00 (1)	21:27			20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:38 (1)	05:11			06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45	23 21:01 (1)	21:26			20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	20:38 (1)	05:12			06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45	23 21:01 (1)	21:24			20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	20:38 (1)	05:14			06:06	07:00	07:54	07:52	08:27
	16:38	17:39	18:32	20:28	21:19	21:45	23 21:01 (1)	21:23			20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	04:44	20:39 (1)	05:15			06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	21:45	22 21:01 (1)	21:21			20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	04:45	20:39 (1)	05:17			06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	21:45	22 21:01 (1)	21:20			20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	04:45	20:40 (1)	05:18			06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21:45	22 21:02 (1)	21:18			20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	04:45	20:40 (1)	05:20			06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	21:45	21 21:01 (1)	21:17			20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	04:46	20:41 (1)	05:22			06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	21:45	20 21:01 (1)	21:15			20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	04:47	20:41 (1)	05:23			06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	21:45	20 21:01 (1)	21:13			20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52			05:25			06:18		07:08		08:29
	16:52		19:44		21:29			21:12			20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508		510		459	382	329	260	235	
astr.max.mögl.Beschattung							525		122						
Red.Sonnenscheinwahrsch.							0.45		0.45						
Reduktion Betriebsdauer							0.91		0.91						
Reduktion Windrichtung							0.63		0.63						
Gesamte Reduktion							0.26		0.26						
Met.wahrsch.Beschattung							138		31						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HC - IO211

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		20:25 (1)	04:47	20:26 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	17	20:42 (1)	21:45	20:54 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		20:25 (1)	04:48	20:26 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	19	20:44 (1)	21:44	20:54 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		20:24 (1)	04:49	20:26 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	20	20:44 (1)	21:44	20:53 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		20:23 (1)	04:50	20:27 (1)	05:31	06:25	07:18	07:15	08:08
	16:07	17:00	17:54	19:52	20:46		21:33	22	20:45 (1)	21:43	20:53 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		20:23 (1)	04:50	20:28 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	23	20:46 (1)	21:43	20:53 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		20:22 (1)	04:51	20:28 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	25	20:47 (1)	21:42	20:53 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		20:21 (1)	04:52	20:29 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	26	20:47 (1)	21:42	20:53 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		20:22 (1)	04:53	20:30 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	26	20:48 (1)	21:41	20:53 (1)	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		20:22 (1)	04:54	20:31 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	27	20:49 (1)	21:40	20:52 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		20:21 (1)	04:55	20:32 (1)	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	28	20:49 (1)	21:39	20:52 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		20:21 (1)	04:57	20:33 (1)	05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58		21:40	29	20:50 (1)	21:38	20:51 (1)	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		20:22 (1)	04:58	20:34 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	28	20:50 (1)	21:38	20:50 (1)	20:48	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		20:21 (1)	04:59	20:35 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	29	20:50 (1)	21:37	20:48 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		20:21 (1)	05:00	20:37 (1)	05:48	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	29	20:50 (1)	21:36	20:46 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		20:21 (1)	05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05		21:43	30	20:51 (1)	21:34		20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		04:43		20:21 (1)	05:03		05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:14	21:07		21:43	30	20:51 (1)	21:33		20:41	19:28	18:16	16:15	15:52
17	08:19	07:29	06:25	06:10	05:10		04:43		20:22 (1)	05:04		05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08		21:44	30	20:52 (1)	21:32		20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		04:43		20:22 (1)	05:05		05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10		21:44	30	20:52 (1)	21:31		20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		04:43		20:22 (1)	05:07		05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11		21:44	30	20:52 (1)	21:30		20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		04:43		20:22 (1)	05:08		05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13		21:45	30	20:52 (1)	21:28		20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		04:43		20:22 (1)	05:09		06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15		21:45	30	20:52 (1)	21:27		20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		04:43		20:23 (1)	05:11		06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16		21:45	30	20:53 (1)	21:26		20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		04:43		20:23 (1)	05:12		06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18		21:45	30	20:53 (1)	21:24		20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		04:44		20:23 (1)	05:14		06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19		21:45	30	20:53 (1)	21:23		20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		04:44		20:24 (1)	05:15		06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21		21:46	30	20:54 (1)	21:21		20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58		04:45		20:23 (1)	05:17		06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22		21:45	30	20:53 (1)	21:20		20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		04:45		20:24 (1)	05:18		06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23		21:45	30	20:54 (1)	21:18		20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		04:45		20:24 (1)	05:20		06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25		21:45	30	20:54 (1)	21:17		20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:30 (1)	04:46		20:25 (1)	05:22		06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26	6 20:36 (1)	21:45	29	20:54 (1)	21:15		20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:28 (1)	04:47		20:25 (1)	05:23		06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	11 20:39 (1)	21:45	29	20:54 (1)	21:13		20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:26 (1)				05:25		06:18		07:08		08:29
	16:52		19:44		21:29	15 20:41 (1)				21:12		20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492		508			510		459	382	329	268	235
astr.max.mögl.Beschattung						32		826		303						
Red.Sonnenscheinwahrsch.						0.51		0.45		0.45						
Reduktion Betriebsdauer						0.91		0.91		0.91						
Reduktion Windrichtung						0.84		0.84		0.84						
Gesamte Reduktion						0.30		0.27		0.26						
Mat.wahrsch.Beschattung						10		220		79						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HD - IO212

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	20:15 (1) 04:47	20:19 (1) 05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30 17	20:42 (1) 21:45 32	20:51 (1) 21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:16 (1) 04:48	20:20 (1) 05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31 18	20:44 (1) 21:44 32	20:52 (1) 21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:15 (1) 04:49	20:19 (1) 05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32 29	20:44 (1) 21:44 32	20:51 (1) 21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:15 (1) 04:50	20:20 (1) 05:31	06:25	07:18	07:15	08:08
	16:06	17:00	17:54	19:52	20:46	21:33 29	20:44 (1) 21:43 31	20:51 (1) 21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:15 (1) 04:50	20:20 (1) 05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34 30	20:45 (1) 21:43 31	20:51 (1) 21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:15 (1) 04:51	20:21 (1) 05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35 30	20:45 (1) 21:42 31	20:52 (1) 21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:14 (1) 04:52	20:21 (1) 05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36 31	20:45 (1) 21:42 31	20:52 (1) 20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:15 (1) 04:53	20:22 (1) 05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37 31	20:46 (1) 21:41 30	20:52 (1) 20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:15 (1) 04:54	20:22 (1) 05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38 32	20:47 (1) 21:40 29	20:51 (1) 20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:15 (1) 04:55	20:23 (1) 05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39 31	20:46 (1) 21:39 28	20:51 (1) 20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:15 (1) 04:57	20:24 (1) 05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58	21:40 32	20:47 (1) 21:38 27	20:51 (1) 20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:15 (1) 04:58	20:24 (1) 05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41 33	20:48 (1) 21:37 26	20:50 (1) 20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:15 (1) 04:59	20:25 (1) 05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41 32	20:47 (1) 21:37 25	20:50 (1) 20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:15 (1) 05:00	20:25 (1) 05:48	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42 33	20:48 (1) 21:36 24	20:49 (1) 20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:15 (1) 05:01	20:26 (1) 05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43 33	20:48 (1) 21:34 22	20:48 (1) 20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:15 (1) 05:03	20:27 (1) 05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:14	21:07	21:43 33	20:48 (1) 21:33 21	20:48 (1) 20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	20:16 (1) 05:04	20:29 (1) 05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44 33	20:49 (1) 21:32 18	20:47 (1) 20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:16 (1) 05:05	20:30 (1) 05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44 33	20:49 (1) 21:31 16	20:46 (1) 20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:16 (1) 05:07	20:31 (1) 05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44 33	20:49 (1) 21:30 13	20:44 (1) 20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:16 (1) 05:08	20:34 (1) 05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45 33	20:49 (1) 21:28 8	20:42 (1) 20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:16 (1) 05:09	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45 33	20:49 (1) 21:27	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:17 (1) 05:11	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45 33	20:50 (1) 21:26	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	20:26 (1) 04:43	20:17 (1) 05:12	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18 1	20:29 (1) 21:45 33	20:50 (1) 21:24	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	20:23 (1) 04:44	20:17 (1) 05:14	06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19 10	20:33 (1) 21:45 33	20:50 (1) 21:23	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:21 (1) 04:44	20:18 (1) 05:15	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21 13	20:36 (1) 21:46 33	20:51 (1) 21:21	20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:20 (1) 04:45	20:17 (1) 05:17	06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22 17	20:37 (1) 21:45 33	20:52 (1) 21:20	20:18	19:04	16:58	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:19 (1) 04:45	20:18 (1) 05:18	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23 20	20:39 (1) 21:45 33	20:53 (1) 21:18	20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:18 (1) 04:45	20:18 (1) 05:20	06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25 22	20:40 (1) 21:45 33	20:53 (1) 21:17	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:17 (1) 04:46	20:19 (1) 05:22	06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26 23	20:40 (1) 21:45 32	20:53 (1) 21:15	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:18 (1) 04:47	20:18 (1) 05:23	06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27 25	20:41 (1) 21:45 33	20:53 (1) 21:13	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:16 (1)	05:25	06:18		07:08		08:29
	16:52		19:44		21:29 26	20:42 (1)	21:12	20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508	510	499	382	329	260	235
astr.max.mögl.Beschattung					161	955	957					
Red.Sonnenscheinwahrsch.					0.51	0.45	0.45					
Reduktion Betriebsdauer					0.91	0.91	0.91					
Reduktion Windrichtung					0.65	0.65	0.65					
Gesamte Reduktion					0.30	0.27	0.26					
Mat.wahrsch.Beschattung					49	256	133					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HE - IO213

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	20:09 (1) - 04:47	20:14 (1) - 05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30	31 20:40 (1) - 21:45	34 20:48 (1) - 21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:10 (1) - 04:48	20:15 (1) - 05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31	31 20:41 (1) - 21:44	33 20:48 (1) - 21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:10 (1) - 04:49	20:14 (1) - 05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32	31 20:41 (1) - 21:44	34 20:48 (1) - 21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:09 (1) - 04:50	20:15 (1) - 05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46	21:33	32 20:41 (1) - 21:43	33 20:48 (1) - 21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:10 (1) - 04:50	20:15 (1) - 05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34	32 20:42 (1) - 21:43	33 20:48 (1) - 21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:09 (1) - 04:51	20:16 (1) - 05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35	33 20:42 (1) - 21:42	32 20:48 (1) - 21:01	19:52	18:39	16:32	15:53
7	08:27	07:49	06:48	06:34	05:28	04:46	20:09 (1) - 04:52	20:16 (1) - 05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36	33 20:42 (1) - 21:42	33 20:49 (1) - 20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:10 (1) - 04:53	20:17 (1) - 05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37	33 20:43 (1) - 21:41	32 20:49 (1) - 20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:10 (1) - 04:54	20:17 (1) - 05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38	33 20:43 (1) - 21:40	32 20:49 (1) - 20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:10 (1) - 04:55	20:17 (1) - 05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39	33 20:43 (1) - 21:39	32 20:49 (1) - 20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:10 (1) - 04:57	20:18 (1) - 05:43	06:37	07:30	07:29	08:17
	16:18	17:13	18:08	20:04	20:58	21:40	34 20:44 (1) - 21:38	30 20:48 (1) - 20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:11 (1) - 04:58	20:18 (1) - 05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41	33 20:44 (1) - 21:37	30 20:48 (1) - 20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:10 (1) - 04:59	20:18 (1) - 05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41	34 20:44 (1) - 21:37	30 20:48 (1) - 20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:10 (1) - 05:00	20:19 (1) - 05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42	34 20:44 (1) - 21:36	29 20:48 (1) - 20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:11 (1) - 05:01	20:19 (1) - 05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43	35 21:01 (2) - 21:34	28 20:47 (1) - 20:43	19:30	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:11 (1) - 05:03	20:20 (1) - 05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:13	21:07	21:43	38 21:02 (3) - 21:33	26 20:48 (1) - 20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	20:11 (1) - 05:04	20:21 (1) - 05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44	40 21:03 (3) - 21:32	26 20:47 (1) - 20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:11 (1) - 05:05	20:22 (1) - 05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44	41 21:04 (3) - 21:31	24 20:46 (1) - 20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:11 (1) - 05:07	20:22 (1) - 05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44	41 21:04 (3) - 21:30	23 20:45 (1) - 20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	20:10 (1) 04:43	20:11 (1) - 05:08	20:24 (1) - 05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	8 20:28 (1) - 21:45	42 21:05 (3) - 21:28	21 20:45 (1) - 20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	20:17 (1) 04:43	20:11 (1) - 05:09	20:25 (1) - 06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	14 20:31 (1) - 21:45	42 21:05 (3) - 21:27	18 20:43 (1) - 20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	20:15 (1) 04:43	20:12 (1) - 05:11	20:26 (1) - 06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	17 20:32 (1) - 21:45	42 21:06 (3) - 21:26	15 20:41 (1) - 20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	20:14 (1) 04:43	20:12 (1) - 05:12	20:29 (1) - 06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	19 20:33 (1) - 21:45	41 21:05 (3) - 21:24	11 20:40 (1) - 20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	20:13 (1) 04:44	20:12 (1) - 05:14	20:32 (1) - 06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19	22 20:35 (1) - 21:45	41 21:05 (3) - 21:23	4 20:36 (1) - 20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:12 (1) 04:44	20:13 (1) - 05:15	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	24 20:36 (1) - 21:45	41 21:06 (3) - 21:21	20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:12 (1) 04:45	20:13 (1) - 05:17	06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	25 20:37 (1) - 21:45	40 21:05 (3) - 21:20	20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:11 (1) 04:45	20:14 (1) - 05:18	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	27 20:38 (1) - 21:45	38 21:05 (3) - 21:18	20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:11 (1) 04:45	20:13 (1) - 05:20	06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	27 20:38 (1) - 21:45	34 20:47 (1) - 21:17	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:10 (1) 04:46	20:14 (1) - 05:22	06:15	07:09	07:04	08:01	08:28
	16:48		19:41	20:37	21:26	26 20:39 (1) - 21:45	34 20:48 (1) - 21:15	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:10 (1) 04:47	20:14 (1) - 05:23	06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	29 20:39 (1) - 21:45	33 20:47 (1) - 21:12	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:10 (1)	05:25	06:18		07:08		08:29
	16:52		19:44		21:29	30 20:40 (1)	21:12	20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508	510	459	382	329	260	231
astr.max.mögl.Beschattung					271	1080	643					
Red.Sonnenscheinwahrsch.					0.51	0.45	0.45					
Reduktion Betriebsdauer					0.91	0.91	0.91					
Reduktion Windrichtung					0.65	0.65	0.65					
Gesamte Reduktion					0.30	0.27	0.26					
Met.wahrsch.Beschattung					82	290	170					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HF - IO214

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April		Mai			Juni		
1	08:29		07:59		07:02		06:48		05:40			04:51		19:50 (1)
	16:03		16:54		17:49		19:46		20:41			21:30	37	20:27 (1)
2	08:28		07:57		07:00		06:46		05:38			04:50		19:51 (1)
	16:04		16:56		17:50		19:48		20:42			21:31	40	20:49 (3)
3	08:28		07:56		06:58		06:43		05:36			04:49		19:51 (1)
	16:05		16:58		17:52		19:50		20:44			21:32	46	20:52 (3)
4	08:28		07:54		06:55		06:41		05:34			04:49		19:51 (1)
	16:06		16:59		17:54		19:52		20:46			21:33	48	20:53 (3)
5	08:28		07:52		06:53		06:39		05:32			04:48		19:52 (1)
	16:08		17:01		17:56		19:53		20:48			21:34	51	20:55 (3)
6	08:27		07:50		06:51		06:36		05:30			04:47		19:52 (1)
	16:09		17:03		17:58		19:55		20:50			21:35	51	20:55 (3)
7	08:27		07:49		06:48		06:34		05:28			04:46		19:51 (1)
	16:10		17:05		18:00		19:57		20:51			21:36	54	20:56 (3)
8	08:26		07:47		06:46		06:31		05:26			04:46		19:52 (1)
	16:12		17:07		18:02		19:59		20:53			21:37	53	20:57 (3)
9	08:26		07:45		06:44		06:29		05:24			04:45		19:53 (1)
	16:13		17:09		18:04		20:01		20:55			21:38	54	20:58 (3)
10	08:25		07:43		06:41		06:27		05:22			04:45		19:53 (1)
	16:15		17:11		18:06		20:03		20:57			21:39	55	20:58 (3)
11	08:25		07:41		06:39		06:24		05:21		20:04 (1)	04:44		19:53 (1)
	16:16		17:13		18:08		20:04		20:58	6	20:10 (1)	21:40	56	20:59 (3)
12	08:24		07:39		06:37		06:22		05:19		20:01 (1)	04:44		19:54 (1)
	16:18		17:15		18:09		20:06		21:00	14	20:15 (1)	21:41	56	21:00 (3)
13	08:23		07:37		06:34		06:20		05:17		19:58 (1)	04:44		19:53 (1)
	16:19		17:17		18:11		20:08		21:02	19	20:17 (1)	21:41	57	20:59 (3)
14	08:22		07:35		06:32		06:17		05:15		19:57 (1)	04:43		19:54 (1)
	16:21		17:19		18:13		20:10		21:03	22	20:19 (1)	21:42	56	21:00 (3)
15	08:21		07:33		06:29		06:15		05:14		19:56 (1)	04:43		19:54 (1)
	16:22		17:21		18:15		20:12		21:05	24	20:20 (1)	21:43	56	21:00 (3)
16	08:20		07:31		06:27		06:13		05:12		19:55 (1)	04:43		19:54 (1)
	16:24		17:23		18:17		20:14		21:07	26	20:21 (1)	21:43	58	21:01 (3)
17	08:19		07:29		06:25		06:10		05:10		19:54 (1)	04:43		19:55 (1)
	16:26		17:25		18:19		20:15		21:08	28	20:22 (1)	21:44	57	21:01 (3)
18	08:18		07:27		06:22		06:08		05:09		19:53 (1)	04:43		19:55 (1)
	16:28		17:27		18:21		20:17		21:10	30	20:23 (1)	21:44	58	21:02 (3)
19	08:17		07:25		06:20		06:06		05:07		19:52 (1)	04:43		19:55 (1)
	16:29		17:29		18:22		20:19		21:11	31	20:23 (1)	21:44	58	21:02 (3)
20	08:16		07:22		06:17		06:04		05:06		19:52 (1)	04:43		19:55 (1)
	16:31		17:31		18:24		20:21		21:13	32	20:24 (1)	21:45	58	21:02 (3)
21	08:15		07:20		06:15		06:01		05:04		19:52 (1)	04:43		19:55 (1)
	16:33		17:33		18:26		20:23		21:15	33	20:25 (1)	21:45	58	21:02 (3)
22	08:14		07:18		06:12		05:59		05:03		19:51 (1)	04:43		19:56 (1)
	16:35		17:35		18:28		20:24		21:16	33	20:24 (1)	21:45	58	21:03 (3)
23	08:12		07:16		06:10		05:57		05:02		19:51 (1)	04:43		19:56 (1)
	16:36		17:37		18:30		20:26		21:18	34	20:25 (1)	21:45	58	21:03 (3)
24	08:11		07:14		06:08		05:55		05:00		19:50 (1)	04:44		19:56 (1)
	16:38		17:39		18:32		20:28		21:19	35	20:25 (1)	21:45	58	21:03 (3)
25	08:10		07:11		06:05		05:52		04:59		19:50 (1)	04:44		19:57 (1)
	16:40		17:41		18:33		20:30		21:21	36	20:26 (1)	21:46	57	21:03 (3)
26	08:08		07:09		06:03		05:50		04:58		19:50 (1)	04:45		19:56 (1)
	16:42		17:43		18:35		20:32		21:22	36	20:26 (1)	21:45	58	21:03 (3)
27	08:07		07:07		06:00		05:48		04:56		19:50 (1)	04:45		19:57 (1)
	16:44		17:45		18:37		20:33		21:23	37	20:27 (1)	21:45	57	21:04 (3)
28	08:05		07:05		05:58		05:46		04:55		19:50 (1)	04:45		19:57 (1)
	16:46		17:47		18:39		20:35		21:25	37	20:27 (1)	21:45	56	21:03 (3)
29	08:04				06:55		05:44		04:54		19:50 (1)	04:46		19:57 (1)
	16:48				19:41		20:37		21:26	37	20:27 (1)	21:45	58	21:04 (3)
30	08:02				06:53		05:42		04:53		19:50 (1)	04:47		19:57 (1)
	16:50				19:43		20:39		21:27	37	20:27 (1)	21:45	57	21:03 (3)
31	08:01				06:51				04:52		19:50 (1)			
	16:52				19:44				21:29	37	20:27 (1)			
Sonnenscheinstunden	252		274		367		419		492			508		
astr.max.mögl.Beschattung										624				1634
Red.Sonnenscheinwahrsch.										0.51				0.45
Reduktion Betriebsdauer										0.91				0.91
Reduktion Windrichtung										0.66				0.65
Gesamte Reduktion										0.31				0.27
Met.wahrsch.Beschattung										191				440

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang		(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende		(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HF - IO214

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September	Oktober	November	Dezember
1	04:47		19:57 (1)	05:26		20:13 (1)	06:20	07:12	07:10	08:04
	21:45	56	21:03 (3)	21:10	11	20:24 (1)	20:04	18:51	16:42	15:58
2	04:48		19:58 (1)	05:28			06:22	07:14	07:12	08:05
	21:44	55	21:03 (3)	21:08			20:02	18:49	16:40	15:57
3	04:49		19:57 (1)	05:30			06:23	07:16	07:14	08:07
	21:44	55	21:03 (3)	21:06			20:00	18:47	16:38	15:57
4	04:50		19:57 (1)	05:31			06:25	07:18	07:15	08:08
	21:43	54	21:02 (3)	21:05			19:57	18:44	16:36	15:56
5	04:50		19:58 (1)	05:33			06:27	07:19	07:17	08:10
	21:43	53	21:02 (3)	21:03			19:55	18:42	16:34	15:55
6	04:51		19:58 (1)	05:35			06:29	07:21	07:19	08:11
	21:42	53	21:02 (3)	21:01			19:52	18:39	16:32	15:55
7	04:52		19:58 (1)	05:37			06:30	07:23	07:21	08:12
	21:42	52	21:02 (3)	20:59			19:50	18:37	16:30	15:54
8	04:53		19:58 (1)	05:38			06:32	07:25	07:23	08:14
	21:41	49	21:01 (3)	20:57			19:48	18:35	16:29	15:54
9	04:54		19:59 (1)	05:40			06:34	07:27	07:25	08:15
	21:40	46	21:00 (3)	20:55			19:45	18:32	16:27	15:54
10	04:55		19:59 (1)	05:42			06:36	07:29	07:27	08:16
	21:39	42	20:58 (3)	20:53			19:43	18:30	16:25	15:53
11	04:57		19:59 (1)	05:43			06:37	07:30	07:29	08:17
	21:38	37	20:36 (1)	20:51			19:40	18:28	16:23	15:53
12	04:58		19:59 (1)	05:45			06:39	07:32	07:31	08:18
	21:38	37	20:36 (1)	20:49			19:38	18:25	16:22	15:53
13	04:59		19:59 (1)	05:47			06:41	07:34	07:33	08:19
	21:37	37	20:36 (1)	20:47			19:35	18:23	16:20	15:53
14	05:00		19:59 (1)	05:49			06:43	07:36	07:34	08:20
	21:36	37	20:36 (1)	20:45			19:33	18:21	16:18	15:53
15	05:01		19:59 (1)	05:50			06:44	07:38	07:36	08:21
	21:34	36	20:35 (1)	20:43			19:30	18:18	16:17	15:53
16	05:03		19:59 (1)	05:52			06:46	07:40	07:38	08:22
	21:33	36	20:35 (1)	20:41			19:28	18:16	16:15	15:53
17	05:04		20:00 (1)	05:54			06:48	07:41	07:40	08:23
	21:32	36	20:36 (1)	20:38			19:26	18:14	16:14	15:53
18	05:05		20:00 (1)	05:55			06:49	07:43	07:42	08:24
	21:31	36	20:36 (1)	20:36			19:23	18:11	16:12	15:53
19	05:07		20:00 (1)	05:57			06:51	07:45	07:44	08:25
	21:30	35	20:35 (1)	20:34			19:21	18:09	16:11	15:54
20	05:08		20:01 (1)	05:59			06:53	07:47	07:45	08:25
	21:29	35	20:36 (1)	20:32			19:18	18:07	16:10	15:54
21	05:09		20:01 (1)	06:01			06:55	07:49	07:47	08:26
	21:27	34	20:35 (1)	20:30			19:16	18:05	16:08	15:54
22	05:11		20:01 (1)	06:02			06:56	07:51	07:49	08:26
	21:26	33	20:34 (1)	20:27			19:13	18:03	16:07	15:55
23	05:12		20:02 (1)	06:04			06:58	07:53	07:51	08:27
	21:24	33	20:35 (1)	20:25			19:11	18:00	16:06	15:55
24	05:14		20:02 (1)	06:06			07:00	07:54	07:53	08:27
	21:23	32	20:34 (1)	20:23			19:08	17:58	16:05	15:56
25	05:15		20:03 (1)	06:08			07:02	06:56	07:54	08:28
	21:21	30	20:33 (1)	20:21			19:06	16:56	16:04	15:57
26	05:17		20:04 (1)	06:09			07:03	06:58	07:56	08:28
	21:20	29	20:33 (1)	20:18			19:04	16:54	16:03	15:57
27	05:18		20:04 (1)	06:11			07:05	07:00	07:58	08:28
	21:18	28	20:32 (1)	20:16			19:01	16:52	16:02	15:58
28	05:20		20:06 (1)	06:13			07:07	07:02	07:59	08:28
	21:17	25	20:31 (1)	20:14			18:59	16:50	16:01	15:59
29	05:22		20:06 (1)	06:15			07:09	07:04	08:01	08:29
	21:15	23	20:29 (1)	20:11			18:56	16:48	16:00	16:00
30	05:23		20:08 (1)	06:16			07:11	07:06	08:02	08:29
	21:13	21	20:29 (1)	20:09			18:54	16:46	15:59	16:01
31	05:25		20:10 (1)	06:18				07:08		08:29
	21:12	16	20:26 (1)	20:07				16:44		16:02
Sonnenscheinstunden	510			459			382	329	260	235
astr.max.mögl.Beschattung		1181			11					
Red.Sonnenscheinwahrsch.		0.45			0.49					
Reduktion Betriebsdauer		0.91			0.91					
Reduktion Windrichtung		0.65			0.66					
Gesamte Reduktion		0.27			0.29					
Met.wahrsch.Beschattung		314			3					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HG - IO215

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai		Juni		Juli		August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40		04:51		04:47		05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41		21:30	37	21:45	51	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38		04:50		04:48		05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42		21:31	37	21:44	48	21:06	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36		04:49		04:50		05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44		21:32	37	21:44	48	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34		04:49		04:50		05:31	06:25	07:18	07:15	08:08
	16:06	16:59	17:54	19:52	20:46		21:33	37	21:43	44	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32		04:48		04:50		05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48		21:34	37	21:43	39	20:59	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30		04:47		04:51		05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50		21:35	37	21:42	37	20:40	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28		04:46		04:52		05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51		21:36	37	21:42	37	20:40	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26		04:46		04:53		05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53		21:37	43	21:41	37	20:40	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24		04:45		04:54		05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55		21:38	48	21:40	37	20:40	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22		04:45		04:55		05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57		21:39	48	21:39	36	20:40	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21		04:44		04:57		05:43	06:37	07:30	07:29	08:17
	16:16	17:13	18:08	20:04	20:58		21:40	48	21:38	36	20:40	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19		04:44		04:58		05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00		21:41	50	21:38	36	20:40	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17		04:44		04:59		05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02		21:41	51	21:37	36	20:40	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15		04:43		05:00		05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03		21:42	52	21:36	36	20:40	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		04:43		05:01		05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	11	20:18 (1)	21:43	21:34	35	20:40	19:31	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		20:05 (1)	21:43	21:36	35	20:40	19:28	18:16	16:15	15:53
	16:24	17:23	18:17	20:14	21:07	16	20:21 (1)	21:43	21:33	34	20:39	19:26	18:13	16:13	15:53
17	08:19	07:29	06:25	06:10	05:10		20:03 (1)	21:43	21:34	34	20:40	19:24	18:11	16:12	15:53
	16:26	17:25	18:19	20:15	21:08	19	20:22 (1)	21:44	21:32	34	20:40	19:21	18:09	16:10	15:53
18	08:18	07:27	06:22	06:08	05:09		20:02 (1)	21:43	21:35	34	20:40	19:19	18:06	16:08	15:53
	16:28	17:27	18:21	20:17	21:10	22	20:24 (1)	21:44	21:31	33	20:39	19:17	18:04	16:06	15:53
19	08:17	07:25	06:20	06:06	05:07		20:00 (1)	21:43	21:36	33	20:40	19:14	18:01	16:04	15:53
	16:29	17:29	18:22	20:19	21:11	24	20:24 (1)	21:44	21:30	33	20:39	19:12	17:59	16:02	15:54
20	08:16	07:22	06:17	06:04	05:06		19:59 (1)	21:43	21:38	33	20:40	19:09	17:56	16:00	15:54
	16:31	17:31	18:24	20:21	21:13	27	20:26 (1)	21:45	21:28	31	20:39	19:07	17:54	15:58	15:54
21	08:15	07:20	06:15	06:01	05:04		19:59 (1)	21:43	21:39	31	20:40	19:04	17:51	15:56	15:55
	16:33	17:33	18:26	20:23	21:15	28	20:27 (1)	21:45	21:27	30	20:38	19:02	17:49	15:54	15:56
22	08:14	07:18	06:12	05:59	05:03		19:58 (1)	21:43	21:41	30	20:40	19:00	17:46	15:52	15:57
	16:35	17:35	18:28	20:24	21:16	29	20:27 (1)	21:45	21:26	29	20:37	18:57	17:44	15:50	15:58
23	08:12	07:16	06:10	05:57	05:02		19:57 (1)	21:43	21:42	29	20:38	18:55	17:41	15:48	15:59
	16:36	17:37	18:30	20:26	21:18	31	20:28 (1)	21:45	21:24	27	20:37	18:53	17:39	15:46	16:00
24	08:11	07:14	06:08	05:55	05:00		19:57 (1)	21:44	21:43	27	20:38	18:50	17:36	15:44	16:01
	16:38	17:39	18:32	20:28	21:19	32	20:29 (1)	21:45	21:23	26	20:36	18:48	17:34	15:42	16:02
25	08:10	07:11	06:05	05:52	04:59		19:57 (1)	21:44	21:44	26	20:37	18:46	17:31	15:40	16:03
	16:40	17:41	18:33	20:30	21:21	32	20:29 (1)	21:46	21:21	23	20:34	18:43	17:29	15:38	16:04
26	08:08	07:09	06:03	05:50	04:58		19:57 (1)	21:45	21:45	23	20:37	18:41	17:26	15:36	16:05
	16:42	17:43	18:35	20:32	21:23	33	20:30 (1)	21:45	21:20	21	20:34	18:38	17:24	15:34	16:06
27	08:07	07:07	06:00	05:48	04:56		19:56 (1)	21:45	21:46	21	20:37	18:36	17:21	15:32	16:07
	16:44	17:45	18:37	20:33	21:25	34	20:30 (1)	21:45	21:18	18	20:34	18:33	17:19	15:30	16:08
28	08:05	07:05	05:58	05:46	04:55		19:56 (1)	21:45	21:47	18	20:37	18:31	17:16	15:28	16:09
	16:46	17:47	18:39	20:35	21:26	35	20:31 (1)	21:45	21:17	13	20:34	18:28	17:14	15:26	16:10
29	08:04		06:55	05:44	04:54		19:56 (1)	21:46	21:48	13	20:37	18:26	17:11	15:24	16:11
	16:48		19:41	20:37	21:26	35	20:31 (1)	21:45	21:15	6	20:34	18:23	17:09	15:22	16:12
30	08:02		06:53	05:42	04:53		19:56 (1)	21:47	21:49	6	20:37	18:21	17:06	15:20	16:13
	16:50		19:43	20:39	21:27	35	20:31 (1)	21:45	21:12	6	20:34	18:18	17:04	15:18	16:14
31	08:01		06:51		04:52		19:56 (1)		21:52		20:37	18:16	17:01	15:16	16:15
	16:52		19:44		21:29	36	20:32 (1)		21:12		20:34	18:13	16:59	15:14	16:16
Sonnenscheinstunden	252	274	367	419	492		508		510		459	382	329	266	231
astr.max.mögl.Beschattung						479		1449		951					
Red.Sonnenscheinwahrsch.						0.51		0.45		0.45					
Reduktion Betriebsdauer						0.91		0.91		0.91					
Reduktion Windrichtung						0.65		0.65		0.65					
Gesamte Reduktion						0.31		0.27		0.27					
Mat.wahrsch.Beschattung						146		390		253					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HH - IO216

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni			Juli			August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51			20:09 (1)	04:47		20:13 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41			21:30	29		20:38 (1)	21:45	35	20:48 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38			04:50			20:10 (1)	04:48		20:13 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42			21:31	29		20:39 (1)	21:44	35	20:48 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36			04:49			20:09 (1)	04:49		20:13 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44			21:32	31		20:40 (1)	21:44	34	20:47 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34			04:49			20:09 (1)	04:50		20:14 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	17:00	17:54	19:52	20:46			21:33	31		20:40 (1)	21:43	33	20:47 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32			04:48			20:09 (1)	04:50		20:14 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48			21:34	32		20:41 (1)	21:43	33	20:47 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30			04:47			20:09 (1)	04:51		20:15 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50			21:35	32		20:41 (1)	21:42	33	20:48 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28			04:46			20:08 (1)	04:52		20:15 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51			21:36	33		20:41 (1)	21:42	32	20:47 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26			04:46			20:08 (1)	04:53		20:16 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53			21:37	34		20:42 (1)	21:41	31	20:47 (1)	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24			04:45			20:08 (1)	04:54		20:16 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55			21:38	34		20:43 (1)	21:40	31	20:47 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22			04:45			20:08 (1)	04:55		20:17 (1)	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57			21:39	35		20:43 (1)	21:39	30	20:47 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21			04:44			20:08 (1)	04:57		20:18 (1)	05:43	06:37	07:30	07:29	08:17
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12	08:24	07:39	06:37	06:22	05:19			04:44			20:09 (1)	04:58		20:18 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00			21:41	35		20:44 (1)	21:38	28	20:46 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17			04:44			20:08 (1)	04:59		20:19 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02			21:41	35		20:43 (1)	21:37	26	20:45 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15			04:43			20:08 (1)	05:00		20:20 (1)	05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03			21:42	36		20:44 (1)	21:36	25	20:45 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14			04:43			20:08 (1)	05:01		20:20 (1)	05:50	06:44	07:38	07:36	08:21
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16	08:20	07:31	06:27	06:13	05:12			04:43			20:09 (1)	05:03		20:21 (1)	05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:14	21:07			21:43	36		20:45 (1)	21:33	22	20:43 (1)	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10			04:43			20:09 (1)	05:04		20:23 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08			21:44	36		20:45 (1)	21:32	18	20:42 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09			04:43			20:09 (1)	05:05		20:25 (1)	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10			21:44	36		20:45 (1)	21:31	16	20:41 (1)	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07			04:43			20:09 (1)	05:07		20:27 (1)	05:57	06:51	07:45	07:44	08:25
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20	08:16	07:22	06:17	06:04	05:06			04:43			20:09 (1)	05:08		20:31 (1)	05:59	06:53	07:47	07:45	08:25
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21	08:15	07:20	06:15	06:01	05:04			04:43			20:09 (1)	05:09			06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15			21:45	37		20:46 (1)	21:27			20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03			04:43			20:10 (1)	05:11			06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16			21:45	37		20:47 (1)	21:26			20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02			04:43			20:10 (1)	05:12			06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18			21:45	36		20:46 (1)	21:24			20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		20:19 (1)	04:44			20:10 (1)	05:14			06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19	8	20:27 (1)	21:45	36		20:46 (1)	21:23			20:23	19:08	17:58	16:05	15:56
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	16:40	17:41	18:33	20:30	21:21	14	20:30 (1)	21:46	36		20:47 (1)	21:21			20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58		20:15 (1)	04:45			20:11 (1)	05:17			06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	17	20:32 (1)	21:45	36		20:47 (1)	21:20			20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		20:13 (1)	04:45			20:12 (1)	05:18			06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	21	20:34 (1)	21:45	35		20:47 (1)	21:18			20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		20:12 (1)	04:45			20:13 (1)	05:20			06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	23	20:35 (1)	21:45	36		20:47 (1)	21:17			20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54		20:12 (1)	04:46			20:12 (1)	05:22			06:15	07:09	07:04	08:01	08:28
	16:48		19:41	20:37	21:26	24	20:36 (1)	21:45	36		20:48 (1)	21:15			20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		20:11 (1)	04:47			20:12 (1)	05:23			06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	26	20:37 (1)	21:45	35		20:47 (1)	21:12			20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:18 (1)					05:25			06:18		07:08		08:29
	16:52		19:44		21:29	27	20:37 (1)					21:12			20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508				510			459	382	329	260	231
astr.mas.mögl.Beschattung						160			1036				530						
Red.Sonnenscheinwahrsch.						0.51			0.45				0.45						
Reduktion Betriebsdauer						0.91			0.91				0.91						
Reduktion Windrichtung						0.65			0.65				0.65						
Gesamte Reduktion						0.30			0.27				0.26						
Mat.wahrsch.Beschattung						48			278				139						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang		(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende		(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HI - IO217

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni			Juli			August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51			20:11 (1)	04:47		20:14 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41			21:30	28		20:39 (1)	21:45	34	20:48 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38			04:50			20:11 (1)	04:48		20:14 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42			21:31	29		20:40 (1)	21:44	35	20:48 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36			04:49			20:10 (1)	04:49		20:14 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44			21:32	30		20:40 (1)	21:44	34	20:48 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34			04:49			20:10 (1)	04:50		20:15 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	17:00	17:54	19:52	20:46			21:33	31		20:41 (1)	21:43	33	20:48 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32			04:48			20:10 (1)	04:50		20:15 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48			21:34	32		20:42 (1)	21:43	33	20:48 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30			04:47			20:10 (1)	04:51		20:16 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50			21:35	32		20:42 (1)	21:42	32	20:48 (1)	21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28			04:46			20:09 (1)	04:52		20:16 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51			21:36	33		20:42 (1)	21:42	32	20:48 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26			04:46			20:09 (1)	04:53		20:17 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53			21:37	34		20:43 (1)	21:41	31	20:48 (1)	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24			04:45			20:10 (1)	04:54		20:18 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55			21:38	34		20:44 (1)	21:40	30	20:48 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22			04:45			20:09 (1)	04:55		20:18 (1)	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57			21:39	34		20:43 (1)	21:39	30	20:48 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21			04:44			20:10 (1)	04:57		20:19 (1)	05:43	06:37	07:30	07:29	08:17
	16:18	17:13	18:08	20:04	20:58			21:40	34		20:44 (1)	21:38	28	20:47 (1)	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19			04:44			20:10 (1)	04:58		20:19 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00			21:41	35		20:45 (1)	21:38	28	20:47 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17			04:44			20:09 (1)	04:59		20:20 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02			21:41	35		20:44 (1)	21:37	26	20:46 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15			04:43			20:10 (1)	05:00		20:21 (1)	05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03			21:42	35		20:45 (1)	21:36	24	20:45 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14			04:43			20:10 (1)	05:01		20:22 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05			21:43	35		20:45 (1)	21:34	23	20:45 (1)	20:43	19:31	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12			04:43			20:10 (1)	05:03		20:22 (1)	05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:14	21:07			21:43	35		20:45 (1)	21:33	21	20:43 (1)	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10			04:43			20:10 (1)	05:04		20:24 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08			21:44	36		20:46 (1)	21:32	18	20:43 (1)	20:38	19:26	18:14	16:14	15:53
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19	08:17	07:25	06:20	06:06	05:07			04:43			20:10 (1)	05:07		20:28 (1)	05:57	06:51	07:45	07:44	08:25
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20	08:16	07:22	06:17	06:04	05:06			04:43			20:10 (1)	05:08		20:32 (1)	05:59	06:53	07:47	07:45	08:25
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21	08:15	07:20	06:15	06:01	05:04			04:43			20:10 (1)	05:09			06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15			21:45	36		20:46 (1)	21:27			20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03			04:43			20:11 (1)	05:11			06:02	06:56	07:51	07:49	08:26
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23	08:12	07:16	06:10	05:57	05:02			04:43			20:11 (1)	05:12			06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18			21:45	36		20:47 (1)	21:24			20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		20:20 (1)	04:44			20:11 (1)	05:14			06:06	07:00	07:54	07:53	08:27
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28	08:05	07:05	05:58	05:46	04:55		20:13 (1)	04:45			20:13 (1)	05:20			06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	23	20:36 (1)	21:45	35		20:48 (1)	21:17			20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54		20:13 (1)	04:46			20:13 (1)	05:22			06:15	07:09	07:04	08:01	08:28
	16:48		19:41	20:37	21:26	24	20:37 (1)	21:45	35		20:48 (1)	21:15			20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		20:12 (1)	04:47			20:13 (1)	05:23			06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	25	20:37 (1)	21:45	35		20:48 (1)	21:12			20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		20:11 (1)					05:25			06:18		07:08		08:29
	16:52		19:44		21:29	27	20:38 (1)					21:12			20:07		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492			508				510			459	382	329	260	231
astr.max.mögl.Beschattung						158			1026				524						
Red.Sonnenscheinwahrsch.						0.51			0.45				0.45						
Reduktion Betriebsdauer						0.91			0.91				0.91						
Reduktion Windrichtung						0.65			0.65				0.65						
Gesamte Reduktion						0.30			0.27				0.26						
Mat.wahrsch.Beschattung						48			276				138						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang		(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende		(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HJ - IO218

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29 16:03	07:59 16:54	07:02 17:49	06:48 19:46	05:40 20:41	04:51 21:30 (1) 04:50	20:13 (1) | 04:47 20:39 (1) | 21:45 20:13 (1) | 04:48	20:16 (1) | 05:26 20:49 (1) | 21:10 20:16 (1) | 05:28	06:20 20:04 06:22	07:12 18:51 07:14	07:10 16:42 07:12	08:04 15:58 08:05
2	08:28 16:04	07:57 16:56	07:00 17:50	06:46 19:48	05:38 20:42	04:50 21:31 04:49	20:41 (1) | 21:44 20:12 (1) | 04:49	20:50 (1) | 21:08 20:18 (1) | 05:30	20:02 06:23	18:49 07:16	16:40 07:14	15:57 08:07
3	08:28 16:05	07:56 16:58	06:58 17:52	06:43 19:50	05:36 20:44	21:32 04:49	20:41 (1) | 21:44 20:12 (1) | 04:50	20:49 (1) | 21:06 20:17 (1) | 05:31	20:00 06:25	18:47 07:18	16:38 07:15	15:57 08:08
4	08:28 16:06	07:54 17:00	06:55 17:54	06:41 19:52	05:34 20:46	21:33 04:48	20:41 (1) | 21:43 20:12 (1) | 04:50	20:49 (1) | 21:05 20:17 (1) | 05:33	19:57 06:27	18:44 07:19	16:36 07:17	15:56 08:10
5	08:28 16:08	07:52 17:01	06:53 17:56	06:39 19:53	05:32 20:48	21:34 04:47	20:43 (1) | 21:43 20:12 (1) | 04:51	20:49 (1) | 21:03 20:18 (1) | 05:35	19:55 06:29	18:42 07:21	16:34 07:19	15:55 08:11
6	08:27 16:09	07:50 17:03	06:51 17:58	06:36 19:55	05:30 20:50	21:35 04:46	20:43 (1) | 21:42 20:13 (1) | 04:52	20:49 (1) | 21:01 20:18 (1) | 05:37	19:52 06:30	18:39 07:23	16:32 07:21	15:55 08:12
7	08:27 16:10	07:49 17:05	06:48 18:00	06:34 19:57	05:28 20:51	21:36 04:46	20:43 (1) | 21:42 20:13 (1) | 04:53	20:49 (1) | 20:59 20:19 (1) | 05:38	19:50 06:32	18:37 07:25	16:30 07:23	15:54 08:14
8	08:26 16:12	07:47 17:07	06:46 18:02	06:31 19:59	05:26 20:53	21:37 04:45	20:44 (1) | 21:41 20:12 (1) | 04:54	20:49 (1) | 20:57 20:20 (1) | 05:40	19:48 06:34	18:35 07:27	16:28 07:25	15:54 08:15
9	08:26 16:13	07:45 17:09	06:44 18:04	06:29 20:01	05:24 20:55	21:38 04:45	20:45 (1) | 21:40 20:12 (1) | 04:55	20:49 (1) | 20:55 20:20 (1) | 05:42	19:45 06:36	18:32 07:29	16:27 07:27	15:54 08:16
10	08:25 16:15	07:43 17:11	06:41 18:06	06:27 20:03	05:22 20:57	21:39 04:44	20:44 (1) | 21:39 20:12 (1) | 04:57	20:48 (1) | 20:53 20:21 (1) | 05:43	19:43 06:37	18:30 07:30	16:25 07:28	15:53 08:17
11	08:25 16:18	07:41 17:13	06:39 18:08	06:24 20:04	05:21 20:58	21:40 04:44	20:45 (1) | 21:38 20:12 (1) | 04:58	20:48 (1) | 20:51 20:22 (1) | 05:45	19:40 06:39	18:28 07:32	16:23 07:31	15:53 08:18
12	08:24 16:18	07:39 17:15	06:37 18:09	06:22 20:06	05:19 21:00	21:41 04:44	20:46 (1) | 21:38 20:13 (1) | 04:59	20:47 (1) | 20:49 20:22 (1) | 05:47	19:38 06:41	18:25 07:34	16:22 07:33	15:53 08:19
13	08:23 16:19	07:37 17:17	06:34 18:11	06:20 20:08	05:17 21:02	21:41 04:43	20:45 (1) | 21:37 20:11 (1) | 05:00	20:47 (1) | 20:47 20:23 (1) | 05:48	19:35 06:43	18:23 07:36	16:20 07:34	15:53 08:20
14	08:22 16:21	07:35 17:19	06:32 18:13	06:17 20:10	05:15 21:03	21:42 04:43	20:46 (1) | 21:36 20:12 (1) | 05:01	20:46 (1) | 20:45 20:24 (1) | 05:50	19:33 06:44	18:21 07:38	16:18 07:36	15:53 08:21
15	08:21 16:22	07:33 17:21	06:29 18:15	06:15 20:12	05:14 21:05	21:43 04:43	20:46 (1) | 21:34 20:12 (1) | 05:03	20:45 (1) | 20:43 20:25 (1) | 05:52	19:31 06:46	18:18 07:40	16:17 07:38	15:53 08:22
16	08:20 16:24	07:31 17:23	06:27 18:17	06:13 20:14	05:12 21:07	21:43 04:43	20:46 (1) | 21:33 20:12 (1) | 05:04	20:44 (1) | 20:41 20:27 (1) | 05:54	19:28 06:48	18:16 07:41	16:15 07:40	15:53 08:23
17	08:19 16:26	07:29 17:25	06:25 18:19	06:10 20:15	05:10 21:08	21:44 04:43	20:47 (1) | 21:32 20:12 (1) | 05:05	20:43 (1) | 20:38 20:29 (1) | 05:55	19:26 06:49	18:14 07:43	16:14 07:42	15:53 08:24
18	08:18 16:28	07:27 17:27	06:22 18:21	06:08 20:17	05:09 21:10	21:44 04:43	20:47 (1) | 21:31 20:12 (1) | 05:07	20:41 (1) | 20:36 20:32 (1) | 05:57	19:23 06:51	18:11 07:45	16:12 07:44	15:53 08:25
19	08:17 16:29	07:25 17:29	06:20 18:22	06:06 20:19	05:07 21:11	21:44 04:43	20:47 (1) | 21:30 20:12 (1) | 05:08	20:38 (1) | 20:34 05:59	19:21 06:53	18:09 07:47	16:11 07:45	15:54 08:25
20	08:16 16:31	07:22 17:31	06:17 18:24	06:04 20:21	05:06 21:13	21:45 04:43	20:47 (1) | 21:28 20:12 (1) | 05:09	20:32 06:01	19:18 06:55	18:07 07:49	16:10 07:47	15:54 08:26
21	08:15 16:33	07:20 17:33	06:15 18:26	06:01 20:23	05:04 21:15	21:45 04:43	20:47 (1) | 21:27 20:13 (1) | 05:11	20:30 06:02	19:16 06:56	18:05 07:51	16:08 07:49	15:54 08:26
22	08:14 16:35	07:18 17:35	06:12 18:28	05:59 20:24	05:03 21:16	21:45 04:43	20:48 (1) | 21:26 20:13 (1) | 05:12	20:27 06:04	19:13 06:58	18:03 07:53	16:07 07:51	15:55 08:27
23	08:12 16:36	07:16 17:37	06:10 18:30	05:57 20:26	05:02 21:18	21:45 04:44	20:48 (1) | 21:24 20:13 (1) | 05:14	20:25 06:06	19:11 07:00	18:00 07:54	16:06 07:53	15:55 08:27
24	08:11 16:38	07:14 17:39	06:08 18:32	05:55 20:28	05:00 21:19	21:45 04:44	20:48 (1) | 21:23 20:14 (1) | 05:15	20:23 06:08	19:08 07:02	17:58 07:56	16:05 07:54	15:56 08:28
25	08:10 16:40	07:11 17:41	06:05 18:33	05:52 20:30	04:59 21:21	20:21 (1) 9 20:38 (1) | 21:46 20:19 (1) | 04:45	20:49 (1) | 21:21 20:14 (1) | 05:17	20:21 06:09	19:06 07:03	16:56 06:58	16:04 07:56	15:57 08:28
26	08:08 16:42	07:09 17:43	06:03 18:35	05:50 20:32	04:58 21:22	14 20:33 (1) | 21:45 20:17 (1) | 04:45	20:49 (1) | 21:20 20:15 (1) | 05:18	20:18 06:11	19:04 07:05	16:58 07:00	18:03 07:58	15:57 08:28
27	08:07 16:44	07:07 17:45	06:00 18:37	05:48 20:33	04:56 21:23	18 20:35 (1) | 21:45 20:16 (1) | 04:45	20:49 (1) | 21:18 20:15 (1) | 05:20	20:16 06:13	19:01 07:07	16:52 07:02	16:02 07:59	15:58 08:28
28	08:05 16:46	07:05 17:47	05:58 18:39	05:46 20:35	04:55 21:25	20 20:36 (1) | 21:45 20:15 (1) | 04:46	20:49 (1) | 21:17 20:15 (1) | 05:22	20:14 06:15	18:59 07:09	16:50 07:04	16:01 08:01	15:59 08:29
29	08:04 16:48		06:55 19:41	05:44 20:37	04:54 21:26	22 20:37 (1) | 21:45 20:13 (1)	20:49 (1) | 21:15 20:15 (1) | 05:23	20:11 06:16	18:56 07:11	16:48 07:06	16:00 08:02	16:00 08:29
30	08:02 16:50		06:53 19:43	05:42 20:39	04:53 21:27	24 20:38 (1) | 21:45 20:13 (1)	20:49 (1) | 21:13 05:25	20:09 06:18	18:54	16:46 07:08	15:59	16:01 08:29
31	08:01 16:52		06:51 19:44		04:52 21:29	24 20:39 (1) |	21:12 05:27	20:07 06:19		16:44 07:08		16:02 08:29
Sonnenscheinstunden	252	274	367	419	492	508	510	459	382	329	260	235
astr.max.mögl.Beschattung					133	985	487					
Red.Sonnenscheinwahrsch.					0.51	0.45	0.45					
Reduktion Betriebsdauer					0.91	0.91	0.91					
Reduktion Windrichtung					0.65	0.65	0.65					
Gesamte Reduktion					0.30	0.27	0.26					
Mat.wahrsch.Beschattung					40	267	128					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HK - IO219

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40	04:51	20:14 (1) 04:47	20:17 (1) 05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41	21:30 16	20:40 (1) 21:45 33	20:50 (1) 21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38	04:50	20:15 (1) 04:48	20:18 (1) 05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42	21:31 16	20:41 (1) 21:44 32	20:50 (1) 21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36	04:49	20:14 (1) 04:49	20:17 (1) 05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44	21:32 28	20:42 (1) 21:44 33	20:50 (1) 21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34	04:49	20:13 (1) 04:50	20:18 (1) 05:31	06:25	07:18	07:15	08:08
	16:06	17:00	17:54	19:52	20:46	21:33 29	20:42 (1) 21:43 32	20:50 (1) 21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32	04:48	20:14 (1) 04:50	20:19 (1) 05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48	21:34 29	20:43 (1) 21:43 31	20:50 (1) 21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30	04:47	20:13 (1) 04:51	20:19 (1) 05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50	21:35 30	20:43 (1) 21:42 31	20:50 (1) 21:01	19:52	18:39	16:32	15:55
7	08:27	07:49	06:48	06:34	05:28	04:46	20:12 (1) 04:52	20:19 (1) 05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51	21:36 31	20:43 (1) 21:42 30	20:50 (1) 20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26	04:46	20:13 (1) 04:53	20:20 (1) 05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53	21:37 31	20:44 (1) 21:41 30	20:50 (1) 20:57	19:48	18:35	16:28	15:54
9	08:26	07:45	06:44	06:29	05:24	04:45	20:13 (1) 04:54	20:21 (1) 05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55	21:38 32	20:45 (1) 21:40 28	20:49 (1) 20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22	04:45	20:12 (1) 04:55	20:22 (1) 05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57	21:39 33	20:45 (1) 21:39 27	20:49 (1) 20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21	04:44	20:13 (1) 04:57	20:22 (1) 05:43	06:37	07:30	07:28	08:17
	16:16	17:13	18:08	20:04	20:58	21:40 33	20:46 (1) 21:38 27	20:49 (1) 20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19	04:44	20:13 (1) 04:58	20:23 (1) 05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00	21:41 33	20:46 (1) 21:38 25	20:48 (1) 20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17	04:44	20:12 (1) 04:59	20:24 (1) 05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02	21:41 34	20:46 (1) 21:37 23	20:47 (1) 20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15	04:43	20:13 (1) 05:00	20:25 (1) 05:48	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03	21:42 33	20:46 (1) 21:36 21	20:46 (1) 20:46	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14	04:43	20:13 (1) 05:01	20:26 (1) 05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	21:43 34	20:47 (1) 21:34 19	20:45 (1) 20:45	19:31	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12	04:43	20:13 (1) 05:03	20:27 (1) 05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:14	21:07	21:43 34	20:47 (1) 21:33 17	20:44 (1) 20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10	04:43	20:13 (1) 05:04	20:29 (1) 05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	21:44 34	20:47 (1) 21:32 14	20:43 (1) 20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09	04:43	20:13 (1) 05:05	20:31 (1) 05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	21:44 35	20:48 (1) 21:31 10	20:41 (1) 20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07	04:43	20:13 (1) 05:07	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	21:44 35	20:48 (1) 21:30	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06	04:43	20:14 (1) 05:08	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	21:45 34	20:48 (1) 21:28	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04	04:43	20:14 (1) 05:09	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	21:45 34	20:48 (1) 21:27	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03	04:43	20:15 (1) 05:11	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	21:45 34	20:49 (1) 21:26	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02	04:43	20:15 (1) 05:12	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	21:45 34	20:49 (1) 21:24	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00	04:44	20:14 (1) 05:14	06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19	21:45 35	20:49 (1) 21:23	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59	20:24 (1) 04:44	20:15 (1) 05:15	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21 5	20:29 (1) 21:46 35	20:50 (1) 21:21	20:21	19:56	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58	20:21 (1) 04:45	20:15 (1) 05:17	06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22 12	20:33 (1) 21:45 34	20:49 (1) 21:20	20:18	19:04	16:58	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56	20:18 (1) 04:45	20:16 (1) 05:18	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23 18	20:35 (1) 21:45 34	20:50 (1) 21:18	20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55	20:18 (1) 04:45	20:16 (1) 05:20	06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25 18	20:36 (1) 21:45 34	20:50 (1) 21:17	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54	20:17 (1) 04:46	20:17 (1) 05:22	06:15	07:09	07:04	08:01	08:29
	16:48		19:41	20:37	21:26 20	20:37 (1) 21:45 33	20:50 (1) 21:15	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53	20:18 (1) 04:47	20:18 (1) 05:23	06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27 22	20:38 (1) 21:45 34	20:50 (1) 21:13	20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52	20:15 (1)		05:25		07:08		08:29
	16:52		19:44		21:29 24	20:39 (1)		21:12		16:44		16:02
Sonnenscheinstunden	252	274	367	419	492	508	510	459	382	329	260	235
astr.max.mögl.Beschattung					117	075	463					
Red.Sonnenscheinwahrsch.					0.51	0.45	0.45					
Reduktion Betriebsdauer					0.91	0.91	0.91					
Reduktion Windrichtung					0.65	0.65	0.65					
Gesamte Reduktion					0.30	0.27	0.26					
Mat.wahrsch.Beschattung					35	261	121					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HL - IO220

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai			Juni			Juli			August	September	Oktober	November	Dezember
1	08:29	07:59	07:02	06:48	05:40			04:51			19:58 (1)	04:47		19:55 (1)	05:26	06:20	07:12	07:10	08:04
	16:03	16:54	17:49	19:46	20:41			21:30	39	20:29 (1)	21:45		41	20:36 (1)	21:10	20:04	18:51	16:42	15:58
2	08:28	07:57	07:00	06:46	05:38			04:50		19:50 (1)	04:48			19:56 (1)	05:28	06:22	07:14	07:12	08:05
	16:04	16:56	17:50	19:48	20:42			21:31	40	20:30 (1)	21:44		41	20:37 (1)	21:08	20:02	18:49	16:40	15:57
3	08:28	07:56	06:58	06:43	05:36			04:49		19:50 (1)	04:49			19:55 (1)	05:30	06:23	07:16	07:14	08:07
	16:05	16:58	17:52	19:50	20:44			21:32	40	20:30 (1)	21:44		41	20:36 (1)	21:06	20:00	18:47	16:38	15:57
4	08:28	07:54	06:55	06:41	05:34			04:49		19:50 (1)	04:50			19:54 (1)	05:31	06:25	07:18	07:15	08:08
	16:06	17:00	17:54	19:52	20:46			21:33	40	20:30 (1)	21:43		41	20:37 (1)	21:05	19:57	18:44	16:36	15:56
5	08:28	07:52	06:53	06:39	05:32			04:48		19:50 (1)	04:50			19:56 (1)	05:33	06:27	07:19	07:17	08:10
	16:08	17:01	17:56	19:53	20:48			21:34	41	20:31 (1)	21:43		41	20:37 (1)	21:03	19:55	18:42	16:34	15:55
6	08:27	07:50	06:51	06:36	05:30			04:47		19:50 (1)	04:51			19:56 (1)	05:35	06:29	07:21	07:19	08:11
	16:09	17:03	17:58	19:55	20:50			21:35	41	20:31 (1)	21:42		41	20:37 (1)	21:01	19:52	18:39	16:32	15:53
7	08:27	07:49	06:48	06:34	05:28			04:46		19:50 (1)	04:52			19:57 (1)	05:37	06:30	07:23	07:21	08:12
	16:10	17:05	18:00	19:57	20:51			21:36	41	20:31 (1)	21:42		40	20:37 (1)	20:59	19:50	18:37	16:30	15:54
8	08:26	07:47	06:46	06:31	05:26			04:46		19:50 (1)	04:53			19:57 (1)	05:38	06:32	07:25	07:23	08:14
	16:12	17:07	18:02	19:59	20:53			21:37	41	20:31 (1)	21:41		40	20:37 (1)	20:57	19:48	18:35	16:29	15:54
9	08:26	07:45	06:44	06:29	05:24			04:45		19:51 (1)	04:54			19:57 (1)	05:40	06:34	07:27	07:25	08:15
	16:13	17:09	18:04	20:01	20:55			21:38	41	20:32 (1)	21:40		41	20:38 (1)	20:55	19:45	18:32	16:27	15:54
10	08:25	07:43	06:41	06:27	05:22			04:45		19:50 (1)	04:55			19:58 (1)	05:42	06:36	07:29	07:27	08:16
	16:15	17:11	18:06	20:03	20:57			21:39	42	20:32 (1)	21:39		40	20:38 (1)	20:53	19:43	18:30	16:25	15:53
11	08:25	07:41	06:39	06:24	05:21			04:44		19:51 (1)	04:57			19:58 (1)	05:43	06:37	07:30	07:29	08:17
	16:18	17:13	18:08	20:04	20:58			21:40	41	20:32 (1)	21:38		39	20:37 (1)	20:51	19:40	18:28	16:23	15:53
12	08:24	07:39	06:37	06:22	05:19			04:44		19:51 (1)	04:58			19:58 (1)	05:45	06:39	07:32	07:31	08:18
	16:18	17:15	18:09	20:06	21:00			21:41	42	20:33 (1)	21:38		39	20:37 (1)	20:49	19:38	18:25	16:22	15:53
13	08:23	07:37	06:34	06:20	05:17			04:44		19:51 (1)	04:59			19:58 (1)	05:47	06:41	07:34	07:33	08:19
	16:19	17:17	18:11	20:08	21:02			21:41	45	20:55 (3)	21:37		39	20:37 (1)	20:47	19:35	18:23	16:20	15:53
14	08:22	07:35	06:32	06:17	05:15			04:43		19:51 (1)	05:00			19:59 (1)	05:49	06:43	07:36	07:34	08:20
	16:21	17:19	18:13	20:10	21:03			21:42	49	20:57 (3)	21:36		38	20:37 (1)	20:45	19:33	18:21	16:18	15:53
15	08:21	07:33	06:29	06:15	05:14		20:04 (1)	04:43		19:52 (1)	05:01			19:59 (1)	05:50	06:44	07:38	07:36	08:21
	16:22	17:21	18:15	20:12	21:05	9	20:13 (1)	21:43	50	20:58 (3)	21:34		38	20:37 (1)	20:43	19:31	18:18	16:17	15:53
16	08:20	07:31	06:27	06:13	05:12		20:01 (1)	04:43		19:52 (1)	05:03			19:59 (1)	05:52	06:46	07:40	07:38	08:22
	16:24	17:23	18:17	20:14	21:07	15	20:16 (1)	21:43	51	20:59 (3)	21:33		37	20:38 (1)	20:41	19:28	18:16	16:15	15:53
17	08:19	07:29	06:25	06:10	05:10		19:58 (1)	04:43		19:52 (1)	05:04			20:00 (1)	05:54	06:48	07:41	07:40	08:23
	16:26	17:25	18:19	20:15	21:08	20	20:18 (1)	21:44	51	20:59 (3)	21:32		37	20:37 (1)	20:38	19:26	18:14	16:14	15:53
18	08:18	07:27	06:22	06:08	05:09		19:57 (1)	04:43		19:52 (1)	05:05			20:01 (1)	05:55	06:49	07:43	07:42	08:24
	16:28	17:27	18:21	20:17	21:10	23	20:20 (1)	21:44	53	21:00 (3)	21:31		35	20:36 (1)	20:36	19:23	18:11	16:12	15:53
19	08:17	07:25	06:20	06:06	05:07		19:55 (1)	04:43		19:52 (1)	05:07			20:01 (1)	05:57	06:51	07:45	07:44	08:25
	16:29	17:29	18:22	20:19	21:11	26	20:21 (1)	21:44	53	21:00 (3)	21:30		34	20:35 (1)	20:34	19:21	18:09	16:11	15:54
20	08:16	07:22	06:17	06:04	05:06		19:55 (1)	04:43		19:52 (1)	05:08			20:02 (1)	05:59	06:53	07:47	07:45	08:25
	16:31	17:31	18:24	20:21	21:13	27	20:22 (1)	21:45	53	21:00 (3)	21:29		33	20:35 (1)	20:32	19:18	18:07	16:10	15:54
21	08:15	07:20	06:15	06:01	05:04		19:54 (1)	04:43		19:52 (1)	05:09			20:03 (1)	06:01	06:55	07:49	07:47	08:26
	16:33	17:33	18:26	20:23	21:15	29	20:23 (1)	21:45	53	21:00 (3)	21:27		32	20:35 (1)	20:30	19:16	18:05	16:08	15:54
22	08:14	07:18	06:12	05:59	05:03		19:53 (1)	04:43		19:53 (1)	05:11			20:03 (1)	06:02	06:56	07:51	07:49	08:26
	16:35	17:35	18:28	20:24	21:16	31	20:24 (1)	21:45	53	21:01 (3)	21:26		31	20:34 (1)	20:27	19:13	18:03	16:07	15:55
23	08:12	07:16	06:10	05:57	05:02		19:52 (1)	04:43		19:53 (1)	05:12			20:05 (1)	06:04	06:58	07:53	07:51	08:27
	16:36	17:37	18:30	20:26	21:18	32	20:24 (1)	21:45	53	21:01 (3)	21:24		28	20:33 (1)	20:25	19:11	18:00	16:06	15:55
24	08:11	07:14	06:08	05:55	05:00		19:52 (1)	04:44		19:53 (1)	05:14			20:05 (1)	06:06	07:00	07:54	07:53	08:27
	16:38	17:39	18:32	20:28	21:19	33	20:25 (1)	21:45	53	21:01 (3)	21:23		27	20:32 (1)	20:23	19:08	17:58	16:05	15:56
25	08:10	07:11	06:05	05:52	04:59		19:51 (1)	04:44		19:54 (1)	05:15			20:06 (1)	06:08	07:02	06:56	07:54	08:28
	16:40	17:41	18:33	20:30	21:21	35	20:26 (1)	21:46	51	21:01 (3)	21:21		24	20:30 (1)	20:21	19:06	16:56	16:04	15:57
26	08:08	07:09	06:03	05:50	04:58		19:51 (1)	04:45		19:54 (1)	05:17			20:08 (1)	06:09	07:03	06:58	07:56	08:28
	16:42	17:43	18:35	20:32	21:22	36	20:27 (1)	21:45	51	21:01 (3)	21:20		22	20:30 (1)	20:18	19:04	16:54	16:03	15:57
27	08:07	07:07	06:00	05:48	04:56		19:51 (1)	04:45		19:55 (1)	05:18			20:10 (1)	06:11	07:05	07:00	07:58	08:28
	16:44	17:45	18:37	20:33	21:23	36	20:27 (1)	21:45	50	21:01 (3)	21:18		17	20:27 (1)	20:16	19:01	16:52	16:02	15:58
28	08:05	07:05	05:58	05:46	04:55		19:51 (1)	04:45		19:54 (1)	05:20			20:13 (1)	06:13	07:07	07:02	07:59	08:28
	16:46	17:47	18:39	20:35	21:25	37	20:28 (1)	21:45	49	21:00 (3)	21:17		13	20:26 (1)	20:14	18:59	16:50	16:01	15:59
29	08:04		06:55	05:44	04:54		19:50 (1)	04:46		19:55 (1)	05:22			20:17 (1)	06:15	07:09	07:04	08:01	08:28
	16:48		19:41	20:37	21:26	38	20:28 (1)	21:45	47	21:00 (3)	21:15		3	20:20 (1)	20:11	18:56	16:48	16:00	16:00
30	08:02		06:53	05:42	04:53		19:50 (1)	04:47		19:55 (1)	05:23				06:16	07:11	07:06	08:02	08:29
	16:50		19:43	20:39	21:27	39	20:29 (1)	21:45	41	20:36 (1)	21:12				20:09	18:54	16:46	15:59	16:01
31	08:01		06:51		04:52		19:50 (1)				05:25				06:18		07:08		08:29
	16:52		19:44		21:29	39	20:29 (1)				21:12				20:07		16:44		16:02
Sonnenscheinstunden	152	274	367	419	492			508			510				459	382	329	260	191
astr.max.mögl.Beschattung						505			1395			973							
Red.Sonnenscheinwahrsch.						0.51			0.45			0.45							
Reduktion Betriebsdauer						0.91			0.91			0.91							
Reduktion Windrichtung						0.68			0.65			0.66							
Gesamte Reduktion						0.31			0.27			0.27							
Mat.wahrsch.Beschattung						155			378			259							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)	
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)	

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HM - IO221

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April		Mai			Juni		
1	08:29		07:59		07:02		06:48		05:40			04:51		19:38 (1)
	16:03		16:54		17:49		19:46		20:41			21:30	42	20:20 (1)
2	08:28		07:57		07:00		06:46		05:38			04:50		19:39 (1)
	16:04		16:56		17:50		19:48		20:42			21:31	46	20:46 (3)
3	08:28		07:56		06:58		06:43		05:36			04:49		19:39 (1)
	16:05		16:58		17:52		19:50		20:44			21:32	51	20:49 (3)
4	08:28		07:54		06:55		06:41		05:34			04:49		19:39 (1)
	16:06		17:00		17:54		19:52		20:46			21:33	54	20:50 (3)
5	08:28		07:52		06:53		06:39		05:32			04:48		19:40 (1)
	16:08		17:01		17:56		19:53		20:48			21:34	55	20:52 (3)
6	08:27		07:50		06:51		06:36		05:30			04:47		19:40 (1)
	16:09		17:03		17:58		19:55		20:50			21:35	57	20:53 (3)
7	08:27		07:49		06:48		06:34		05:28			04:46		19:39 (1)
	16:10		17:05		18:00		19:57		20:51			21:36	59	20:53 (3)
8	08:26		07:47		06:46		06:31		05:26			04:46		19:40 (1)
	16:12		17:07		18:02		19:59		20:53			21:37	59	20:54 (3)
9	08:26		07:45		06:44		06:29		05:24		19:52 (1)	04:45		19:41 (1)
	16:13		17:09		18:04		20:01		20:55	13	20:05 (1)	21:38	60	20:55 (3)
10	08:25		07:43		06:41		06:27		05:22		19:49 (1)	04:45		19:40 (1)
	16:15		17:11		18:06		20:03		20:57	18	20:07 (1)	21:39	61	20:55 (3)
11	08:25		07:41		06:39		06:24		05:21		19:46 (1)	04:44		19:41 (1)
	16:16		17:13		18:08		20:04		20:58	23	20:09 (1)	21:40	62	20:56 (3)
12	08:24		07:39		06:37		06:22		05:19		19:46 (1)	04:44		19:42 (1)
	16:18		17:15		18:09		20:06		21:00	25	20:11 (1)	21:41	62	20:57 (3)
13	08:23		07:37		06:34		06:20		05:17		19:44 (1)	04:44		19:41 (1)
	16:19		17:17		18:11		20:08		21:02	28	20:12 (1)	21:41	64	20:57 (3)
14	08:22		07:35		06:32		06:17		05:15		19:43 (1)	04:43		19:42 (1)
	16:21		17:19		18:13		20:10		21:03	30	20:13 (1)	21:42	63	20:57 (3)
15	08:21		07:33		06:29		06:15		05:14		19:42 (1)	04:43		19:42 (1)
	16:22		17:21		18:15		20:12		21:05	32	20:14 (1)	21:43	63	20:58 (3)
16	08:20		07:31		06:27		06:13		05:12		19:42 (1)	04:43		19:42 (1)
	16:24		17:23		18:17		20:14		21:07	33	20:15 (1)	21:43	63	20:58 (3)
17	08:19		07:29		06:25		06:10		05:10		19:40 (1)	04:43		19:43 (1)
	16:26		17:25		18:19		20:15		21:08	35	20:15 (1)	21:44	64	20:59 (3)
18	08:18		07:27		06:22		06:08		05:09		19:40 (1)	04:43		19:43 (1)
	16:28		17:27		18:21		20:17		21:10	36	20:16 (1)	21:44	64	20:59 (3)
19	08:17		07:25		06:20		06:06		05:07		19:39 (1)	04:43		19:43 (1)
	16:29		17:29		18:22		20:19		21:11	37	20:16 (1)	21:44	64	20:59 (3)
20	08:16		07:22		06:17		06:04		05:06		19:39 (1)	04:43		19:43 (1)
	16:31		17:31		18:24		20:21		21:13	38	20:17 (1)	21:45	64	20:59 (3)
21	08:15		07:20		06:15		06:01		05:04		19:39 (1)	04:43		19:43 (1)
	16:33		17:33		18:26		20:23		21:15	39	20:18 (1)	21:45	64	20:59 (3)
22	08:14		07:18		06:12		05:59		05:03		19:38 (1)	04:43		19:44 (1)
	16:35		17:35		18:28		20:24		21:16	39	20:17 (1)	21:45	64	21:00 (3)
23	08:12		07:16		06:10		05:57		05:02		19:38 (1)	04:43		19:44 (1)
	16:36		17:37		18:30		20:26		21:18	40	20:18 (1)	21:45	64	21:00 (3)
24	08:11		07:14		06:08		05:55		05:00		19:38 (1)	04:44		19:44 (1)
	16:38		17:39		18:32		20:28		21:19	41	20:19 (1)	21:45	64	21:00 (3)
25	08:10		07:11		06:05		05:52		04:59		19:38 (1)	04:44		19:45 (1)
	16:40		17:41		18:33		20:30		21:21	41	20:19 (1)	21:46	64	21:01 (3)
26	08:08		07:09		06:03		05:50		04:58		19:38 (1)	04:45		19:44 (1)
	16:42		17:43		18:35		20:32		21:22	41	20:19 (1)	21:46	63	21:00 (3)
27	08:07		07:07		06:00		05:48		04:56		19:38 (1)	04:45		19:45 (1)
	16:44		17:45		18:37		20:33		21:23	42	20:20 (1)	21:45	63	21:01 (3)
28	08:05		07:05		05:58		05:46		04:55		19:38 (1)	04:45		19:45 (1)
	16:46		17:47		18:39		20:35		21:25	42	20:20 (1)	21:45	63	21:01 (3)
29	08:04				06:55		05:44		04:54		19:38 (1)	04:46		19:45 (1)
	16:48				19:41		20:37		21:26	42	20:20 (1)	21:45	64	21:01 (3)
30	08:02				06:53		05:42		04:53		19:38 (1)	04:47		19:45 (1)
	16:50				19:43		20:39		21:27	42	20:20 (1)	21:45	62	21:00 (3)
31	08:01				06:51				04:52		19:38 (1)			
	16:52				19:44				21:29	42	20:20 (1)			
Sonnenscheinstunden	252		274		367		419		492			508		
astr.max.mögl.Beschattung										799			1812	
Red.Sonnenscheinwahrsch.										0.51			0.45	
Reduktion Betriebsdauer										0.91			0.91	
Reduktion Windrichtung										0.66			0.65	
Gesamte Reduktion										0.31			0.27	
Met.wahrsch.Beschattung										246			490	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HM - IO221

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September	Oktober	November	Dezember
1	04:47		19:45 (1)	05:26		19:56 (1)	06:20	07:12	07:10	08:04
	21:45	63	21:01 (3)	21:10	25	20:21 (1)	20:04	18:51	16:42	15:58
2	04:48		19:46 (1)	05:28		19:58 (1)	06:22	07:14	07:12	08:05
	21:44	61	21:01 (3)	21:08	21	20:19 (1)	20:02	18:49	16:40	15:57
3	04:49		19:45 (1)	05:30		20:00 (1)	06:23	07:16	07:14	08:07
	21:44	61	21:00 (3)	21:06	17	20:17 (1)	20:00	18:47	16:38	15:57
4	04:50		19:45 (1)	05:31		20:03 (1)	06:25	07:18	07:15	08:08
	21:43	60	21:00 (3)	21:05	10	20:13 (1)	19:57	18:44	16:36	15:56
5	04:50		19:46 (1)	05:33			06:27	07:19	07:17	08:10
	21:43	59	21:00 (3)	21:03			19:55	18:42	16:34	15:55
6	04:51		19:46 (1)	05:35			06:29	07:21	07:19	08:11
	21:42	57	20:59 (3)	21:01			19:52	18:39	16:32	15:55
7	04:52		19:46 (1)	05:37			06:30	07:23	07:21	08:12
	21:42	57	20:59 (3)	20:59			19:50	18:37	16:30	15:54
8	04:53		19:46 (1)	05:38			06:32	07:25	07:23	08:14
	21:41	55	20:58 (3)	20:57			19:48	18:35	16:29	15:54
9	04:54		19:46 (1)	05:40			06:34	07:27	07:25	08:15
	21:40	53	20:57 (3)	20:55			19:45	18:32	16:27	15:54
10	04:55		19:47 (1)	05:42			06:36	07:29	07:27	08:16
	21:39	48	20:55 (3)	20:53			19:43	18:30	16:25	15:53
11	04:57		19:47 (1)	05:43			06:37	07:30	07:29	08:17
	21:38	41	20:28 (1)	20:51			19:40	18:28	16:23	15:53
12	04:58		19:47 (1)	05:45			06:39	07:32	07:31	08:18
	21:38	41	20:28 (1)	20:49			19:38	18:25	16:22	15:53
13	04:59		19:47 (1)	05:47			06:41	07:34	07:33	08:19
	21:37	41	20:28 (1)	20:47			19:35	18:23	16:20	15:53
14	05:00		19:47 (1)	05:49			06:43	07:36	07:34	08:20
	21:36	41	20:28 (1)	20:45			19:33	18:21	16:18	15:53
15	05:01		19:47 (1)	05:50			06:44	07:38	07:36	08:21
	21:34	41	20:28 (1)	20:43			19:31	18:18	16:17	15:53
16	05:03		19:47 (1)	05:52			06:46	07:40	07:38	08:22
	21:33	41	20:28 (1)	20:41			19:28	18:16	16:15	15:53
17	05:04		19:48 (1)	05:54			06:48	07:41	07:40	08:23
	21:32	41	20:29 (1)	20:38			19:26	18:14	16:14	15:53
18	05:05		19:48 (1)	05:55			06:49	07:43	07:42	08:24
	21:31	41	20:29 (1)	20:36			19:23	18:11	16:12	15:53
19	05:07		19:48 (1)	05:57			06:51	07:45	07:44	08:25
	21:30	40	20:28 (1)	20:34			19:21	18:09	16:11	15:54
20	05:08		19:49 (1)	05:59			06:53	07:47	07:45	08:25
	21:29	40	20:29 (1)	20:32			19:18	18:07	16:10	15:54
21	05:09		19:49 (1)	06:01			06:55	07:49	07:47	08:26
	21:27	39	20:28 (1)	20:30			19:16	18:05	16:08	15:54
22	05:11		19:49 (1)	06:02			06:56	07:51	07:49	08:26
	21:26	39	20:28 (1)	20:27			19:13	18:03	16:07	15:55
23	05:12		19:50 (1)	06:04			06:58	07:53	07:51	08:27
	21:24	38	20:28 (1)	20:25			19:11	18:00	16:06	15:55
24	05:14		19:50 (1)	06:06			07:00	07:54	07:53	08:27
	21:23	37	20:27 (1)	20:23			19:08	17:58	16:05	15:56
25	05:15		19:50 (1)	06:08			07:02	06:56	07:54	08:28
	21:21	36	20:26 (1)	20:21			19:06	16:56	16:04	15:57
26	05:17		19:51 (1)	06:09			07:03	06:58	07:56	08:28
	21:20	35	20:26 (1)	20:18			19:04	16:54	16:03	15:57
27	05:18		19:51 (1)	06:11			07:05	07:00	07:58	08:28
	21:18	34	20:25 (1)	20:16			19:01	16:52	16:02	15:58
28	05:20		19:52 (1)	06:13			07:07	07:02	07:59	08:28
	21:17	33	20:25 (1)	20:14			18:59	16:50	16:01	15:59
29	05:22		19:53 (1)	06:15			07:09	07:04	08:01	08:29
	21:15	31	20:24 (1)	20:11			18:56	16:48	16:00	16:00
30	05:23		19:54 (1)	06:16			07:11	07:06	08:02	08:29
	21:13	29	20:23 (1)	20:09			18:54	16:46	15:59	16:01
31	05:25		19:55 (1)	06:18				07:08		08:29
	21:12	27	20:22 (1)	20:07				16:44		16:02
Sonnenscheinstunden	510			459			382	329	260	235
astr.max.mögl.Beschattung		1360			73					
Red.Sonnenscheinwahrsch.		0.45			0.49					
Reduktion Betriebsdauer		0.91			0.91					
Reduktion Windrichtung		0.66			0.66					
Gesamte Reduktion		0.27			0.29					
Met.wahrsch.Beschattung		363			21					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HN - IO222

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:02		06:48			05:40		06:16 (2)	04:51		05:29 (6)
	16:03		16:54		17:49		19:46			20:41	63	07:22 (1)	21:30	23	05:52 (6)
2	08:29		07:57		07:00		06:46			05:38		06:16 (2)	04:50		05:30 (6)
	16:04		16:56		17:51		19:48			20:43	63	07:22 (1)	21:31	23	05:53 (6)
3	08:28		07:56		06:58		06:43			05:36		06:16 (2)	04:49		05:29 (6)
	16:05		16:58		17:52		19:50			20:44	61	07:21 (1)	21:32	24	05:53 (6)
4	08:28		07:54		06:56		06:41			05:34		06:17 (2)	04:49		05:29 (6)
	16:07		17:00		17:54		19:52			20:46	59	07:21 (1)	21:33	24	05:53 (6)
5	08:28		07:52		06:53		06:39			05:32		06:16 (2)	04:48		05:30 (6)
	16:08		17:02		17:56		19:54			20:48	57	07:19 (1)	21:35	24	05:54 (6)
6	08:27		07:50		06:51		06:36			05:30		06:16 (2)	04:47		05:29 (6)
	16:09		17:04		17:58		19:55			20:50	55	07:18 (1)	21:36	25	05:54 (6)
7	08:27		07:49		06:49		06:34			05:28		06:16 (2)	04:46		05:30 (6)
	16:10		17:06		18:00		19:57			20:51	53	07:17 (1)	21:37	25	05:55 (6)
8	08:27		07:47		06:46		06:31			05:26		06:17 (2)	04:46		05:30 (6)
	16:12		17:08		18:02		19:59			20:53	48	07:15 (1)	21:37	24	05:54 (6)
9	08:26		07:45		06:44		06:29			05:24		06:18 (2)	04:45		05:30 (6)
	16:13		17:09		18:04		20:01			20:55	44	07:14 (1)	21:38	25	05:55 (6)
10	08:25		07:43		06:41		06:27			05:22		06:18 (2)	04:45		05:30 (6)
	16:15		17:11		18:06		20:03			20:57	39	07:12 (1)	21:39	24	05:54 (6)
11	08:25		07:41		06:39		06:24			05:21		06:19 (2)	04:44		05:31 (6)
	16:16		17:13		18:08		20:05			20:58	30	07:08 (1)	21:40	24	05:55 (6)
12	08:24		07:39		06:37		06:22			05:19		06:20 (2)	04:44		05:31 (6)
	16:18		17:15		18:10		20:06			21:00	18	06:38 (2)	21:41	24	05:55 (6)
13	08:23		07:37		06:34		06:20		07:01 (1)	05:17		06:21 (2)	04:44		05:32 (6)
	16:19		17:17		18:11		20:08	14	07:15 (1)	21:02	15	06:36 (2)	21:41	24	05:56 (6)
14	08:22		07:35		06:32		06:17		06:58 (1)	05:15		06:24 (2)	04:43		05:31 (6)
	16:21		17:19		18:13		20:10	20	07:18 (1)	21:03	11	06:35 (2)	21:42	24	05:55 (6)
15	08:21		07:33		06:29		06:15		06:56 (1)	05:14		06:26 (2)	04:43		05:31 (6)
	16:23		17:21		18:15		20:12	24	07:20 (1)	21:05	5	06:31 (2)	21:43	24	05:55 (6)
16	08:21		07:31		06:27		06:13		06:54 (1)	05:12			04:43		05:32 (6)
	16:24		17:23		18:17		20:14	28	07:22 (1)	21:07			21:43	24	05:56 (6)
17	08:20		07:29		06:25		06:10		06:52 (1)	05:10			04:43		05:32 (6)
	16:26		17:25		18:19		20:15	30	07:22 (1)	21:08			21:44	24	05:56 (6)
18	08:18		07:27		06:22		06:08		06:51 (1)	05:09			04:43		05:32 (6)
	16:28		17:27		18:21		20:17	32	07:23 (1)	21:10			21:44	24	05:56 (6)
19	08:17		07:25		06:20		06:06		06:50 (1)	05:07			04:43		05:32 (6)
	16:29		17:29		18:22		20:19	34	07:24 (1)	21:12			21:45	24	05:56 (6)
20	08:16		07:23		06:17		06:04		06:49 (1)	05:06		05:38 (6)	04:43		05:32 (6)
	16:31		17:31		18:24		20:21	36	07:25 (1)	21:13	4	05:42 (6)	21:45	24	05:56 (6)
21	08:15		07:20		06:15		06:01		06:49 (1)	05:04		05:35 (6)	04:43		05:33 (6)
	16:33		17:33		18:26		20:23	36	07:25 (1)	21:15	10	05:45 (6)	21:45	24	05:57 (6)
22	08:14		07:18		06:13		05:59		06:48 (1)	05:03		05:34 (6)	04:43		05:33 (6)
	16:35		17:35		18:28		20:25	37	07:25 (1)	21:16	13	05:47 (6)	21:45	24	05:57 (6)
23	08:13		07:16		06:10		05:57		06:28 (2)	05:02		05:32 (6)	04:44		05:33 (6)
	16:37		17:37		18:30		20:26	44	07:25 (1)	21:18	15	05:47 (6)	21:45	24	05:57 (6)
24	08:11		07:14		06:08		05:55		06:24 (2)	05:00		05:31 (6)	04:44		05:33 (6)
	16:38		17:39		18:32		20:28	52	07:25 (1)	21:19	17	05:48 (6)	21:46	24	05:57 (6)
25	08:10		07:12		06:05		05:53		06:22 (2)	04:59		05:31 (6)	04:44		05:34 (6)
	16:40		17:41		18:33		20:30	56	07:25 (1)	21:21	18	05:49 (6)	21:46	24	05:58 (6)
26	08:08		07:09		06:03		05:50		06:21 (2)	04:58		05:30 (6)	04:45		05:34 (6)
	16:42		17:43		18:35		20:32	58	07:25 (1)	21:22	20	05:50 (6)	21:46	24	05:58 (6)
27	08:07		07:07		06:00		05:48		06:19 (2)	04:57		05:30 (6)	04:45		05:34 (6)
	16:44		17:45		18:37		20:34	60	07:24 (1)	21:23	21	05:51 (6)	21:46	24	05:58 (6)
28	08:05		07:05		05:58		05:46		06:18 (2)	04:55		05:30 (6)	04:46		05:34 (6)
	16:46		17:47		18:39		20:35	62	07:24 (1)	21:25	21	05:51 (6)	21:45	24	05:58 (6)
29	08:04				06:56		05:44		06:18 (2)	04:54		05:29 (6)	04:46		05:35 (6)
	16:48				19:41		20:37	63	07:24 (1)	21:26	23	05:52 (6)	21:45	24	05:59 (6)
30	08:02				06:53		05:42		06:17 (2)	04:53		05:29 (6)	04:47		05:34 (6)
	16:50				19:43		20:39	63	07:23 (1)	21:27	23	05:52 (6)	21:45	25	05:59 (6)
31	08:01				06:51					04:52		05:29 (6)			
	16:52				19:44					21:29	23	05:52 (6)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung								749			829			722	
Red.Sonnenscheinwahrsch.								0.41			0.51			0.45	
Reduktion Betriebsdauer								0.91			0.91			0.91	
Reduktion Windrichtung								0.69			0.69			0.68	
Gesamte Reduktion								0.26			0.32			0.28	
Met.wahrsch.Beschattung								194			266			204	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HN - IO222

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September	Oktober	November	Dezember
1	04:47		05:35 (6)	05:27		06:30 (2)	06:20	07:12	07:10	08:04
	21:45	24	05:59 (6)	21:10	24	07:16 (1)	20:04	18:51	16:42	15:58
2	04:48		05:35 (6)	05:28		06:29 (2)	06:22	07:14	07:12	08:06
	21:44	25	06:00 (6)	21:08	34	07:20 (1)	20:02	18:49	16:40	15:57
3	04:49		05:35 (6)	05:30		06:28 (2)	06:23	07:16	07:14	08:07
	21:44	24	05:59 (6)	21:07	40	07:23 (1)	20:00	18:47	16:38	15:57
4	04:50		05:35 (6)	05:32		06:27 (2)	06:25	07:18	07:16	08:08
	21:43	25	06:00 (6)	21:05	46	07:24 (1)	19:57	18:44	16:36	15:56
5	04:51		05:35 (6)	05:33		06:27 (2)	06:27	07:20	07:18	08:10
	21:43	25	06:00 (6)	21:03	49	07:26 (1)	19:55	18:42	16:34	15:56
6	04:51		05:36 (6)	05:35		06:27 (2)	06:29	07:21	07:19	08:11
	21:42	24	06:00 (6)	21:01	53	07:28 (1)	19:52	18:39	16:32	15:55
7	04:52		05:36 (6)	05:37		06:26 (2)	06:30	07:23	07:21	08:13
	21:42	25	06:01 (6)	20:59	55	07:28 (1)	19:50	18:37	16:30	15:55
8	04:53		05:36 (6)	05:38		06:26 (2)	06:32	07:25	07:23	08:14
	21:41	25	06:01 (6)	20:57	57	07:29 (1)	19:48	18:35	16:29	15:54
9	04:54		05:37 (6)	05:40		06:25 (2)	06:34	07:27	07:25	08:15
	21:40	24	06:01 (6)	20:55	60	07:29 (1)	19:45	18:32	16:27	15:54
10	04:55		05:37 (6)	05:42		06:25 (2)	06:36	07:29	07:27	08:16
	21:39	24	06:01 (6)	20:53	61	07:30 (1)	19:43	18:30	16:25	15:53
11	04:57		05:37 (6)	05:43		06:26 (2)	06:37	07:30	07:29	08:17
	21:39	24	06:01 (6)	20:51	61	07:31 (1)	19:40	18:28	16:23	15:53
12	04:58		05:37 (6)	05:45		06:25 (2)	06:39	07:32	07:31	08:19
	21:38	24	06:01 (6)	20:49	62	07:31 (1)	19:38	18:25	16:22	15:53
13	04:59		05:38 (6)	05:47		06:26 (2)	06:41	07:34	07:33	08:20
	21:37	23	06:01 (6)	20:47	63	07:32 (1)	19:35	18:23	16:20	15:53
14	05:00		05:38 (6)	05:49		06:25 (2)	06:43	07:36	07:35	08:21
	21:36	22	06:00 (6)	20:45	63	07:31 (1)	19:33	18:21	16:19	15:53
15	05:01		05:38 (6)	05:50		06:26 (2)	06:44	07:38	07:36	08:21
	21:35	22	06:00 (6)	20:43	62	07:32 (1)	19:31	18:18	16:17	15:53
16	05:03		05:39 (6)	05:52		06:27 (2)	06:46	07:40	07:38	08:22
	21:33	22	06:01 (6)	20:41	61	07:32 (1)	19:28	18:16	16:15	15:53
17	05:04		05:40 (6)	05:54		06:28 (2)	06:48	07:41	07:40	08:23
	21:32	20	06:00 (6)	20:39	57	07:31 (1)	19:26	18:14	16:14	15:53
18	05:05		05:40 (6)	05:56		06:29 (2)	06:50	07:43	07:42	08:24
	21:31	19	05:59 (6)	20:36	54	07:31 (1)	19:23	18:12	16:13	15:53
19	05:07		05:40 (6)	05:57		06:31 (2)	06:51	07:45	07:44	08:25
	21:30	18	05:58 (6)	20:34	50	07:31 (1)	19:21	18:09	16:11	15:54
20	05:08		05:42 (6)	05:59		06:35 (2)	06:53	07:47	07:46	08:25
	21:29	16	05:58 (6)	20:32	41	07:30 (1)	19:18	18:07	16:10	15:54
21	05:10		05:43 (6)	06:01		06:53 (1)	06:55	07:49	07:47	08:26
	21:27	14	05:57 (6)	20:30	37	07:30 (1)	19:16	18:05	16:09	15:54
22	05:11		05:44 (6)	06:03		06:53 (1)	06:57	07:51	07:49	08:27
	21:26	12	05:56 (6)	20:27	37	07:30 (1)	19:13	18:03	16:07	15:55
23	05:12		05:46 (6)	06:04		06:53 (1)	06:58	07:53	07:51	08:27
	21:25	8	05:54 (6)	20:25	35	07:28 (1)	19:11	18:00	16:06	15:55
24	05:14			06:06		06:54 (1)	07:00	07:55	07:53	08:27
	21:23			20:23	34	07:28 (1)	19:09	17:58	16:05	15:56
25	05:15			06:08		06:55 (1)	07:02	06:56	07:54	08:28
	21:22			20:21	32	07:27 (1)	19:06	16:56	16:04	15:57
26	05:17			06:10		06:55 (1)	07:04	06:58	07:56	08:28
	21:20			20:18	30	07:25 (1)	19:04	16:54	16:03	15:57
27	05:19			06:11		06:56 (1)	07:05	07:00	07:58	08:28
	21:18			20:16	28	07:24 (1)	19:01	16:52	16:02	15:58
28	05:20			06:13		06:58 (1)	07:07	07:02	07:59	08:29
	21:17			20:14	24	07:22 (1)	18:59	16:50	16:01	15:59
29	05:22		06:35 (2)	06:15		06:59 (1)	07:09	07:04	08:01	08:29
	21:15	8	06:43 (2)	20:11	20	07:19 (1)	18:56	16:48	16:00	16:00
30	05:23		06:33 (2)	06:17		07:02 (1)	07:11	07:06	08:03	08:29
	21:14	13	06:46 (2)	20:09	14	07:16 (1)	18:54	16:46	15:59	16:01
31	05:25		06:31 (2)	06:18				07:08		08:29
	21:12	16	06:47 (2)	20:07				16:44		16:02
Sonnenscheinstunden	510			459		382	329	260		235
astr.max.mögl.Beschattung		526			1344					
Red.Sonnenscheinwahrsch.		0.45			0.49					
Reduktion Betriebsdauer		0.91			0.91					
Reduktion Windrichtung		0.68			0.69					
Gesamte Reduktion		0.28			0.31					
Met.wahrsch.Beschattung		146			412					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HO - IO223

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April			Mai			Juni		
1	08:29	07:59	07:03	06:48			05:40		06:19 (1)	04:51		05:39 (3)
	16:03	16:54	17:49	19:46			20:41	17	06:36 (1)	21:30	19	05:58 (3)
2	08:29	07:58	07:00	06:46			05:38		06:20 (1)	04:50		05:39 (3)
	16:04	16:56	17:51	19:48			20:43	15	06:35 (1)	21:31	18	05:57 (3)
3	08:28	07:56	06:58	06:43			05:36		06:22 (1)	04:50		05:40 (3)
	16:05	16:58	17:53	19:50			20:44	12	06:34 (1)	21:32	17	05:57 (3)
4	08:28	07:54	06:56	06:41			05:34		06:24 (1)	04:49		05:40 (3)
	16:07	17:00	17:54	19:52			20:46	8	06:32 (1)	21:33	16	05:56 (3)
5	08:28	07:52	06:53	06:39			05:32			04:48		05:41 (3)
	16:08	17:02	17:56	19:54			20:48			21:35	15	05:56 (3)
6	08:27	07:51	06:51	06:36			05:30			04:47		05:41 (3)
	16:09	17:04	17:58	19:55			20:50			21:36	15	05:56 (3)
7	08:27	07:49	06:49	06:34			05:28			04:47		05:43 (3)
	16:11	17:06	18:00	19:57			20:51			21:37	13	05:56 (3)
8	08:27	07:47	06:46	06:32			05:26			04:46		05:43 (3)
	16:12	17:08	18:02	19:59			20:53			21:38	12	05:55 (3)
9	08:26	07:45	06:44	06:29			05:24			04:45		05:44 (3)
	16:13	17:10	18:04	20:01			20:55			21:38	11	05:55 (3)
10	08:25	07:43	06:41	06:27			05:23			04:45		05:44 (3)
	16:15	17:12	18:06	20:03			20:57			21:39	10	05:54 (3)
11	08:25	07:41	06:39	06:24			05:21			04:44		05:46 (3)
	16:16	17:14	18:08	20:05			20:58			21:40	8	05:54 (3)
12	08:24	07:39	06:37	06:22			05:19			04:44		05:47 (3)
	16:18	17:15	18:10	20:06			21:00			21:41	6	05:53 (3)
13	08:23	07:37	06:34	06:20			05:17		05:44 (3)	04:44		05:48 (3)
	16:19	17:17	18:11	20:08			21:02	5	05:49 (3)	21:41	5	05:53 (3)
14	08:22	07:35	06:32	06:17			05:15		05:43 (3)	04:43		05:49 (3)
	16:21	17:19	18:13	20:10			21:03	9	05:52 (3)	21:42	1	05:50 (3)
15	08:21	07:33	06:30	06:15			05:14		05:41 (3)	04:43		
	16:23	17:21	18:15	20:12			21:05	12	05:53 (3)	21:43		
16	08:21	07:31	06:27	06:13			05:12		05:40 (3)	04:43		
	16:24	17:23	18:17	20:14			21:07	15	05:55 (3)	21:43		
17	08:20	07:29	06:25	06:10			05:11		05:38 (3)	04:43		
	16:26	17:25	18:19	20:15			21:08	17	05:55 (3)	21:44		
18	08:19	07:27	06:22	06:08			05:09		05:38 (3)	04:43		
	16:28	17:27	18:21	20:17			21:10	18	05:56 (3)	21:44		
19	08:17	07:25	06:20	06:06			05:07		05:38 (3)	04:43		
	16:29	17:29	18:23	20:19			21:12	19	05:57 (3)	21:45		
20	08:16	07:23	06:17	06:04		06:28 (1)	05:06		05:37 (3)	04:43		
	16:31	17:31	18:24	20:21	5	06:33 (1)	21:13	20	05:57 (3)	21:45		
21	08:15	07:20	06:15	06:01		06:26 (1)	05:04		05:37 (3)	04:43		
	16:33	17:33	18:26	20:23	10	06:36 (1)	21:15	20	05:57 (3)	21:45		
22	08:14	07:18	06:13	05:59		06:24 (1)	05:03		05:37 (3)	04:43		
	16:35	17:35	18:28	20:25	13	06:37 (1)	21:16	21	05:58 (3)	21:45		
23	08:13	07:16	06:10	05:57		06:22 (1)	05:02		05:36 (3)	04:44		
	16:37	17:37	18:30	20:26	16	06:38 (1)	21:18	21	05:57 (3)	21:46		
24	08:11	07:14	06:08	05:55		06:20 (1)	05:00		05:36 (3)	04:44		
	16:38	17:39	18:32	20:28	18	06:38 (1)	21:19	21	05:57 (3)	21:46		
25	08:10	07:12	06:05	05:53		06:19 (1)	04:59		05:36 (3)	04:44		
	16:40	17:41	18:34	20:30	19	06:38 (1)	21:21	22	05:58 (3)	21:46		
26	08:08	07:09	06:03	05:50		06:19 (1)	04:58		05:37 (3)	04:45		
	16:42	17:43	18:35	20:32	19	06:38 (1)	21:22	21	05:58 (3)	21:46		
27	08:07	07:07	06:00	05:48		06:18 (1)	04:57		05:37 (3)	04:45		
	16:44	17:45	18:37	20:34	20	06:38 (1)	21:24	21	05:58 (3)	21:46		
28	08:06	07:05	05:58	05:46		06:18 (1)	04:55		05:37 (3)	04:46		
	16:46	17:47	18:39	20:35	20	06:38 (1)	21:25	21	05:58 (3)	21:45		
29	08:04		06:56	05:44		06:18 (1)	04:54		05:37 (3)	04:46		05:52 (3)
	16:48		19:41	20:37	19	06:37 (1)	21:26	20	05:57 (3)	21:45	3	05:55 (3)
30	08:02		06:53	05:42		06:19 (1)	04:53		05:38 (3)	04:47		05:50 (3)
	16:50		19:43	20:39	18	06:37 (1)	21:28	19	05:57 (3)	21:45	6	05:56 (3)
31	08:01		06:51				04:52		05:38 (3)			
	16:52		19:45				21:29	19	05:57 (3)			
Sonnenscheinstunden	252	274	367	419			492			508		
astr.max.mögl.Beschattung					177			393			175	
Red.Sonnenscheinwahrsch.					0.41			0.51			0.45	
Reduktion Betriebsdauer					0.91			0.91			0.91	
Reduktion Windrichtung					0.69			0.69			0.69	
Gesamte Reduktion					0.26			0.32			0.28	
Met.wahrsch.Beschattung					46			126			50	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HO - IO223

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		Septembe	Oktober	November	Dezember
1	04:47		05:50 (3)	05:27		06:20	07:12	07:10	08:04
	21:45	7	05:57 (3)	21:10		20:04	18:52	16:42	15:58
2	04:48		05:50 (3)	05:28		06:22	07:14	07:12	08:06
	21:44	9	05:59 (3)	21:08		20:02	18:49	16:40	15:57
3	04:49		05:50 (3)	05:30		06:24	07:16	07:14	08:07
	21:44	10	06:00 (3)	21:07		20:00	18:47	16:38	15:57
4	04:50		05:48 (3)	05:32		06:25	07:18	07:16	08:09
	21:43	12	06:00 (3)	21:05		19:57	18:44	16:36	15:56
5	04:51		05:48 (3)	05:33		06:27	07:20	07:18	08:10
	21:43	13	06:01 (3)	21:03		19:55	18:42	16:34	15:56
6	04:52		05:48 (3)	05:35		06:29	07:21	07:19	08:11
	21:42	14	06:02 (3)	21:01		19:53	18:40	16:32	15:55
7	04:52		05:48 (3)	05:37		06:30	07:23	07:21	08:13
	21:42	14	06:02 (3)	20:59		19:50	18:37	16:30	15:55
8	04:53		05:48 (3)	05:38	06:36 (1)	06:32	07:25	07:23	08:14
	21:41	15	06:03 (3)	20:57	2 06:38 (1)	19:48	18:35	16:29	15:54
9	04:54		05:47 (3)	05:40	06:31 (1)	06:34	07:27	07:25	08:15
	21:40	17	06:04 (3)	20:55	10 06:41 (1)	19:45	18:32	16:27	15:54
10	04:56		05:47 (3)	05:42	06:30 (1)	06:36	07:29	07:27	08:16
	21:39	17	06:04 (3)	20:53	13 06:43 (1)	19:43	18:30	16:25	15:54
11	04:57		05:47 (3)	05:44	06:29 (1)	06:37	07:30	07:29	08:17
	21:39	18	06:05 (3)	20:51	16 06:45 (1)	19:40	18:28	16:23	15:53
12	04:58		05:47 (3)	05:45	06:27 (1)	06:39	07:32	07:31	08:19
	21:38	18	06:05 (3)	20:49	18 06:45 (1)	19:38	18:25	16:22	15:53
13	04:59		05:46 (3)	05:47	06:27 (1)	06:41	07:34	07:33	08:20
	21:37	20	06:06 (3)	20:47	18 06:45 (1)	19:36	18:23	16:20	15:53
14	05:00		05:46 (3)	05:49	06:27 (1)	06:43	07:36	07:35	08:21
	21:36	20	06:06 (3)	20:45	19 06:46 (1)	19:33	18:21	16:19	15:53
15	05:01		05:46 (3)	05:50	06:26 (1)	06:44	07:38	07:36	08:22
	21:35	20	06:06 (3)	20:43	20 06:46 (1)	19:31	18:18	16:17	15:53
16	05:03		05:46 (3)	05:52	06:26 (1)	06:46	07:40	07:38	08:22
	21:34	21	06:07 (3)	20:41	20 06:46 (1)	19:28	18:16	16:16	15:53
17	05:04		05:46 (3)	05:54	06:25 (1)	06:48	07:42	07:40	08:23
	21:32	21	06:07 (3)	20:39	20 06:45 (1)	19:26	18:14	16:14	15:53
18	05:05		05:46 (3)	05:56	06:26 (1)	06:50	07:43	07:42	08:24
	21:31	21	06:07 (3)	20:36	19 06:45 (1)	19:23	18:12	16:13	15:54
19	05:07		05:46 (3)	05:57	06:26 (1)	06:51	07:45	07:44	08:25
	21:30	21	06:07 (3)	20:34	18 06:44 (1)	19:21	18:09	16:11	15:54
20	05:08		05:47 (3)	05:59	06:27 (1)	06:53	07:47	07:46	08:25
	21:29	21	06:08 (3)	20:32	16 06:43 (1)	19:18	18:07	16:10	15:54
21	05:10		05:46 (3)	06:01	06:29 (1)	06:55	07:49	07:47	08:26
	21:27	21	06:07 (3)	20:30	13 06:42 (1)	19:16	18:05	16:09	15:55
22	05:11		05:46 (3)	06:03	06:31 (1)	06:57	07:51	07:49	08:27
	21:26	21	06:07 (3)	20:28	9 06:40 (1)	19:13	18:03	16:07	15:55
23	05:13		05:47 (3)	06:04	06:32 (1)	06:58	07:53	07:51	08:27
	21:25	20	06:07 (3)	20:25	4 06:36 (1)	19:11	18:01	16:06	15:56
24	05:14		05:47 (3)	06:06		07:00	07:55	07:53	08:28
	21:23	20	06:07 (3)	20:23		19:09	17:58	16:05	15:56
25	05:16		05:48 (3)	06:08		07:02	06:57	07:54	08:28
	21:22	19	06:07 (3)	20:21		19:06	16:56	16:04	15:57
26	05:17		05:48 (3)	06:10		07:04	06:58	07:56	08:28
	21:20	18	06:06 (3)	20:18		19:04	16:54	16:03	15:57
27	05:19		05:49 (3)	06:11		07:05	07:00	07:58	08:28
	21:18	16	06:05 (3)	20:16		19:01	16:52	16:02	15:58
28	05:20		05:51 (3)	06:13		07:07	07:02	07:59	08:29
	21:17	14	06:05 (3)	20:14		18:59	16:50	16:01	15:59
29	05:22		05:52 (3)	06:15		07:09	07:04	08:01	08:29
	21:15	11	06:03 (3)	20:12		18:56	16:48	16:00	16:00
30	05:23		05:54 (3)	06:17		07:11	07:06	08:03	08:29
	21:14	7	06:01 (3)	20:09		18:54	16:46	15:59	16:01
31	05:25			06:18			07:08		08:29
	21:12			20:07			16:44		16:02
Sonnenscheinstunden	510			459		382	329	260	235
astr.max.mögl.Beschattung		496			235				
Red.Sonnenscheinwahrsch.		0.45			0.49				
Reduktion Betriebsdauer		0.91			0.91				
Reduktion Windrichtung		0.69			0.69				
Gesamte Reduktion		0.28			0.31				
Met.wahrsch.Beschattung		138			72				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HP - IO224

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April			Mai			Juni		
1	08:29		07:59		07:03		06:48			05:40		06:13 (1)	04:51		05:33 (3)
	16:03		16:54		17:49		19:46			20:41	19	06:32 (1)	21:30	21	05:54 (3)
2	08:29		07:58		07:00		06:46			05:38		06:13 (1)	04:50		05:33 (3)
	16:04		16:56		17:51		19:48			20:43	19	06:32 (1)	21:31	20	05:53 (3)
3	08:28		07:56		06:58		06:43			05:36		06:14 (1)	04:50		05:33 (3)
	16:05		16:58		17:53		19:50			20:44	18	06:32 (1)	21:32	20	05:53 (3)
4	08:28		07:54		06:56		06:41			05:34		06:14 (1)	04:49		05:33 (3)
	16:07		17:00		17:54		19:52			20:46	17	06:31 (1)	21:33	20	05:53 (3)
5	08:28		07:52		06:53		06:39			05:32		06:15 (1)	04:48		05:34 (3)
	16:08		17:02		17:56		19:54			20:48	15	06:30 (1)	21:35	19	05:53 (3)
6	08:27		07:51		06:51		06:36			05:30		06:16 (1)	04:47		05:34 (3)
	16:09		17:04		17:58		19:55			20:50	12	06:28 (1)	21:36	19	05:53 (3)
7	08:27		07:49		06:49		06:34			05:28		06:18 (1)	04:47		05:35 (3)
	16:11		17:06		18:00		19:57			20:51	8	06:26 (1)	21:37	18	05:53 (3)
8	08:27		07:47		06:46		06:32			05:26			04:46		05:35 (3)
	16:12		17:08		18:02		19:59			20:53			21:38	18	05:53 (3)
9	08:26		07:45		06:44		06:29			05:24			04:45		05:36 (3)
	16:13		17:10		18:04		20:01			20:55			21:38	17	05:53 (3)
10	08:25		07:43		06:41		06:27			05:23			04:45		05:35 (3)
	16:15		17:12		18:06		20:03			20:57			21:39	17	05:52 (3)
11	08:25		07:41		06:39		06:24			05:21			04:44		05:36 (3)
	16:16		17:14		18:08		20:05			20:58			21:40	17	05:53 (3)
12	08:24		07:39		06:37		06:22			05:19			04:44		05:37 (3)
	16:18		17:15		18:10		20:06			21:00			21:41	16	05:53 (3)
13	08:23		07:37		06:34		06:20			05:17			04:44		05:37 (3)
	16:19		17:17		18:11		20:08			21:02			21:41	16	05:53 (3)
14	08:22		07:35		06:32		06:17			05:15			04:43		05:37 (3)
	16:21		17:19		18:13		20:10			21:03			21:42	15	05:52 (3)
15	08:21		07:33		06:30		06:15			05:14			04:43		05:38 (3)
	16:23		17:21		18:15		20:12			21:05			21:43	14	05:52 (3)
16	08:21		07:31		06:27		06:13			05:12			04:43		05:38 (3)
	16:24		17:23		18:17		20:14			21:07			21:43	14	05:52 (3)
17	08:20		07:29		06:25		06:10			05:11		05:38 (3)	04:43		05:38 (3)
	16:26		17:25		18:19		20:15			21:08	7	05:45 (3)	21:44	15	05:53 (3)
18	08:19		07:27		06:22		06:08			05:09		05:37 (3)	04:43		05:39 (3)
	16:28		17:27		18:21		20:17			21:10	10	05:47 (3)	21:44	14	05:53 (3)
19	08:17		07:25		06:20		06:06			05:07		05:36 (3)	04:43		05:39 (3)
	16:29		17:29		18:23		20:19			21:12	13	05:49 (3)	21:45	14	05:53 (3)
20	08:16		07:23		06:17		06:04			05:06		05:34 (3)	04:43		05:39 (3)
	16:31		17:31		18:24		20:21			21:13	15	05:49 (3)	21:45	14	05:53 (3)
21	08:15		07:20		06:15		06:01			05:04		05:33 (3)	04:43		05:40 (3)
	16:33		17:33		18:26		20:23			21:15	17	05:50 (3)	21:45	14	05:54 (3)
22	08:14		07:18		06:13		05:59			05:03		05:33 (3)	04:43		05:40 (3)
	16:35		17:35		18:28		20:25			21:16	18	05:51 (3)	21:45	14	05:54 (3)
23	08:13		07:16		06:10		05:57		06:22 (1)	05:02		05:32 (3)	04:44		05:40 (3)
	16:37		17:37		18:30		20:26	7	06:29 (1)	21:18	19	05:51 (3)	21:46	14	05:54 (3)
24	08:11		07:14		06:08		05:55		06:19 (1)	05:00		05:32 (3)	04:44		05:40 (3)
	16:38		17:39		18:32		20:28	11	06:30 (1)	21:19	19	05:51 (3)	21:46	14	05:54 (3)
25	08:10		07:12		06:05		05:53		06:17 (1)	04:59		05:32 (3)	04:44		05:41 (3)
	16:40		17:41		18:34		20:30	14	06:31 (1)	21:21	20	05:52 (3)	21:46	14	05:55 (3)
26	08:08		07:09		06:03		05:50		06:15 (1)	04:58		05:32 (3)	04:45		05:40 (3)
	16:42		17:43		18:35		20:32	17	06:32 (1)	21:22	20	05:52 (3)	21:46	14	05:54 (3)
27	08:07		07:07		06:00		05:48		06:14 (1)	04:57		05:32 (3)	04:45		05:41 (3)
	16:44		17:45		18:37		20:34	18	06:32 (1)	21:24	20	05:52 (3)	21:46	14	05:55 (3)
28	08:06		07:05		05:58		05:46		06:13 (1)	04:55		05:32 (3)	04:46		05:40 (3)
	16:46		17:47		18:39		20:35	20	06:33 (1)	21:25	21	05:53 (3)	21:45	15	05:55 (3)
29	08:04				06:56		05:44		06:13 (1)	04:54		05:32 (3)	04:46		05:41 (3)
	16:48				19:41		20:37	20	06:33 (1)	21:26	21	05:53 (3)	21:45	15	05:56 (3)
30	08:02				06:53		05:42		06:13 (1)	04:53		05:32 (3)	04:47		05:40 (3)
	16:50				19:43		20:39	20	06:33 (1)	21:28	21	05:53 (3)	21:45	16	05:56 (3)
31	08:01				06:51					04:52		05:32 (3)			
	16:52				19:45					21:29	21	05:53 (3)			
Sonnenscheinstunden	252		274		367		419			492			508		
astr.max.mögl.Beschattung							127				370			482	
Red.Sonnenscheinwahrsch.							0.41				0.51			0.45	
Reduktion Betriebsdauer							0.91				0.91			0.91	
Reduktion Windrichtung							0.69				0.68			0.68	
Gesamte Reduktion							0.26				0.32			0.28	
Met.wahrsch.Beschattung							33				118			137	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HP - IO224

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		Septembe	Oktober	November	Dezember
1 | 04:47		05:40 (3) | 05:27		| 06:20	| 07:12	| 07:10	| 08:04
| 21:45	17	05:57 (3) | 21:10		| 20:04	| 18:52	| 16:42	| 15:58
2 | 04:48		05:41 (3) | 05:28		| 06:22	| 07:14	| 07:12	| 08:06
| 21:44	16	05:57 (3) | 21:08		| 20:02	| 18:49	| 16:40	| 15:57
3 | 04:49		05:41 (3) | 05:30		| 06:24	| 07:16	| 07:14	| 08:07
| 21:44	17	05:58 (3) | 21:07		| 20:00	| 18:47	| 16:38	| 15:57
4 | 04:50		05:40 (3) | 05:32		| 06:25	| 07:18	| 07:16	| 08:09
| 21:43	18	05:58 (3) | 21:05		| 19:57	| 18:44	| 16:36	| 15:56
5 | 04:51		05:40 (3) | 05:33		06:30 (1) | 06:27	| 07:20	| 07:18	| 08:10
| 21:43	18	05:58 (3) | 21:03	4	06:34 (1) | 19:55	| 18:42	| 16:34	| 15:56
6 | 04:52		05:40 (3) | 05:35		06:27 (1) | 06:29	| 07:21	| 07:19	| 08:11
| 21:42	19	05:59 (3) | 21:01	10	06:37 (1) | 19:53	| 18:40	| 16:32	| 15:55
7 | 04:52		05:40 (3) | 05:37		06:25 (1) | 06:31	| 07:23	| 07:21	| 08:13
| 21:42	19	05:59 (3) | 20:59	13	06:38 (1) | 19:50	| 18:37	| 16:30	| 15:55
8 | 04:53		05:40 (3) | 05:38		06:24 (1) | 06:32	| 07:25	| 07:23	| 08:14
| 21:41	20	06:00 (3) | 20:57	16	06:40 (1) | 19:48	| 18:35	| 16:29	| 15:54
9 | 04:54		05:40 (3) | 05:40		06:23 (1) | 06:34	| 07:27	| 07:25	| 08:15
| 21:40	20	06:00 (3) | 20:55	17	06:40 (1) | 19:45	| 18:32	| 16:27	| 15:54
10 | 04:56		05:40 (3) | 05:42		06:22 (1) | 06:36	| 07:29	| 07:27	| 08:16
| 21:39	21	06:01 (3) | 20:53	19	06:41 (1) | 19:43	| 18:30	| 16:25	| 15:54
11 | 04:57		05:40 (3) | 05:44		06:22 (1) | 06:37	| 07:30	| 07:29	| 08:17
| 21:39	21	06:01 (3) | 20:51	19	06:41 (1) | 19:40	| 18:28	| 16:23	| 15:53
12 | 04:58		05:40 (3) | 05:45		06:21 (1) | 06:39	| 07:32	| 07:31	| 08:19
| 21:38	21	06:01 (3) | 20:49	20	06:41 (1) | 19:38	| 18:25	| 16:22	| 15:53
13 | 04:59		05:40 (3) | 05:47		06:21 (1) | 06:41	| 07:34	| 07:33	| 08:20
| 21:37	21	06:01 (3) | 20:47	20	06:41 (1) | 19:36	| 18:23	| 16:20	| 15:53
14 | 05:00		05:40 (3) | 05:49		06:22 (1) | 06:43	| 07:36	| 07:35	| 08:21
| 21:36	21	06:01 (3) | 20:45	19	06:41 (1) | 19:33	| 18:21	| 16:19	| 15:53
15 | 05:01		05:40 (3) | 05:50		06:21 (1) | 06:44	| 07:38	| 07:36	| 08:22
| 21:35	21	06:01 (3) | 20:43	19	06:40 (1) | 19:31	| 18:18	| 16:17	| 15:53
16 | 05:03		05:41 (3) | 05:52		06:22 (1) | 06:46	| 07:40	| 07:38	| 08:22
| 21:34	21	06:02 (3) | 20:41	18	06:40 (1) | 19:28	| 18:16	| 16:16	| 15:53
17 | 05:04		05:41 (3) | 05:54		06:22 (1) | 06:48	| 07:42	| 07:40	| 08:23
| 21:32	21	06:02 (3) | 20:39	16	06:38 (1) | 19:26	| 18:14	| 16:14	| 15:53
18 | 05:05		05:41 (3) | 05:56		06:24 (1) | 06:50	| 07:43	| 07:42	| 08:24
| 21:31	21	06:02 (3) | 20:36	14	06:38 (1) | 19:23	| 18:12	| 16:13	| 15:54
19 | 05:07		05:41 (3) | 05:57		06:26 (1) | 06:51	| 07:45	| 07:44	| 08:25
| 21:30	20	06:01 (3) | 20:34	10	06:36 (1) | 19:21	| 18:09	| 16:11	| 15:54
20 | 05:08		05:42 (3) | 05:59		06:27 (1) | 06:53	| 07:47	| 07:46	| 08:25
| 21:29	20	06:02 (3) | 20:32	6	06:33 (1) | 19:18	| 18:07	| 16:10	| 15:54
21 | 05:10		05:42 (3) | 06:01		| 06:55	| 07:49	| 07:47	| 08:26
| 21:27	19	06:01 (3) | 20:30		| 19:16	| 18:05	| 16:09	| 15:55
22 | 05:11		05:42 (3) | 06:03		| 06:57	| 07:51	| 07:49	| 08:27
| 21:26	18	06:00 (3) | 20:28		| 19:13	| 18:03	| 16:07	| 15:55
23 | 05:13		05:44 (3) | 06:04		| 06:58	| 07:53	| 07:51	| 08:27
| 21:25	16	06:00 (3) | 20:25		| 19:11	| 18:01	| 16:06	| 15:56
24 | 05:14		05:45 (3) | 06:06		| 07:00	| 07:55	| 07:53	| 08:28
| 21:23	14	05:59 (3) | 20:23		| 19:09	| 17:58	| 16:05	| 15:56
25 | 05:16		05:47 (3) | 06:08		| 07:02	| 06:57	| 07:54	| 08:28
| 21:22	12	05:59 (3) | 20:21		| 19:06	| 16:56	| 16:04	| 15:57
26 | 05:17		05:48 (3) | 06:10		| 07:04	| 06:58	| 07:56	| 08:28
| 21:20	9	05:57 (3) | 20:18		| 19:04	| 16:54	| 16:03	| 15:57
27 | 05:19		05:49 (3) | 06:11		| 07:05	| 07:00	| 07:58	| 08:28
| 21:18	6	05:55 (3) | 20:16		| 19:01	| 16:52	| 16:02	| 15:58
28 | 05:20		| 06:13		| 07:07	| 07:02	| 07:59	| 08:29
| 21:17		| 20:14		| 18:59	| 16:50	| 16:01	| 15:59
29 | 05:22		| 06:15		| 07:09	| 07:04	| 08:01	| 08:29
| 21:15		| 20:12		| 18:56	| 16:48	| 16:00	| 16:00
30 | 05:23		| 06:17		| 07:11	| 07:06	| 08:03	| 08:29
| 21:14		| 20:09		| 18:54	| 16:46	| 15:59	| 16:01
31 | 05:25		| 06:18			| 07:08		| 08:29
| 21:12		| 20:07			| 16:44		| 16:02
Sonnenscheinstunden | 510		| 459		| 382	| 329	| 260	| 235
astr.max.mögl.Beschattung |	487	|	240	|	|	|	|
Red.Sonnenscheinwahrsch. |	0.45	|	0.49	|	|	|	|
Reduktion Betriebsdauer |	0.91	|	0.91	|	|	|	|
Reduktion Windrichtung |	0.68	|	0.69	|	|	|	|
Gesamte Reduktion |	0.28	|	0.31	|	|	|	|
Met.wahrsch.Beschattung |	135	|	73	|	|	|	|

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HQ - IO225

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März			April			Mai			Juni		
1	08:29	07:59		07:03			06:48			07:31 (4)	05:40			04:51	
	16:03	16:54		17:49			19:46	20		07:51 (4)	20:41			21:30	
2	08:29	07:58		07:00		07:26 (3)	06:46			07:31 (4)	05:38			04:50	
	16:04	16:56		17:51	2	07:28 (3)	19:48	18		07:49 (4)	20:43			21:31	
3	08:29	07:56		06:58		07:22 (3)	06:43			07:33 (4)	05:36		06:05 (8)	04:49	
	16:05	16:58		17:53	9	07:31 (3)	19:50	14		07:47 (4)	20:44	9	06:14 (8)	21:32	
4	08:28	07:54		06:56		07:20 (3)	06:41			07:35 (4)	05:34		06:02 (8)	04:49	
	16:07	17:00		17:54	14	07:34 (3)	19:52	10		07:45 (4)	20:46	14	06:16 (8)	21:34	
5	08:28	07:52		06:53		07:17 (3)	06:39				05:32		06:01 (8)	04:48	
	16:08	17:02		17:56	17	07:34 (3)	19:54				20:48	16	06:17 (8)	21:35	
6	08:28	07:51		06:51		07:16 (3)	06:36				05:30		05:59 (8)	04:47	
	16:09	17:04		17:58	19	07:35 (3)	19:55				20:50	19	06:18 (8)	21:36	
7	08:27	07:49		06:49		07:16 (3)	06:34				05:28		05:58 (8)	04:46	
	16:10	17:06		18:00	20	07:36 (3)	19:57				20:52	21	06:19 (8)	21:37	
8	08:27	07:47		06:46		07:15 (3)	06:32				05:26		05:57 (8)	04:46	
	16:12	17:08		18:02	20	07:35 (3)	19:59				20:53	22	06:19 (8)	21:38	
9	08:26	07:45		06:44		07:15 (3)	06:29				05:24		05:57 (8)	04:45	
	16:13	17:10		18:04	20	07:35 (3)	20:01				20:55	23	06:20 (8)	21:38	
10	08:25	07:43		06:42		07:15 (3)	06:27				05:22		05:56 (8)	04:45	
	16:15	17:12		18:06	19	07:34 (3)	20:03				20:57	24	06:20 (8)	21:39	
11	08:25	07:41		06:39		07:15 (3)	06:24				05:21		05:56 (8)	04:44	
	16:16	17:13		18:08	19	07:34 (3)	20:05				20:58	24	06:20 (8)	21:40	
12	08:24	07:39		06:37		07:15 (3)	06:22				05:19		05:56 (8)	04:44	
	16:18	17:15		18:10	17	07:32 (3)	20:06				21:00	25	06:21 (8)	21:41	
13	08:23	07:37		06:34		07:17 (3)	06:20				05:17		05:56 (8)	04:44	
	16:19	17:17		18:11	14	07:31 (3)	20:08				21:02	24	06:20 (8)	21:42	
14	08:22	07:35		06:32		07:19 (3)	06:17				05:15		05:56 (8)	04:43	
	16:21	17:19		18:13	10	07:29 (3)	20:10				21:04	25	06:21 (8)	21:42	
15	08:22	07:33		06:30			06:15			06:39 (7)	05:14		05:56 (8)	04:43	
	16:23	17:21		18:15			20:12	7		06:46 (7)	21:05	24	06:20 (8)	21:43	
16	08:21	07:31		06:27			06:13			06:37 (7)	05:12		05:56 (8)	04:43	
	16:24	17:23		18:17			20:14	11		06:48 (7)	21:07	25	06:21 (8)	21:43	
17	08:20	07:29		06:25			06:10			06:34 (7)	05:11		05:56 (8)	04:43	
	16:26	17:25		18:19			20:16	15		06:49 (7)	21:08	24	06:20 (8)	21:44	
18	08:19	07:27		06:22			06:08			06:32 (7)	05:09		05:57 (8)	04:43	
	16:28	17:27		18:21			20:17	18		06:50 (7)	21:10	23	06:20 (8)	21:44	
19	08:17	07:25		06:20			06:06			06:31 (7)	05:07		05:57 (8)	04:43	
	16:29	17:29		18:23			20:19	19		06:50 (7)	21:12	22	06:19 (8)	21:45	
20	08:16	07:23		06:17			06:04			06:31 (7)	05:06		05:57 (8)	04:43	
	16:31	17:31		18:24			20:21	20		06:51 (7)	21:13	22	06:19 (8)	21:45	
21	08:15	07:20		06:15		06:41 (4)	06:01			06:31 (7)	05:04		05:58 (8)	04:43	
	16:33	17:33		18:26	6	06:47 (4)	20:23	20		06:51 (7)	21:15	21	06:19 (8)	21:45	
22	08:14	07:18		06:13		06:37 (4)	05:59			06:31 (7)	05:03		05:59 (8)	04:43	
	16:35	17:35		18:28	13	06:50 (4)	20:25	20		06:51 (7)	21:16	19	06:18 (8)	21:45	
23	08:13	07:16		06:10		06:36 (4)	05:57			06:30 (7)	05:02		05:59 (8)	04:44	
	16:37	17:37		18:30	16	06:52 (4)	20:26	19		06:49 (7)	21:18	18	06:17 (8)	21:46	
24	08:11	07:14		06:08		06:33 (4)	05:55			06:30 (7)	05:00		06:01 (8)	04:44	
	16:38	17:39		18:32	20	06:53 (4)	20:28	19		06:49 (7)	21:19	15	06:16 (8)	21:46	
25	08:10	07:12		06:05		06:33 (4)	05:53			06:30 (7)	04:59		06:02 (8)	04:44	
	16:40	17:41		18:34	21	06:54 (4)	20:30	18		06:48 (7)	21:21	13	06:15 (8)	21:46	
26	08:09	07:09		06:03		06:31 (4)	05:50			06:31 (7)	04:58		06:03 (8)	04:45	
	16:42	17:43		18:35	22	06:53 (4)	20:32	16		06:47 (7)	21:22	11	06:14 (8)	21:46	
27	08:07	07:07		06:00		06:31 (4)	05:48			06:32 (7)	04:57		06:06 (8)	04:45	
	16:44	17:45		18:37	23	06:54 (4)	20:34	14		06:46 (7)	21:24	6	06:12 (8)	21:46	
28	08:06	07:05		05:58		06:30 (4)	05:46			06:34 (7)	04:55			04:46	
	16:46	17:47		18:39	23	06:53 (4)	20:35	10		06:44 (7)	21:25			21:46	
29	08:04			06:56		07:30 (4)	05:44			06:37 (7)	04:54			04:46	
	16:48			19:41	23	07:53 (4)	20:37	3		06:40 (7)	21:26			21:45	
30	08:02			06:53		07:30 (4)	05:42				04:53			04:47	
	16:50			19:43	23	07:53 (4)	20:39				21:28			21:45	
31	08:01			06:51		07:30 (4)					04:52				
	16:52			19:45	22	07:52 (4)					21:29				
Sonnenscheinstunden		252	274	367			419			492			508		
astr.max.mögl.Beschattung					412			291			489				
Red.Sonnenscheinwahrsch.					0.31			0.41			0.51				
Reduktion Betriebsdauer					0.91			0.91			0.91				
Reduktion Windrichtung					0.68			0.69			0.69				
Gesamte Reduktion					0.19			0.26			0.32				
Met.wahrsch.Beschattung					80			75			157				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HQ - IO225

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1 | 04:47			05:27		06:06 (8)	06:20			07:13		07:56 (3)	07:10	08:04
| 21:45			21:10	25	06:31 (8)	20:04			18:52	15	08:11 (3)	16:42	15:58
2 | 04:48			05:28		06:06 (8)	06:22			07:14		07:53 (3)	07:12	08:06
| 21:44			21:08	24	06:30 (8)	20:02			18:49	18	08:11 (3)	16:40	15:57
3 | 04:49			05:30		06:07 (8)	06:24			07:16		07:53 (3)	07:14	08:07
| 21:44			21:07	23	06:30 (8)	20:00			18:47	19	08:12 (3)	16:38	15:57
4 | 04:50			05:32		06:08 (8)	06:25			07:18		07:52 (3)	07:16	08:09
| 21:44			21:05	22	06:30 (8)	19:57			18:44	20	08:12 (3)	16:36	15:56
5 | 04:51			05:33		06:08 (8)	06:27			07:20		07:52 (3)	07:18	08:10
| 21:43			21:03	21	06:29 (8)	19:55			18:42	20	08:12 (3)	16:34	15:56
6 | 04:51			05:35		06:09 (8)	06:29			07:21		07:52 (3)	07:20	08:11
| 21:42			21:01	20	06:29 (8)	19:53			18:40	20	08:12 (3)	16:32	15:55
7 | 04:52			05:37		06:09 (8)	06:30			07:23		07:52 (3)	07:21	08:13
| 21:42			20:59	18	06:27 (8)	19:50			18:37	19	08:11 (3)	16:30	15:55
8 | 04:53			05:38		06:10 (8)	06:32		07:30 (4)	07:25		07:53 (3)	07:23	08:14
| 21:41			20:57	16	06:26 (8)	19:48	9	07:39 (4)	18:35	18	08:11 (3)	16:29	15:54
9 | 04:54			05:40		06:11 (8)	06:34		07:27 (4)	07:27		07:53 (3)	07:25	08:15
| 21:40			20:55	13	06:24 (8)	19:45	14	07:41 (4)	18:32	15	08:08 (3)	16:27	15:54
10 | 04:56			05:42		06:15 (8)	06:36		07:24 (4)	07:29		07:55 (3)	07:27	08:16
| 21:39			20:53	6	06:21 (8)	19:43	18	07:42 (4)	18:30	12	08:07 (3)	16:25	15:54
11 | 04:57			05:43			06:37		07:23 (4)	07:31		07:57 (3)	07:29	08:18
| 21:39			20:51			19:40	20	07:43 (4)	18:28	7	08:04 (3)	16:23	15:53
12 | 04:58			05:45			06:39		07:22 (4)	07:32			07:31	08:19
| 21:38			20:49			19:38	22	07:44 (4)	18:25			16:22	15:53
13 | 04:59			05:47			06:41		07:21 (4)	07:34			07:33	08:20
| 21:37			20:47			19:36	22	07:43 (4)	18:23			16:20	15:53
14 | 05:00			05:49		06:43 (7)	06:43		07:20 (4)	07:36			07:35	08:21
| 21:36			20:45	6	06:49 (7)	19:33	24	07:44 (4)	18:21			16:19	15:53
15 | 05:01			05:50		06:41 (7)	06:44		07:20 (4)	07:38			07:37	08:22
| 21:35			20:43	11	06:52 (7)	19:31	24	07:44 (4)	18:18			16:17	15:53
16 | 05:03		06:17 (8)	05:52		06:39 (7)	06:46		07:19 (4)	07:40			07:38	08:22
| 21:34	2	06:19 (8)	20:41	15	06:54 (7)	19:28	23	07:42 (4)	18:16			16:16	15:53
17 | 05:04		06:14 (8)	05:54		06:37 (7)	06:48		07:20 (4)	07:42			07:40	08:23
| 21:32	8	06:22 (8)	20:39	17	06:54 (7)	19:26	22	07:42 (4)	18:14			16:14	15:53
18 | 05:05		06:12 (8)	05:56		06:37 (7)	06:50		07:20 (4)	07:43			07:42	08:24
| 21:31	12	06:24 (8)	20:36	18	06:55 (7)	19:23	21	07:41 (4)	18:12			16:13	15:53
19 | 05:07		06:11 (8)	05:57		06:36 (7)	06:51		07:21 (4)	07:45			07:44	08:25
| 21:30	14	06:25 (8)	20:34	20	06:56 (7)	19:21	20	07:41 (4)	18:09			16:11	15:54
20 | 05:08		06:11 (8)	05:59		06:35 (7)	06:53		07:21 (4)	07:47			07:46	08:25
| 21:29	16	06:27 (8)	20:32	20	06:55 (7)	19:18	17	07:38 (4)	18:07			16:10	15:54
21 | 05:10		06:09 (8)	06:01		06:35 (7)	06:55		07:22 (4)	07:49			07:47	08:26
| 21:27	18	06:27 (8)	20:30	20	06:55 (7)	19:16	14	07:36 (4)	18:05			16:09	15:54
22 | 05:11		06:08 (8)	06:03		06:35 (7)	06:57		07:25 (4)	07:51			07:49	08:27
| 21:26	20	06:28 (8)	20:28	20	06:55 (7)	19:14	9	07:34 (4)	18:03			16:07	15:55
23 | 05:12		06:08 (8)	06:04		06:35 (7)	06:58			07:53			07:51	08:27
| 21:25	21	06:29 (8)	20:25	19	06:54 (7)	19:11			18:00			16:06	15:55
24 | 05:14		06:08 (8)	06:06		06:35 (7)	07:00			07:55			07:53	08:28
| 21:23	21	06:29 (8)	20:23	19	06:54 (7)	19:09			17:58			16:05	15:56
25 | 05:15		06:08 (8)	06:08		06:36 (7)	07:02			06:57			07:54	08:28
| 21:22	23	06:31 (8)	20:21	17	06:53 (7)	19:06			16:56			16:04	15:57
26 | 05:17		06:07 (8)	06:10		06:37 (7)	07:04			06:58			07:56	08:28
| 21:20	23	06:30 (8)	20:18	14	06:51 (7)	19:04			16:54			16:03	15:57
27 | 05:19		06:06 (8)	06:11		06:39 (7)	07:05			07:00			07:58	08:29
| 21:19	24	06:30 (8)	20:16	11	06:50 (7)	19:01			16:52			16:02	15:58
28 | 05:20		06:07 (8)	06:13		06:41 (7)	07:07			07:02			07:59	08:29
| 21:17	24	06:31 (8)	20:14	7	06:48 (7)	18:59			16:50			16:01	15:59
29 | 05:22		06:06 (8)	06:15			07:09		08:00 (3)	07:04			08:01	08:29
| 21:15	25	06:31 (8)	20:12			18:56	8	08:08 (3)	16:48			16:00	16:00
30 | 05:23		06:06 (8)	06:17			07:11		07:57 (3)	07:06			08:03	08:29
| 21:14	25	06:31 (8)	20:09			18:54	13	08:10 (3)	16:46			15:59	16:01
31 | 05:25		06:06 (8)	06:18						07:08				08:29
| 21:12	25	06:31 (8)	20:07						16:44				16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung		301		422			300			183			
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91		0.91			0.91			0.91			
Reduktion Windrichtung		0.69		0.69			0.69			0.67			
Gesamte Reduktion		0.28		0.30			0.25			0.20			
Met.wahrsch.Beschattung		84		128			76			37			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HR - IO226

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März		April		Mai		Juni	
1	08:29	07:59		07:03		07:27 (3)	06:48	07:38 (4)	05:40	06:11 (8)	04:51
	16:03	16:54		17:49	9	07:36 (3)	19:46	15 07:53 (4)	20:41	2 06:13 (8)	21:30
2	08:29	07:58		07:00		07:25 (3)	06:46	07:39 (4)	05:38	06:06 (8)	04:50
	16:04	16:56		17:51	13	07:38 (3)	19:48	11 07:50 (4)	20:43	11 06:17 (8)	21:31
3	08:29	07:56		06:58		07:22 (3)	06:43		05:36	06:05 (8)	04:49
	16:05	16:58		17:53	17	07:39 (3)	19:50		20:44	15 06:20 (8)	21:32
4	08:28	07:54		06:56		07:21 (3)	06:41		05:34	06:03 (8)	04:49
	16:07	17:00		17:54	19	07:40 (3)	19:52		20:46	18 06:21 (8)	21:34
5	08:28	07:52		06:53		07:20 (3)	06:39		05:32	06:02 (8)	04:48
	16:08	17:02		17:56	20	07:40 (3)	19:54		20:48	20 06:22 (8)	21:35
6	08:28	07:51		06:51		07:20 (3)	06:36		05:30	06:01 (8)	04:47
	16:09	17:04		17:58	20	07:40 (3)	19:55		20:50	22 06:23 (8)	21:36
7	08:27	07:49		06:49		07:20 (3)	06:34		05:28	06:00 (8)	04:46
	16:10	17:06		18:00	20	07:40 (3)	19:57		20:52	23 06:23 (8)	21:37
8	08:27	07:47		06:46		07:19 (3)	06:32		05:26	05:59 (8)	04:46
	16:12	17:08		18:02	20	07:39 (3)	19:59		20:53	24 06:23 (8)	21:38
9	08:26	07:45		06:44		07:20 (3)	06:29		05:24	05:59 (8)	04:45
	16:13	17:10		18:04	19	07:39 (3)	20:01		20:55	25 06:24 (8)	21:38
10	08:25	07:43		06:42		07:20 (3)	06:27		05:22	05:59 (8)	04:45
	16:15	17:12		18:06	17	07:37 (3)	20:03		20:57	25 06:24 (8)	21:39
11	08:25	07:41		06:39		07:21 (3)	06:24		05:21	05:58 (8)	04:44
	16:16	17:13		18:08	15	07:36 (3)	20:05		20:58	26 06:24 (8)	21:40
12	08:24	07:39		06:37		07:22 (3)	06:22		05:19	05:59 (8)	04:44
	16:18	17:15		18:10	12	07:34 (3)	20:06		21:00	25 06:24 (8)	21:41
13	08:23	07:37		06:34		07:26 (3)	06:20		05:17	05:58 (8)	04:44
	16:19	17:17		18:11	4	07:30 (3)	20:08		21:02	26 06:24 (8)	21:42
14	08:22	07:35		06:32			06:17	06:41 (7)	05:15	05:59 (8)	04:43
	16:21	17:19		18:13			20:10	9 06:50 (7)	21:04	25 06:24 (8)	21:42
15	08:22	07:33		06:30			06:15	06:39 (7)	05:14	05:59 (8)	04:43
	16:23	17:21		18:15			20:12	13 06:52 (7)	21:05	25 06:24 (8)	21:43
16	08:21	07:31		06:27			06:13	06:37 (7)	05:12	06:00 (8)	04:43
	16:24	17:23		18:17			20:14	16 06:53 (7)	21:07	24 06:24 (8)	21:43
17	08:20	07:29		06:25			06:10	06:35 (7)	05:11	05:59 (8)	04:43
	16:26	17:25		18:19			20:16	18 06:53 (7)	21:08	24 06:23 (8)	21:44
18	08:19	07:27		06:22			06:08	06:34 (7)	05:09	06:00 (8)	04:43
	16:28	17:27		18:21			20:17	20 06:54 (7)	21:10	23 06:23 (8)	21:44
19	08:17	07:25		06:20		06:47 (4)	06:06	06:34 (7)	05:07	06:00 (8)	04:43
	16:29	17:29		18:23	4	06:51 (4)	20:19	20 06:54 (7)	21:12	22 06:22 (8)	21:45
20	08:16	07:23		06:17		06:43 (4)	06:04	06:34 (7)	05:06	06:01 (8)	04:43
	16:31	17:31		18:24	12	06:55 (4)	20:21	20 06:54 (7)	21:13	20 06:21 (8)	21:45
21	08:15	07:20		06:15		06:40 (4)	06:01	06:34 (7)	05:04	06:02 (8)	04:43
	16:33	17:33		18:26	16	06:56 (4)	20:23	20 06:54 (7)	21:15	19 06:21 (8)	21:45
22	08:14	07:18		06:13		06:39 (4)	05:59	06:34 (7)	05:03	06:04 (8)	04:43
	16:35	17:35		18:28	19	06:58 (4)	20:25	20 06:54 (7)	21:16	16 06:20 (8)	21:45
23	08:13	07:16		06:10		06:38 (4)	05:57	06:33 (7)	05:02	06:04 (8)	04:44
	16:37	17:37		18:30	21	06:59 (4)	20:26	19 06:52 (7)	21:18	14 06:18 (8)	21:46
24	08:11	07:14		06:08		06:36 (4)	05:55	06:34 (7)	05:00	06:05 (8)	04:44
	16:38	17:39		18:32	23	06:59 (4)	20:28	17 06:51 (7)	21:19	12 06:17 (8)	21:46
25	08:10	07:12		06:05		06:36 (4)	05:53	06:34 (7)	04:59	06:08 (8)	04:44
	16:40	17:41		18:34	23	06:59 (4)	20:30	16 06:50 (7)	21:21	8 06:16 (8)	21:46
26	08:09	07:09		06:03		06:35 (4)	05:50	06:36 (7)	04:58		04:45
	16:42	17:43		18:35	24	06:59 (4)	20:32	13 06:49 (7)	21:22		21:46
27	08:07	07:07		06:00		06:35 (4)	05:48	06:38 (7)	04:57		04:45
	16:44	17:45		18:37	24	06:59 (4)	20:34	9 06:47 (7)	21:24		21:46
28	08:06	07:05		05:58		06:35 (4)	05:46		04:55		04:46
	16:46	17:47		18:39	23	06:58 (4)	20:35		21:25		21:46
29	08:04			06:56		07:35 (4)	05:44		04:54		04:46
	16:48			19:41	22	07:57 (4)	20:37		21:26		21:45
30	08:02			06:53		07:36 (4)	05:42		04:53		04:47
	16:50			19:43	21	07:57 (4)	20:39		21:28		21:45
31	08:01			06:51		07:36 (4)			04:52		
	16:52			19:45	19	07:55 (4)			21:29		
Sonnenscheinstunden		252	274	367			419		492		508
astr.max.mögl.Beschattung					456			256	494		
Red.Sonnenscheinwahrsch.					0.31			0.41	0.51		
Reduktion Betriebsdauer					0.91			0.91	0.91		
Reduktion Windrichtung					0.68			0.68	0.69		
Gesamte Reduktion					0.19			0.26	0.32		
Met.wahrsch.Beschattung					89			66	159		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)	
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)	

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HR - IO226

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1 | 04:47			05:27		06:09 (8)	06:20			07:13		08:03 (3)	07:10	08:04
| 21:45			21:10	26	06:35 (8)	20:04			18:52	10	08:13 (3)	16:42	15:58
2 | 04:48			05:28		06:09 (8)	06:22			07:14		08:00 (3)	07:12	08:06
| 21:44			21:08	25	06:34 (8)	20:02			18:49	14	08:14 (3)	16:40	15:57
3 | 04:49			05:30		06:09 (8)	06:24			07:16		07:58 (3)	07:14	08:07
| 21:44			21:07	25	06:34 (8)	20:00			18:47	17	08:15 (3)	16:38	15:57
4 | 04:50			05:32		06:09 (8)	06:25			07:18		07:57 (3)	07:16	08:09
| 21:44			21:05	24	06:33 (8)	19:57			18:44	19	08:16 (3)	16:36	15:56
5 | 04:51			05:33		06:10 (8)	06:27			07:20		07:56 (3)	07:18	08:10
| 21:43			21:03	23	06:33 (8)	19:55			18:42	20	08:16 (3)	16:34	15:56
6 | 04:51			05:35		06:11 (8)	06:29			07:21		07:56 (3)	07:20	08:11
| 21:42			21:01	22	06:33 (8)	19:53			18:40	20	08:16 (3)	16:32	15:55
7 | 04:52			05:37		06:11 (8)	06:30			07:23		07:56 (3)	07:21	08:13
| 21:42			20:59	21	06:32 (8)	19:50			18:37	20	08:16 (3)	16:30	15:55
8 | 04:53			05:38		06:12 (8)	06:32			07:25		07:56 (3)	07:23	08:14
| 21:41			20:57	19	06:31 (8)	19:48			18:35	20	08:16 (3)	16:29	15:54
9 | 04:54			05:40		06:12 (8)	06:34			07:27		07:55 (3)	07:25	08:15
| 21:40			20:55	17	06:29 (8)	19:45			18:32	19	08:14 (3)	16:27	15:54
10 | 04:56			05:42		06:14 (8)	06:36		07:32 (4)	07:29		07:56 (3)	07:27	08:16
| 21:39			20:53	14	06:28 (8)	19:43	11	07:43 (4)	18:30	18	08:14 (3)	16:25	15:54
11 | 04:57			05:43		06:16 (8)	06:37		07:30 (4)	07:31		07:57 (3)	07:29	08:18
| 21:39			20:51	10	06:26 (8)	19:40	15	07:45 (4)	18:28	15	08:12 (3)	16:23	15:53
12 | 04:58			05:45			06:39		07:28 (4)	07:32		07:59 (3)	07:31	08:19
| 21:38			20:49			19:38	19	07:47 (4)	18:25	12	08:11 (3)	16:22	15:53
13 | 04:59			05:47			06:41		07:26 (4)	07:34		08:01 (3)	07:33	08:20
| 21:37			20:47			19:36	21	07:47 (4)	18:23	7	08:08 (3)	16:20	15:53
14 | 05:00			05:49			06:43		07:26 (4)	07:36			07:35	08:21
| 21:36			20:45			19:33	21	07:47 (4)	18:21			16:19	15:53
15 | 05:01			05:50		06:48 (7)	06:44		07:25 (4)	07:38			07:37	08:22
| 21:35			20:43	2	06:50 (7)	19:31	23	07:48 (4)	18:18			16:17	15:53
16 | 05:03			05:52		06:45 (7)	06:46		07:24 (4)	07:40			07:38	08:22
| 21:34			20:41	10	06:55 (7)	19:28	23	07:47 (4)	18:16			16:16	15:53
17 | 05:04			05:54		06:42 (7)	06:48		07:23 (4)	07:42			07:40	08:23
| 21:32			20:39	14	06:56 (7)	19:26	24	07:47 (4)	18:14			16:14	15:53
18 | 05:05		06:18 (8)	05:56		06:41 (7)	06:50		07:24 (4)	07:43			07:42	08:24
| 21:31	6	06:24 (8)	20:36	16	06:57 (7)	19:23	23	07:47 (4)	18:12			16:13	15:53
19 | 05:07		06:16 (8)	05:57		06:40 (7)	06:51		07:24 (4)	07:45			07:44	08:25
| 21:30	10	06:26 (8)	20:34	18	06:58 (7)	19:21	22	07:46 (4)	18:09			16:11	15:54
20 | 05:08		06:15 (8)	05:59		06:39 (7)	06:53		07:23 (4)	07:47			07:46	08:25
| 21:29	13	06:28 (8)	20:32	19	06:58 (7)	19:18	22	07:45 (4)	18:07			16:10	15:54
21 | 05:10		06:14 (8)	06:01		06:38 (7)	06:55		07:24 (4)	07:49			07:47	08:26
| 21:27	15	06:29 (8)	20:30	20	06:58 (7)	19:16	20	07:44 (4)	18:05			16:09	15:54
22 | 05:11		06:13 (8)	06:03		06:38 (7)	06:57		07:25 (4)	07:51			07:49	08:27
| 21:26	17	06:30 (8)	20:28	21	06:59 (7)	19:14	18	07:43 (4)	18:03			16:07	15:55
23 | 05:12		06:12 (8)	06:04		06:37 (7)	06:58		07:26 (4)	07:53			07:51	08:27
| 21:25	20	06:32 (8)	20:25	21	06:58 (7)	19:11	14	07:40 (4)	18:00			16:06	15:55
24 | 05:14		06:11 (8)	06:06		06:38 (7)	07:00		07:29 (4)	07:55			07:53	08:28
| 21:23	21	06:32 (8)	20:23	20	06:58 (7)	19:09	8	07:37 (4)	17:58			16:05	15:56
25 | 05:15		06:10 (8)	06:08		06:38 (7)	07:02			06:57			07:54	08:28
| 21:22	22	06:32 (8)	20:21	19	06:57 (7)	19:06			16:56			16:04	15:57
26 | 05:17		06:10 (8)	06:10		06:38 (7)	07:04			06:58			07:56	08:28
| 21:20	23	06:33 (8)	20:18	18	06:56 (7)	19:04			16:54			16:03	15:57
27 | 05:19		06:10 (8)	06:11		06:39 (7)	07:05			07:00			07:58	08:29
| 21:19	23	06:33 (8)	20:16	16	06:55 (7)	19:01			16:52			16:02	15:58
28 | 05:20		06:10 (8)	06:13		06:41 (7)	07:07			07:02			07:59	08:29
| 21:17	24	06:34 (8)	20:14	13	06:54 (7)	18:59			16:50			16:01	15:59
29 | 05:22		06:09 (8)	06:15		06:42 (7)	07:09			07:04			08:01	08:29
| 21:15	25	06:34 (8)	20:12	9	06:51 (7)	18:56			16:48			16:00	16:00
30 | 05:23		06:09 (8)	06:17			07:11			07:06			08:03	08:29
| 21:14	26	06:35 (8)	20:09			18:54			16:46			15:59	16:01
31 | 05:25		06:09 (8)	06:18						07:08				08:29
| 21:12	25	06:34 (8)	20:07						16:44				16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung	270		462			284			211				
Red.Sonnenscheinwahrsch.	0.45		0.49			0.40			0.33				
Reduktion Betriebsdauer	0.91		0.91			0.91			0.91				
Reduktion Windrichtung	0.69		0.69			0.69			0.67				
Gesamte Reduktion	0.28		0.30			0.25			0.20				
Met.wahrsch.Beschattung	76		141			72			42				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HS - IO227

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März			April			Mai			Juni	
1	08:29	07:59		07:03			06:48			07:35 (4)	05:40		06:08 (8)	04:51
	16:03	16:54		17:49			19:46	16		07:51 (4)	20:41	8	06:16 (8)	21:30
2	08:29	07:58		07:00		07:25 (3)	06:46			07:36 (4)	05:38		06:05 (8)	04:50
	16:04	16:56		17:51	8	07:33 (3)	19:48	13		07:49 (4)	20:43	13	06:18 (8)	21:31
3	08:29	07:56		06:58		07:22 (3)	06:43			07:39 (4)	05:36		06:04 (8)	04:49
	16:05	16:58		17:53	13	07:35 (3)	19:50	6		07:45 (4)	20:44	17	06:21 (8)	21:32
4	08:28	07:54		06:56		07:20 (3)	06:41				05:34		06:03 (8)	04:49
	16:07	17:00		17:54	16	07:36 (3)	19:52				20:46	19	06:22 (8)	21:34
5	08:28	07:52		06:53		07:18 (3)	06:39				05:32		06:02 (8)	04:48
	16:08	17:02		17:56	18	07:36 (3)	19:54				20:48	20	06:22 (8)	21:35
6	08:28	07:51		06:51		07:17 (3)	06:36				05:30		06:01 (8)	04:47
	16:09	17:04		17:58	20	07:37 (3)	19:55				20:50	22	06:23 (8)	21:36
7	08:27	07:49		06:49		07:17 (3)	06:34				05:28		06:00 (8)	04:46
	16:10	17:06		18:00	20	07:37 (3)	19:57				20:52	23	06:23 (8)	21:37
8	08:27	07:47		06:46		07:16 (3)	06:32				05:26		05:59 (8)	04:46
	16:12	17:08		18:02	20	07:36 (3)	19:59				20:53	24	06:23 (8)	21:38
9	08:26	07:45		06:44		07:17 (3)	06:29				05:24		06:00 (8)	04:45
	16:13	17:10		18:04	19	07:36 (3)	20:01				20:55	24	06:24 (8)	21:38
10	08:25	07:43		06:42		07:17 (3)	06:27				05:22		05:59 (8)	04:45
	16:15	17:12		18:06	18	07:35 (3)	20:03				20:57	25	06:24 (8)	21:39
11	08:25	07:41		06:39		07:18 (3)	06:24				05:21		05:59 (8)	04:44
	16:16	17:13		18:08	16	07:34 (3)	20:05				20:58	24	06:23 (8)	21:40
12	08:24	07:39		06:37		07:18 (3)	06:22				05:19		05:59 (8)	04:44
	16:18	17:15		18:10	14	07:32 (3)	20:06				21:00	25	06:24 (8)	21:41
13	08:23	07:37		06:34		07:20 (3)	06:20				05:17		05:59 (8)	04:44
	16:19	17:17		18:11	10	07:30 (3)	20:08				21:02	24	06:23 (8)	21:42
14	08:22	07:35		06:32			06:17			06:41 (7)	05:15		06:00 (8)	04:43
	16:21	17:19		18:13			20:10	8		06:49 (7)	21:04	24	06:24 (8)	21:42
15	08:22	07:33		06:30			06:15			06:39 (7)	05:14		05:59 (8)	04:43
	16:23	17:21		18:15			20:12	12		06:51 (7)	21:05	24	06:23 (8)	21:43
16	08:21	07:31		06:27			06:13			06:37 (7)	05:12		06:00 (8)	04:43
	16:24	17:23		18:17			20:14	15		06:52 (7)	21:07	23	06:23 (8)	21:43
17	08:20	07:29		06:25			06:10			06:34 (7)	05:11		06:00 (8)	04:43
	16:26	17:25		18:19			20:16	18		06:52 (7)	21:08	22	06:22 (8)	21:44
18	08:19	07:27		06:22			06:08			06:34 (7)	05:09		06:01 (8)	04:43
	16:28	17:27		18:21			20:17	19		06:53 (7)	21:10	21	06:22 (8)	21:44
19	08:17	07:25		06:20			06:06			06:33 (7)	05:07		06:01 (8)	04:43
	16:29	17:29		18:23			20:19	20		06:53 (7)	21:12	19	06:20 (8)	21:45
20	08:16	07:23		06:17		06:43 (4)	06:04			06:33 (7)	05:06		06:03 (8)	04:43
	16:31	17:31		18:24	7	06:50 (4)	20:21	20		06:53 (7)	21:13	17	06:20 (8)	21:45
21	08:15	07:20		06:15		06:39 (4)	06:01			06:33 (7)	05:04		06:04 (8)	04:43
	16:33	17:33		18:26	14	06:53 (4)	20:23	20		06:53 (7)	21:15	15	06:19 (8)	21:45
22	08:14	07:18		06:13		06:37 (4)	05:59			06:33 (7)	05:03		06:05 (8)	04:43
	16:35	17:35		18:28	17	06:54 (4)	20:25	20		06:53 (7)	21:16	13	06:18 (8)	21:45
23	08:13	07:16		06:10		06:36 (4)	05:57			06:33 (7)	05:02		06:06 (8)	04:44
	16:37	17:37		18:30	20	06:56 (4)	20:26	18		06:51 (7)	21:18	10	06:16 (8)	21:46
24	08:11	07:14		06:08		06:35 (4)	05:55			06:33 (7)	05:00		06:09 (8)	04:44
	16:38	17:39		18:32	21	06:56 (4)	20:28	17		06:50 (7)	21:19	4	06:13 (8)	21:46
25	08:10	07:12		06:05		06:34 (4)	05:53			06:34 (7)	04:59			04:44
	16:40	17:41		18:34	22	06:56 (4)	20:30	15		06:49 (7)	21:21			21:46
26	08:09	07:09		06:03		06:33 (4)	05:50			06:35 (7)	04:58			04:45
	16:42	17:43		18:35	23	06:56 (4)	20:32	12		06:47 (7)	21:22			21:46
27	08:07	07:07		06:00		06:33 (4)	05:48			06:38 (7)	04:57			04:45
	16:44	17:45		18:37	23	06:56 (4)	20:34	7		06:45 (7)	21:24			21:46
28	08:06	07:05		05:58		06:32 (4)	05:46				04:55			04:46
	16:46	17:47		18:39	23	06:55 (4)	20:35				21:25			21:46
29	08:04			06:56		07:33 (4)	05:44				04:54			04:46
	16:48			19:41	22	07:55 (4)	20:37				21:26			21:45
30	08:02			06:53		07:33 (4)	05:42				04:53			04:47
	16:50			19:43	21	07:54 (4)	20:39				21:28			21:45
31	08:01			06:51		07:33 (4)					04:52			
	16:52			19:45	20	07:53 (4)					21:29			
Sonnenscheinstunden		252	274	367			419				492			508
astr.max.mögl.Beschattung					425			256				460		
Red.Sonnenscheinwahrsch.					0.31			0.41				0.51		
Reduktion Betriebsdauer					0.91			0.91				0.91		
Reduktion Windrichtung					0.68			0.68				0.69		
Gesamte Reduktion					0.19			0.26				0.32		
Met.wahrsch.Beschattung					83			66				148		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HS - IO227

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47			05:27		06:10 (8)	06:20			07:13		07:58 (3)	07:10	08:04
	21:45			21:10	24	06:34 (8)	20:04			18:52	13	08:11 (3)	16:42	15:58
2	04:48			05:28		06:09 (8)	06:22			07:14		07:56 (3)	07:12	08:06
	21:44			21:08	25	06:34 (8)	20:02			18:49	16	08:12 (3)	16:40	15:57
3	04:49			05:30		06:09 (8)	06:24			07:16		07:55 (3)	07:14	08:07
	21:44			21:07	25	06:34 (8)	20:00			18:47	18	08:13 (3)	16:38	15:57
4	04:50			05:32		06:10 (8)	06:25			07:18		07:54 (3)	07:16	08:09
	21:44			21:05	24	06:34 (8)	19:57			18:44	19	08:13 (3)	16:36	15:56
5	04:51			05:33		06:10 (8)	06:27			07:20		07:54 (3)	07:18	08:10
	21:43			21:03	23	06:33 (8)	19:55			18:42	19	08:13 (3)	16:34	15:56
6	04:51			05:35		06:10 (8)	06:29			07:21		07:53 (3)	07:20	08:11
	21:42			21:01	23	06:33 (8)	19:53			18:40	20	08:13 (3)	16:32	15:55
7	04:52			05:37		06:10 (8)	06:30			07:23		07:53 (3)	07:21	08:13
	21:42			20:59	22	06:32 (8)	19:50			18:37	20	08:13 (3)	16:30	15:55
8	04:53			05:38		06:11 (8)	06:32			07:25		07:54 (3)	07:23	08:14
	21:41			20:57	21	06:32 (8)	19:48			18:35	18	08:12 (3)	16:29	15:54
9	04:54			05:40		06:12 (8)	06:34		07:34 (4)	07:27		07:53 (3)	07:25	08:15
	21:40			20:55	18	06:30 (8)	19:45	5	07:39 (4)	18:32	18	08:11 (3)	16:27	15:54
10	04:56			05:42		06:13 (8)	06:36		07:29 (4)	07:29		07:55 (3)	07:27	08:16
	21:39			20:53	16	06:29 (8)	19:43	13	07:42 (4)	18:30	14	08:09 (3)	16:25	15:54
11	04:57			05:43		06:15 (8)	06:37		07:27 (4)	07:31		07:57 (3)	07:29	08:18
	21:39			20:51	12	06:27 (8)	19:40	16	07:43 (4)	18:28	11	08:08 (3)	16:23	15:53
12	04:58			05:45		06:18 (8)	06:39		07:26 (4)	07:32		07:59 (3)	07:31	08:19
	21:38			20:49	5	06:23 (8)	19:38	19	07:45 (4)	18:25	6	08:05 (3)	16:22	15:53
13	04:59			05:47			06:41		07:24 (4)	07:34			07:33	08:20
	21:37			20:47			19:36	21	07:45 (4)	18:23			16:20	15:53
14	05:00			05:49			06:43		07:23 (4)	07:36			07:35	08:21
	21:36			20:45			19:33	22	07:45 (4)	18:21			16:19	15:53
15	05:01			05:50			06:44		07:23 (4)	07:38			07:37	08:22
	21:35			20:43			19:31	22	07:45 (4)	18:18			16:17	15:53
16	05:03			05:52		06:45 (7)	06:46		07:21 (4)	07:40			07:38	08:22
	21:34			20:41	8	06:53 (7)	19:28	23	07:44 (4)	18:16			16:16	15:53
17	05:04			05:54		06:42 (7)	06:48		07:21 (4)	07:42			07:40	08:23
	21:32			20:39	12	06:54 (7)	19:26	23	07:44 (4)	18:14			16:14	15:53
18	05:05			05:56		06:40 (7)	06:50		07:22 (4)	07:43			07:42	08:24
	21:31			20:36	16	06:56 (7)	19:23	22	07:44 (4)	18:12			16:13	15:53
19	05:07			05:57		06:40 (7)	06:51		07:22 (4)	07:45			07:44	08:25
	21:30			20:34	17	06:57 (7)	19:21	21	07:43 (4)	18:09			16:11	15:54
20	05:08		06:18 (8)	05:59		06:38 (7)	06:53		07:22 (4)	07:47			07:46	08:25
	21:29	7	06:25 (8)	20:32	19	06:57 (7)	19:18	20	07:42 (4)	18:07			16:10	15:54
21	05:10		06:16 (8)	06:01		06:38 (7)	06:55		07:23 (4)	07:49			07:47	08:26
	21:27	11	06:27 (8)	20:30	19	06:57 (7)	19:16	17	07:40 (4)	18:05			16:09	15:54
22	05:11		06:14 (8)	06:03		06:38 (7)	06:57		07:24 (4)	07:51			07:49	08:27
	21:26	14	06:28 (8)	20:28	20	06:58 (7)	19:14	15	07:39 (4)	18:03			16:07	15:55
23	05:12		06:14 (8)	06:04		06:37 (7)	06:58		07:26 (4)	07:53			07:51	08:27
	21:25	16	06:30 (8)	20:25	20	06:57 (7)	19:11	9	07:35 (4)	18:00			16:06	15:55
24	05:14		06:13 (8)	06:06		06:37 (7)	07:00			07:55			07:53	08:28
	21:23	18	06:31 (8)	20:23	20	06:57 (7)	19:09			17:58			16:05	15:56
25	05:15		06:12 (8)	06:08		06:37 (7)	07:02			06:57			07:54	08:28
	21:22	20	06:32 (8)	20:21	19	06:56 (7)	19:06			16:56			16:04	15:57
26	05:17		06:11 (8)	06:10		06:37 (7)	07:04			06:58			07:56	08:28
	21:20	21	06:32 (8)	20:18	18	06:55 (7)	19:04			16:54			16:03	15:57
27	05:19		06:10 (8)	06:11		06:39 (7)	07:05			07:00			07:58	08:29
	21:19	22	06:32 (8)	20:16	15	06:54 (7)	19:01			16:52			16:02	15:58
28	05:20		06:11 (8)	06:13		06:41 (7)	07:07			07:02			07:59	08:29
	21:17	22	06:33 (8)	20:14	12	06:53 (7)	18:59			16:50			16:01	15:59
29	05:22		06:10 (8)	06:15		06:42 (7)	07:09			07:04			08:01	08:29
	21:15	23	06:33 (8)	20:12	8	06:50 (7)	18:56			16:48			16:00	16:00
30	05:23		06:10 (8)	06:17			07:11		08:01 (3)	07:06			08:03	08:29
	21:14	24	06:34 (8)	20:09			18:54	8	08:09 (3)	16:46			15:59	16:01
31	05:25		06:09 (8)	06:18						07:08				08:29
	21:12	25	06:34 (8)	20:07						16:44				16:02
Sonnenscheinstunden	510			459			382			329			260	235
astr.max.mögl.Beschattung		223			461			276			192			
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91			
Reduktion Windrichtung		0.69			0.69			0.69			0.67			
Gesamte Reduktion		0.28			0.30			0.25			0.20			
Met.wahrsch.Beschattung		62			140			70			38			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HT - IO228

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März		April		Mai		Juni	
1	08:29	07:59		07:03		07:28 (3)	06:48		07:36 (4)	05:40	
	16:03	16:54		17:49	1	07:29 (3)	19:46	15	07:51 (4)	20:41	11
2	08:29	07:58		07:00		07:25 (3)	06:46		07:37 (4)	05:38	
	16:04	16:56		17:51	9	07:34 (3)	19:48	11	07:48 (4)	20:43	15
3	08:29	07:56		06:58		07:22 (3)	06:43			05:36	
	16:05	16:58		17:53	13	07:35 (3)	19:50			20:44	18
4	08:28	07:54		06:56		07:20 (3)	06:41			05:34	
	16:07	17:00		17:54	17	07:37 (3)	19:52			20:46	20
5	08:28	07:52		06:53		07:18 (3)	06:39			05:32	
	16:08	17:02		17:56	18	07:36 (3)	19:54			20:48	21
6	08:28	07:51		06:51		07:18 (3)	06:36			05:30	
	16:09	17:04		17:58	19	07:37 (3)	19:55			20:50	23
7	08:27	07:49		06:49		07:18 (3)	06:34			05:28	
	16:10	17:06		18:00	20	07:38 (3)	19:57			20:52	24
8	08:27	07:47		06:46		07:17 (3)	06:32			05:26	
	16:12	17:08		18:02	20	07:37 (3)	19:59			20:53	24
9	08:26	07:45		06:44		07:17 (3)	06:29			05:24	
	16:13	17:10		18:04	20	07:37 (3)	20:01			20:55	25
10	08:25	07:43		06:42		07:17 (3)	06:27			05:22	
	16:15	17:12		18:06	18	07:35 (3)	20:03			20:57	24
11	08:25	07:41		06:39		07:18 (3)	06:24			05:21	
	16:16	17:13		18:08	16	07:34 (3)	20:05			20:58	25
12	08:24	07:39		06:37		07:19 (3)	06:22			05:19	
	16:18	17:15		18:10	13	07:32 (3)	20:06			21:00	25
13	08:23	07:37		06:34		07:21 (3)	06:20		06:43 (7)	05:17	
	16:19	17:17		18:11	9	07:30 (3)	20:08	4	06:47 (7)	21:02	24
14	08:22	07:35		06:32			06:17		06:41 (7)	05:15	
	16:21	17:19		18:13			20:10	9	06:50 (7)	21:04	23
15	08:22	07:33		06:30			06:15		06:39 (7)	05:14	
	16:23	17:21		18:15			20:12	13	06:52 (7)	21:05	23
16	08:21	07:31		06:27			06:13		06:37 (7)	05:12	
	16:24	17:23		18:17			20:14	16	06:53 (7)	21:07	22
17	08:20	07:29		06:25			06:10		06:35 (7)	05:11	
	16:26	17:25		18:19			20:16	18	06:53 (7)	21:08	21
18	08:19	07:27		06:22			06:08		06:34 (7)	05:09	
	16:28	17:27		18:21			20:17	19	06:53 (7)	21:10	19
19	08:17	07:25		06:20			06:06		06:34 (7)	05:07	
	16:29	17:29		18:23			20:19	20	06:54 (7)	21:12	17
20	08:16	07:23		06:17		06:42 (4)	06:04		06:34 (7)	05:06	
	16:31	17:31		18:24	10	06:52 (4)	20:21	20	06:54 (7)	21:13	16
21	08:15	07:20		06:15		06:39 (4)	06:01		06:34 (7)	05:04	
	16:33	17:33		18:26	15	06:54 (4)	20:23	19	06:53 (7)	21:15	13
22	08:14	07:18		06:13		06:38 (4)	05:59		06:34 (7)	05:03	
	16:35	17:35		18:28	17	06:55 (4)	20:25	19	06:53 (7)	21:16	11
23	08:13	07:16		06:10		06:37 (4)	05:57		06:33 (7)	05:02	
	16:37	17:37		18:30	20	06:57 (4)	20:26	18	06:51 (7)	21:18	6
24	08:11	07:14		06:08		06:35 (4)	05:55		06:34 (7)	05:00	
	16:38	17:39		18:32	21	06:56 (4)	20:28	16	06:50 (7)	21:19	
25	08:10	07:12		06:05		06:35 (4)	05:53		06:35 (7)	04:59	
	16:40	17:41		18:34	22	06:57 (4)	20:30	14	06:49 (7)	21:21	
26	08:09	07:09		06:03		06:34 (4)	05:50		06:37 (7)	04:58	
	16:42	17:43		18:35	22	06:56 (4)	20:32	10	06:47 (7)	21:22	
27	08:07	07:07		06:00		06:34 (4)	05:48		06:40 (7)	04:57	
	16:44	17:45		18:37	23	06:57 (4)	20:34	4	06:44 (7)	21:24	
28	08:06	07:05		05:58		06:33 (4)	05:46			04:55	
	16:46	17:47		18:39	22	06:55 (4)	20:35			21:25	
29	08:04			06:56		07:33 (4)	05:44			04:54	
	16:48			19:41	22	07:55 (4)	20:37			21:26	
30	08:02			06:53		07:34 (4)	05:42			04:53	
	16:50			19:43	21	07:55 (4)	20:39			21:28	
31	08:01			06:51		07:34 (4)				04:52	
	16:52			19:45	19	07:53 (4)				21:29	
Sonnenscheinstunden		252	274	367			419			492	
astr.max.mögl.Beschattung					427			245			450
Red.Sonnenscheinwahrsch.					0.31			0.41			0.51
Reduktion Betriebsdauer					0.91			0.91			0.91
Reduktion Windrichtung					0.68			0.68			0.69
Gesamte Reduktion					0.19			0.26			0.32
Met.wahrsch.Beschattung					83			63			145

Juni	
	04:51
11	21:30
	04:50
15	21:31
	04:49
18	21:32
	04:49
20	21:34
	04:48
21	21:35
	04:47
23	21:36
	04:46
24	21:37
	04:46
24	21:38
	04:45
25	21:38
	04:45
24	21:39
	04:44
25	21:40
	04:44
25	21:41
	04:44
24	21:42
	04:43
23	21:42
	04:43
23	21:43
	04:43
22	21:43
	04:43
21	21:44
	04:43
19	21:44
	04:43
17	21:45
	04:43
16	21:45
	04:43
13	21:45
	04:44
11	21:45
6	06:15 (8) 21:46
	04:44
	21:46
	04:44
	21:46
	04:45
	21:46
	04:45
	21:46
	04:46
	21:46
	04:46
	21:45
	04:47
	21:45
	508
450	
0.51	
0.91	
0.69	
0.32	
145	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HT - IO228

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1 | 04:47			05:27		06:10 (8)	06:20			07:13		07:59 (3)	07:10	08:04
| 21:45			21:10	25	06:35 (8)	20:04			18:52	12	08:11 (3)	16:42	15:58
2 | 04:48			05:28		06:10 (8)	06:22			07:14		07:57 (3)	07:12	08:06
| 21:44			21:08	24	06:34 (8)	20:02			18:49	15	08:12 (3)	16:40	15:57
3 | 04:49			05:30		06:10 (8)	06:24			07:16		07:55 (3)	07:14	08:07
| 21:44			21:07	25	06:35 (8)	20:00			18:47	18	08:13 (3)	16:38	15:57
4 | 04:50			05:32		06:11 (8)	06:25			07:18		07:55 (3)	07:16	08:09
| 21:44			21:05	24	06:35 (8)	19:57			18:44	18	08:13 (3)	16:36	15:56
5 | 04:51			05:33		06:10 (8)	06:27			07:20		07:54 (3)	07:18	08:10
| 21:43			21:03	24	06:34 (8)	19:55			18:42	20	08:14 (3)	16:34	15:56
6 | 04:51			05:35		06:11 (8)	06:29			07:21		07:54 (3)	07:20	08:11
| 21:42			21:01	23	06:34 (8)	19:53			18:40	20	08:14 (3)	16:32	15:55
7 | 04:52			05:37		06:11 (8)	06:30			07:23		07:54 (3)	07:21	08:13
| 21:42			20:59	22	06:33 (8)	19:50			18:37	19	08:13 (3)	16:30	15:55
8 | 04:53			05:38		06:12 (8)	06:32			07:25		07:54 (3)	07:23	08:14
| 21:41			20:57	21	06:33 (8)	19:48			18:35	19	08:13 (3)	16:29	15:54
9 | 04:54			05:40		06:12 (8)	06:34			07:27		07:53 (3)	07:25	08:15
| 21:40			20:55	19	06:31 (8)	19:45			18:32	18	08:11 (3)	16:27	15:54
10 | 04:56			05:42		06:13 (8)	06:36		07:30 (4)	07:29		07:55 (3)	07:27	08:16
| 21:39			20:53	17	06:30 (8)	19:43	11	07:41 (4)	18:30	15	08:10 (3)	16:25	15:54
11 | 04:57			05:43		06:15 (8)	06:37		07:28 (4)	07:31		07:57 (3)	07:29	08:18
| 21:39			20:51	14	06:29 (8)	19:40	15	07:43 (4)	18:28	11	08:08 (3)	16:23	15:53
12 | 04:58			05:45		06:17 (8)	06:39		07:27 (4)	07:32		07:59 (3)	07:31	08:19
| 21:38			20:49	9	06:26 (8)	19:38	18	07:45 (4)	18:25	7	08:06 (3)	16:22	15:53
13 | 04:59			05:47			06:41		07:25 (4)	07:34			07:33	08:20
| 21:37			20:47			19:36	20	07:45 (4)	18:23			16:20	15:53
14 | 05:00			05:49			06:43		07:24 (4)	07:36			07:35	08:21
| 21:36			20:45			19:33	21	07:45 (4)	18:21			16:19	15:53
15 | 05:01			05:50			06:44		07:23 (4)	07:38			07:37	08:22
| 21:35			20:43			19:31	23	07:46 (4)	18:18			16:17	15:53
16 | 05:03			05:52		06:46 (7)	06:46		07:22 (4)	07:40			07:38	08:22
| 21:34			20:41	6	06:52 (7)	19:28	23	07:45 (4)	18:16			16:16	15:53
17 | 05:04			05:54		06:43 (7)	06:48		07:22 (4)	07:42			07:40	08:23
| 21:32			20:39	11	06:54 (7)	19:26	23	07:45 (4)	18:14			16:14	15:53
18 | 05:05			05:56		06:42 (7)	06:50		07:22 (4)	07:43			07:42	08:24
| 21:31			20:36	14	06:56 (7)	19:23	23	07:45 (4)	18:12			16:13	15:53
19 | 05:07			05:57		06:41 (7)	06:51		07:22 (4)	07:45			07:44	08:25
| 21:30			20:34	16	06:57 (7)	19:21	22	07:44 (4)	18:09			16:11	15:54
20 | 05:08			05:59		06:39 (7)	06:53		07:22 (4)	07:47			07:46	08:25
| 21:29			20:32	18	06:57 (7)	19:18	20	07:42 (4)	18:07			16:10	15:54
21 | 05:10		06:18 (8)	06:01		06:39 (7)	06:55		07:23 (4)	07:49			07:47	08:26
| 21:27	8	06:26 (8)	20:30	19	06:58 (7)	19:16	18	07:41 (4)	18:05			16:09	15:54
22 | 05:11		06:16 (8)	06:03		06:38 (7)	06:57		07:24 (4)	07:51			07:49	08:27
| 21:26	12	06:28 (8)	20:28	20	06:58 (7)	19:14	16	07:40 (4)	18:03			16:07	15:55
23 | 05:12		06:15 (8)	06:04		06:37 (7)	06:58		07:25 (4)	07:53			07:51	08:27
| 21:25	15	06:30 (8)	20:25	20	06:57 (7)	19:11	12	07:37 (4)	18:00			16:06	15:55
24 | 05:14		06:14 (8)	06:06		06:38 (7)	07:00			07:55			07:53	08:28
| 21:23	17	06:31 (8)	20:23	19	06:57 (7)	19:09			17:58			16:05	15:56
25 | 05:15		06:14 (8)	06:08		06:38 (7)	07:02			06:57			07:54	08:28
| 21:22	18	06:32 (8)	20:21	19	06:57 (7)	19:06			16:56			16:04	15:57
26 | 05:17		06:13 (8)	06:10		06:37 (7)	07:04			06:58			07:56	08:28
| 21:20	20	06:33 (8)	20:18	19	06:56 (7)	19:04			16:54			16:03	15:57
27 | 05:19		06:12 (8)	06:11		06:39 (7)	07:05			07:00			07:58	08:29
| 21:19	21	06:33 (8)	20:16	16	06:55 (7)	19:01			16:52			16:02	15:58
28 | 05:20		06:12 (8)	06:13		06:41 (7)	07:07			07:02			07:59	08:29
| 21:17	22	06:34 (8)	20:14	13	06:54 (7)	18:59			16:50			16:01	15:59
29 | 05:22		06:11 (8)	06:15		06:42 (7)	07:09			07:04			08:01	08:29
| 21:15	23	06:34 (8)	20:12	9	06:51 (7)	18:56			16:48			16:00	16:00
30 | 05:23		06:11 (8)	06:17		06:44 (7)	07:11		08:02 (3)	07:06			08:03	08:29
| 21:14	24	06:35 (8)	20:09	4	06:48 (7)	18:54	7	08:09 (3)	16:46			15:59	16:01
31 | 05:25		06:10 (8)	06:18						07:08				08:29
| 21:12	24	06:34 (8)	20:07						16:44				16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung		204		470			272			192			
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91		0.91			0.91			0.91			
Reduktion Windrichtung		0.69		0.69			0.69			0.67			
Gesamte Reduktion		0.28		0.30			0.25			0.20			
Met.wahrsch.Beschattung		57		143			69			38			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HU - IO229

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar			März			April			Mai			Juni	
1	08:29	07:59			07:03		07:27 (3)	06:48		07:42 (4)	05:40		06:08 (8)	04:51
	16:03	16:54			17:49	12	07:39 (3)	19:46	10	07:52 (4)	20:41	13	06:21 (8)	21:30
2	08:29	07:58			07:00		07:25 (3)	06:46			05:38		06:06 (8)	04:50
	16:04	16:56			17:51	15	07:40 (3)	19:48			20:43	17	06:23 (8)	21:31
3	08:29	07:56			06:58		07:23 (3)	06:43			05:36		06:06 (8)	04:49
	16:05	16:58			17:53	17	07:40 (3)	19:50			20:44	19	06:25 (8)	21:32
4	08:28	07:54			06:56		07:22 (3)	06:41			05:34		06:04 (8)	04:49
	16:07	17:00			17:54	19	07:41 (3)	19:52			20:46	22	06:26 (8)	21:34
5	08:28	07:52			06:53		07:21 (3)	06:39			05:32		06:03 (8)	04:48
	16:08	17:02			17:56	20	07:41 (3)	19:54			20:48	23	06:26 (8)	21:35
6	08:28	07:51			06:51		07:21 (3)	06:36			05:30		06:03 (8)	04:47
	16:09	17:04			17:58	20	07:41 (3)	19:55			20:50	23	06:26 (8)	21:36
7	08:27	07:49			06:49		07:21 (3)	06:34			05:28		06:02 (8)	04:46
	16:10	17:06			18:00	20	07:41 (3)	19:57			20:52	24	06:26 (8)	21:37
8	08:27	07:47			06:46		07:21 (3)	06:32			05:26		06:01 (8)	04:46
	16:12	17:08			18:02	19	07:40 (3)	19:59			20:53	25	06:26 (8)	21:38
9	08:26	07:45			06:44		07:22 (3)	06:29			05:24		06:02 (8)	04:45
	16:13	17:10			18:04	17	07:39 (3)	20:01			20:55	25	06:27 (8)	21:38
10	08:25	07:43			06:42		07:22 (3)	06:27			05:22		06:01 (8)	04:45
	16:15	17:12			18:06	16	07:38 (3)	20:03			20:57	26	06:27 (8)	21:39
11	08:25	07:41			06:39		07:23 (3)	06:24			05:21		06:01 (8)	04:44
	16:16	17:13			18:08	13	07:36 (3)	20:05			20:58	25	06:26 (8)	21:40
12	08:24	07:39			06:37		07:25 (3)	06:22			05:19		06:02 (8)	04:44
	16:18	17:15			18:10	8	07:33 (3)	20:06			21:00	25	06:27 (8)	21:41
13	08:23	07:37			06:34			06:20		06:43 (7)	05:17		06:01 (8)	04:44
	16:19	17:17			18:11			20:08	9	06:52 (7)	21:02	25	06:26 (8)	21:42
14	08:22	07:35			06:32			06:17		06:41 (7)	05:15		06:02 (8)	04:43
	16:21	17:19			18:13			20:10	13	06:54 (7)	21:04	24	06:26 (8)	21:42
15	08:22	07:33			06:30			06:15		06:39 (7)	05:14		06:02 (8)	04:43
	16:23	17:21			18:15			20:12	16	06:55 (7)	21:05	23	06:25 (8)	21:43
16	08:21	07:31			06:27			06:13		06:38 (7)	05:12		06:03 (8)	04:43
	16:24	17:23			18:17			20:14	18	06:56 (7)	21:07	22	06:25 (8)	21:43
17	08:20	07:29			06:25			06:10		06:36 (7)	05:11		06:03 (8)	04:43
	16:26	17:25			18:19			20:16	20	06:56 (7)	21:08	21	06:24 (8)	21:44
18	08:19	07:27			06:22		06:50 (4)	06:08		06:36 (7)	05:09		06:04 (8)	04:43
	16:28	17:27			18:21	3	06:53 (4)	20:17	20	06:56 (7)	21:10	20	06:24 (8)	21:44
19	08:17	07:25			06:20		06:45 (4)	06:06		06:36 (7)	05:07		06:05 (8)	04:43
	16:29	17:29			18:23	12	06:57 (4)	20:19	20	06:56 (7)	21:12	17	06:22 (8)	21:45
20	08:16	07:23			06:17		06:43 (4)	06:04		06:36 (7)	05:06		06:06 (8)	04:43
	16:31	17:31			18:24	16	06:59 (4)	20:21	20	06:56 (7)	21:13	16	06:22 (8)	21:45
21	08:15	07:20			06:15		06:40 (4)	06:01		06:36 (7)	05:04		06:08 (8)	04:43
	16:33	17:33			18:26	19	06:59 (4)	20:23	19	06:55 (7)	21:15	13	06:21 (8)	21:45
22	08:14	07:18			06:13		06:40 (4)	05:59		06:36 (7)	05:03		06:10 (8)	04:43
	16:35	17:35			18:28	20	07:00 (4)	20:25	19	06:55 (7)	21:16	9	06:19 (8)	21:45
23	08:13	07:16			06:10		06:39 (4)	05:57		06:36 (7)	05:02		06:12 (8)	04:44
	16:37	17:37			18:30	22	07:01 (4)	20:26	17	06:53 (7)	21:18	4	06:16 (8)	21:46
24	08:11	07:14			06:08		06:38 (4)	05:55		06:37 (7)	05:00			04:44
	16:38	17:39			18:32	23	07:01 (4)	20:28	15	06:52 (7)	21:19			21:46
25	08:10	07:12			06:05		06:38 (4)	05:53		06:38 (7)	04:59			04:44
	16:40	17:41			18:34	23	07:01 (4)	20:30	12	06:50 (7)	21:21			21:46
26	08:09	07:09			06:03		06:37 (4)	05:50		06:40 (7)	04:58			04:45
	16:42	17:43			18:35	23	07:00 (4)	20:32	8	06:48 (7)	21:22			21:46
27	08:07	07:07			06:00		06:37 (4)	05:48			04:57			04:45
	16:44	17:45			18:37	23	07:00 (4)	20:34			21:24			21:46
28	08:06	07:05		07:29 (3)	05:58		06:37 (4)	05:46			04:55			04:46
	16:46	17:47	7	07:36 (3)	18:39	22	06:59 (4)	20:35			21:25			21:46
29	08:04				06:56		07:38 (4)	05:44			04:54			04:46
	16:48				19:41	20	07:58 (4)	20:37			21:26			21:45
30	08:02				06:53		07:39 (4)	05:42		06:11 (8)	04:53			04:47
	16:50				19:43	18	07:57 (4)	20:39	8	06:19 (8)	21:28			21:45
31	08:01				06:51		07:39 (4)				04:52			
	16:52				19:45	16	07:55 (4)				21:29			
Sonnenscheinstunden	252	274			367			419			492			508	
astr.max.mögl.Beschattung			7			456			244			461			
Red.Sonnenscheinwahrsch.			0.24			0.31			0.41			0.51			
Reduktion Betriebsdauer			0.91			0.91			0.91			0.91			
Reduktion Windrichtung			0.66			0.68			0.69			0.69			
Gesamte Reduktion			0.14			0.19			0.26			0.32			
Met.wahrsch.Beschattung			1			89			63			148			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HU - IO229

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47			05:27		06:12 (8)	06:20			07:13		08:08 (3)	07:10	08:04
	21:45			21:10	25	06:37 (8)	20:04			18:52	2	08:10 (3)	16:42	15:58
2	04:48			05:28		06:11 (8)	06:22			07:14		08:02 (3)	07:12	08:06
	21:44			21:08	26	06:37 (8)	20:02			18:49	11	08:13 (3)	16:40	15:57
3	04:49			05:30		06:12 (8)	06:24			07:16		08:00 (3)	07:14	08:07
	21:44			21:07	25	06:37 (8)	20:00			18:47	15	08:15 (3)	16:38	15:57
4	04:50			05:32		06:11 (8)	06:25			07:18		07:59 (3)	07:16	08:09
	21:44			21:05	25	06:36 (8)	19:57			18:44	17	08:16 (3)	16:36	15:56
5	04:51			05:33		06:12 (8)	06:27			07:20		07:58 (3)	07:18	08:10
	21:43			21:03	25	06:37 (8)	19:55			18:42	19	08:17 (3)	16:34	15:56
6	04:51			05:35		06:12 (8)	06:29			07:21		07:57 (3)	07:20	08:11
	21:42			21:01	25	06:37 (8)	19:53			18:40	20	08:17 (3)	16:32	15:55
7	04:52			05:37		06:12 (8)	06:30			07:23		07:57 (3)	07:21	08:13
	21:42			20:59	23	06:35 (8)	19:50			18:37	20	08:17 (3)	16:30	15:55
8	04:53			05:38		06:13 (8)	06:32			07:25		07:57 (3)	07:23	08:14
	21:41			20:57	22	06:35 (8)	19:48			18:35	20	08:17 (3)	16:29	15:54
9	04:54			05:40		06:13 (8)	06:34			07:27		07:56 (3)	07:25	08:15
	21:40			20:55	21	06:34 (8)	19:45			18:32	20	08:16 (3)	16:27	15:54
10	04:56			05:42		06:14 (8)	06:36			07:29		07:56 (3)	07:27	08:16
	21:39			20:53	19	06:33 (8)	19:43			18:30	19	08:15 (3)	16:25	15:54
11	04:57			05:43		06:16 (8)	06:37		07:34 (4)	07:31		07:57 (3)	07:29	08:18
	21:39			20:51	16	06:32 (8)	19:40	10	07:44 (4)	18:28	17	08:14 (3)	16:23	15:53
12	04:58			05:45		06:17 (8)	06:39		07:32 (4)	07:32		07:59 (3)	07:31	08:19
	21:38			20:49	12	06:29 (8)	19:38	15	07:47 (4)	18:25	14	08:13 (3)	16:22	15:53
13	04:59			05:47		06:20 (8)	06:41		07:29 (4)	07:34		08:01 (3)	07:33	08:20
	21:37			20:47	7	06:27 (8)	19:36	18	07:47 (4)	18:23	10	08:11 (3)	16:20	15:53
14	05:00			05:49			06:43		07:28 (4)	07:36		08:03 (3)	07:35	08:21
	21:36			20:45			19:33	20	07:48 (4)	18:21	4	08:07 (3)	16:19	15:53
15	05:01			05:50			06:44		07:27 (4)	07:38			07:37	08:22
	21:35			20:43			19:31	22	07:49 (4)	18:18			16:17	15:53
16	05:03			05:52			06:46		07:26 (4)	07:40			07:38	08:22
	21:34			20:41			19:28	22	07:48 (4)	18:16			16:16	15:53
17	05:04			05:54		06:46 (7)	06:48		07:25 (4)	07:42			07:40	08:23
	21:32			20:39	9	06:55 (7)	19:26	24	07:49 (4)	18:14			16:14	15:53
18	05:05			05:56		06:44 (7)	06:50		07:25 (4)	07:43			07:42	08:24
	21:31			20:36	13	06:57 (7)	19:23	24	07:49 (4)	18:12			16:13	15:53
19	05:07			05:57		06:43 (7)	06:51		07:25 (4)	07:45			07:44	08:25
	21:30			20:34	16	06:59 (7)	19:21	23	07:48 (4)	18:09			16:11	15:54
20	05:08			05:59		06:41 (7)	06:53		07:24 (4)	07:47			07:46	08:25
	21:29			20:32	18	06:59 (7)	19:18	23	07:47 (4)	18:07			16:10	15:54
21	05:10		06:21 (8)	06:01		06:41 (7)	06:55		07:25 (4)	07:49			07:47	08:26
	21:27	7	06:28 (8)	20:30	19	07:00 (7)	19:16	21	07:46 (4)	18:05			16:09	15:54
22	05:11		06:18 (8)	06:03		06:40 (7)	06:57		07:26 (4)	07:51			07:49	08:27
	21:26	12	06:30 (8)	20:28	20	07:00 (7)	19:14	19	07:45 (4)	18:03			16:07	15:55
23	05:12		06:17 (8)	06:04		06:39 (7)	06:58		07:26 (4)	07:53			07:51	08:27
	21:25	15	06:32 (8)	20:25	21	07:00 (7)	19:11	17	07:43 (4)	18:00			16:06	15:55
24	05:14		06:16 (8)	06:06		06:39 (7)	07:00		07:28 (4)	07:55			07:53	08:28
	21:23	17	06:33 (8)	20:23	21	07:00 (7)	19:09	13	07:41 (4)	17:58			16:05	15:56
25	05:15		06:15 (8)	06:08		06:40 (7)	07:02		07:31 (4)	06:57			07:54	08:28
	21:22	18	06:33 (8)	20:21	20	07:00 (7)	19:06	7	07:38 (4)	16:56			16:04	15:57
26	05:17		06:14 (8)	06:10		06:39 (7)	07:04			06:58			07:56	08:28
	21:20	21	06:35 (8)	20:18	19	06:58 (7)	19:04			16:54			16:03	15:57
27	05:19		06:13 (8)	06:11		06:40 (7)	07:05			07:00			07:58	08:29
	21:19	22	06:35 (8)	20:16	18	06:58 (7)	19:01			16:52			16:02	15:58
28	05:20		06:13 (8)	06:13		06:41 (7)	07:07			07:02			07:59	08:29
	21:17	23	06:36 (8)	20:14	16	06:57 (7)	18:59			16:50			16:01	15:59
29	05:22		06:12 (8)	06:15		06:42 (7)	07:09			07:04			08:01	08:29
	21:15	24	06:36 (8)	20:12	13	06:55 (7)	18:56			16:48			16:00	16:00
30	05:23		06:13 (8)	06:17		06:44 (7)	07:11			07:06			08:03	08:29
	21:14	24	06:37 (8)	20:09	9	06:53 (7)	18:54			16:46			15:59	16:01
31	05:25		06:12 (8)	06:18						07:08				08:29
	21:12	24	06:36 (8)	20:07						16:44				16:02
Sonnenscheinstunden	510			459			382			329			260	235
astr.max.mögl.Beschattung		207			503			278			208			
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91			
Reduktion Windrichtung		0.69			0.69			0.69			0.66			
Gesamte Reduktion		0.28			0.30			0.25			0.20			
Met.wahrsch.Beschattung		58			153			71			41			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HV - IO230

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März		April		Mai		Juni	
1	08:29	07:59		07:03		07:27 (3)	06:48	07:39 (4)	05:40	06:07 (8)	04:51
	16:03	16:54		17:49	7	07:34 (3)	19:46	12 07:51 (4)	20:41	16 06:23 (8)	21:30
2	08:29	07:58		07:00		07:25 (3)	06:46		05:38	06:06 (8)	04:50
	16:04	16:56		17:51	11	07:36 (3)	19:48		20:43	18 06:24 (8)	21:31
3	08:29	07:56		06:58		07:22 (3)	06:43		05:36	06:05 (8)	04:49
	16:05	16:58		17:53	15	07:37 (3)	19:50		20:44	21 06:26 (8)	21:32
4	08:28	07:54		06:56		07:20 (3)	06:41		05:34	06:04 (8)	04:49
	16:07	17:00		17:54	18	07:38 (3)	19:52		20:46	22 06:26 (8)	21:34
5	08:28	07:52		06:53		07:19 (3)	06:39		05:32	06:04 (8)	04:48
	16:08	17:02		17:56	19	07:38 (3)	19:54		20:48	23 06:27 (8)	21:35
6	08:28	07:51		06:51		07:19 (3)	06:36		05:30	06:03 (8)	04:47
	16:09	17:04		17:58	19	07:38 (3)	19:55		20:50	24 06:27 (8)	21:36
7	08:27	07:49		06:49		07:19 (3)	06:34		05:28	06:02 (8)	04:46
	16:10	17:06		18:00	20	07:39 (3)	19:57		20:52	25 06:27 (8)	21:37
8	08:27	07:47		06:46		07:18 (3)	06:32		05:26	06:03 (8)	04:46
	16:12	17:08		18:02	20	07:38 (3)	19:59		20:53	24 06:27 (8)	21:38
9	08:26	07:45		06:44		07:19 (3)	06:29		05:24	06:03 (8)	04:45
	16:13	17:10		18:04	18	07:37 (3)	20:01		20:55	24 06:27 (8)	21:38
10	08:25	07:43		06:42		07:19 (3)	06:27		05:22	06:02 (8)	04:45
	16:15	17:12		18:06	17	07:36 (3)	20:03		20:57	25 06:27 (8)	21:39
11	08:25	07:41		06:39		07:20 (3)	06:24		05:21	06:02 (8)	04:44
	16:16	17:13		18:08	15	07:35 (3)	20:05		20:58	24 06:26 (8)	21:40
12	08:24	07:39		06:37		07:21 (3)	06:22	06:46 (7)	05:19	06:03 (8)	04:44
	16:18	17:15		18:10	11	07:32 (3)	20:06	3 06:49 (7)	21:00	23 06:26 (8)	21:41
13	08:23	07:37		06:34		07:26 (3)	06:20	06:43 (7)	05:17	06:03 (8)	04:44
	16:19	17:17		18:11	2	07:28 (3)	20:08	9 06:52 (7)	21:02	23 06:26 (8)	21:42
14	08:22	07:35		06:32			06:17	06:41 (7)	05:15	06:04 (8)	04:43
	16:21	17:19		18:13			20:10	13 06:54 (7)	21:04	22 06:26 (8)	21:42
15	08:22	07:33		06:30			06:15	06:39 (7)	05:14	06:04 (8)	04:43
	16:23	17:21		18:15			20:12	16 06:55 (7)	21:05	21 06:25 (8)	21:43
16	08:21	07:31		06:27			06:13	06:37 (7)	05:12	06:05 (8)	04:43
	16:24	17:23		18:17			20:14	19 06:56 (7)	21:07	19 06:24 (8)	21:43
17	08:20	07:29		06:25			06:10	06:36 (7)	05:11	06:05 (8)	04:43
	16:26	17:25		18:19			20:16	19 06:55 (7)	21:08	18 06:23 (8)	21:44
18	08:19	07:27		06:22			06:08	06:36 (7)	05:09	06:07 (8)	04:43
	16:28	17:27		18:21			20:17	19 06:55 (7)	21:10	15 06:22 (8)	21:44
19	08:17	07:25		06:20		06:45 (4)	06:06	06:35 (7)	05:07	06:07 (8)	04:43
	16:29	17:29		18:23	8	06:53 (4)	20:19	20 06:55 (7)	21:12	13 06:20 (8)	21:45
20	08:16	07:23		06:17		06:42 (4)	06:04	06:36 (7)	05:06	06:09 (8)	04:43
	16:31	17:31		18:24	14	06:56 (4)	20:21	19 06:55 (7)	21:13	10 06:19 (8)	21:45
21	08:15	07:20		06:15		06:39 (4)	06:01	06:36 (7)	05:04	06:13 (8)	04:43
	16:33	17:33		18:26	18	06:57 (4)	20:23	19 06:55 (7)	21:15	3 06:16 (8)	21:45
22	08:14	07:18		06:13		06:38 (4)	05:59	06:36 (7)	05:03		04:43
	16:35	17:35		18:28	20	06:58 (4)	20:25	18 06:54 (7)	21:16		21:45
23	08:13	07:16		06:10		06:38 (4)	05:57	06:36 (7)	05:02		04:44
	16:37	17:37		18:30	21	06:59 (4)	20:26	16 06:52 (7)	21:18		21:46
24	08:11	07:14		06:08		06:36 (4)	05:55	06:37 (7)	05:00		04:44
	16:38	17:39		18:32	22	06:58 (4)	20:28	14 06:51 (7)	21:19		21:46
25	08:10	07:12		06:05		06:36 (4)	05:53	06:39 (7)	04:59		04:44
	16:40	17:41		18:34	23	06:59 (4)	20:30	10 06:49 (7)	21:21		21:46
26	08:09	07:09		06:03		06:35 (4)	05:50	06:43 (7)	04:58		04:45
	16:42	17:43		18:35	23	06:58 (4)	20:32	1 06:44 (7)	21:22		21:46
27	08:07	07:07		06:00		06:35 (4)	05:48		04:57		04:45
	16:44	17:45		18:37	23	06:58 (4)	20:34		21:24		21:46
28	08:06	07:05		05:58		06:35 (4)	05:46		04:55		04:46
	16:46	17:47		18:39	22	06:57 (4)	20:35		21:25		21:46
29	08:04			06:56		07:36 (4)	05:44	06:12 (8)	04:54		04:46
	16:48			19:41	20	07:56 (4)	20:37	7 06:19 (8)	21:26		21:45
30	08:02			06:53		07:37 (4)	05:42	06:09 (8)	04:53		04:47
	16:50			19:43	18	07:55 (4)	20:39	12 06:21 (8)	21:28		21:45
31	08:01			06:51		07:37 (4)			04:52		
	16:52			19:45	16	07:53 (4)			21:29		
Sonnenscheinstunden	252	274		367			419		492		508
astr.max.mögl.Beschattung					440			246		413	
Red.Sonnenscheinwahrsch.					0.31			0.41		0.51	
Reduktion Betriebsdauer					0.91			0.91		0.91	
Reduktion Windrichtung					0.68			0.69		0.69	
Gesamte Reduktion					0.19			0.26		0.32	
Met.wahrsch.Beschattung					86			63		133	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HV - IO230

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47			05:27		06:13 (8)	06:20			07:13		08:02 (3)	07:10	08:04
	21:45			21:10	24	06:37 (8)	20:04			18:52	9	08:11 (3)	16:42	15:58
2	04:48			05:28		06:12 (8)	06:22			07:14		07:59 (3)	07:12	08:06
	21:44			21:08	25	06:37 (8)	20:02			18:49	13	08:12 (3)	16:40	15:57
3	04:49			05:30		06:13 (8)	06:24			07:16		07:57 (3)	07:14	08:07
	21:44			21:07	24	06:37 (8)	20:00			18:47	16	08:13 (3)	16:38	15:57
4	04:50			05:32		06:13 (8)	06:25			07:18		07:56 (3)	07:16	08:09
	21:44			21:05	25	06:38 (8)	19:57			18:44	18	08:14 (3)	16:36	15:56
5	04:51			05:33		06:12 (8)	06:27			07:20		07:55 (3)	07:18	08:10
	21:43			21:03	25	06:37 (8)	19:55			18:42	19	08:14 (3)	16:34	15:56
6	04:51			05:35		06:13 (8)	06:29			07:21		07:55 (3)	07:20	08:11
	21:42			21:01	24	06:37 (8)	19:53			18:40	20	08:15 (3)	16:32	15:55
7	04:52			05:37		06:13 (8)	06:30			07:23		07:55 (3)	07:21	08:13
	21:42			20:59	23	06:36 (8)	19:50			18:37	19	08:14 (3)	16:30	15:55
8	04:53			05:38		06:13 (8)	06:32			07:25		07:55 (3)	07:23	08:14
	21:41			20:57	23	06:36 (8)	19:48			18:35	19	08:14 (3)	16:29	15:54
9	04:54			05:40		06:13 (8)	06:34			07:27		07:54 (3)	07:25	08:15
	21:40			20:55	22	06:35 (8)	19:45			18:32	19	08:13 (3)	16:27	15:54
10	04:56			05:42		06:14 (8)	06:36			07:29		07:55 (3)	07:27	08:16
	21:39			20:53	20	06:34 (8)	19:43			18:30	17	08:12 (3)	16:25	15:54
11	04:57			05:43		06:15 (8)	06:37		07:32 (4)	07:31		07:57 (3)	07:29	08:18
	21:39			20:51	18	06:33 (8)	19:40	11	07:43 (4)	18:28	13	08:10 (3)	16:23	15:53
12	04:58			05:45		06:16 (8)	06:39		07:30 (4)	07:32		07:59 (3)	07:31	08:19
	21:38			20:49	15	06:31 (8)	19:38	15	07:45 (4)	18:25	10	08:09 (3)	16:22	15:53
13	04:59			05:47		06:18 (8)	06:41		07:27 (4)	07:34		08:01 (3)	07:33	08:20
	21:37			20:47	11	06:29 (8)	19:36	18	07:45 (4)	18:23	4	08:05 (3)	16:20	15:53
14	05:00			05:49		06:22 (8)	06:43		07:26 (4)	07:36			07:35	08:21
	21:36			20:45	2	06:24 (8)	19:33	20	07:46 (4)	18:21			16:19	15:53
15	05:01			05:50			06:44		07:25 (4)	07:38			07:37	08:22
	21:35			20:43			19:31	22	07:47 (4)	18:18			16:17	15:53
16	05:03			05:52			06:46		07:24 (4)	07:40			07:38	08:22
	21:34			20:41			19:28	22	07:46 (4)	18:16			16:16	15:53
17	05:04			05:54		06:48 (7)	06:48		07:24 (4)	07:42			07:40	08:23
	21:32			20:39	5	06:53 (7)	19:26	22	07:46 (4)	18:14			16:14	15:53
18	05:05			05:56		06:45 (7)	06:50		07:24 (4)	07:43			07:42	08:24
	21:31			20:36	11	06:56 (7)	19:23	22	07:46 (4)	18:12			16:13	15:53
19	05:07			05:57		06:44 (7)	06:51		07:24 (4)	07:45			07:44	08:25
	21:30			20:34	14	06:58 (7)	19:21	22	07:46 (4)	18:09			16:11	15:54
20	05:08			05:59		06:42 (7)	06:53		07:23 (4)	07:47			07:46	08:25
	21:29			20:32	16	06:58 (7)	19:18	21	07:44 (4)	18:07			16:10	15:54
21	05:10			06:01		06:41 (7)	06:55		07:24 (4)	07:49			07:47	08:26
	21:27			20:30	18	06:59 (7)	19:16	20	07:44 (4)	18:05			16:09	15:54
22	05:11			06:03		06:40 (7)	06:57		07:25 (4)	07:51			07:49	08:27
	21:26			20:28	19	06:59 (7)	19:14	17	07:42 (4)	18:03			16:07	15:55
23	05:12		06:22 (8)	06:04		06:39 (7)	06:58		07:25 (4)	07:53			07:51	08:27
	21:25	6	06:28 (8)	20:25	20	06:59 (7)	19:11	15	07:40 (4)	18:00			16:06	15:55
24	05:14		06:19 (8)	06:06		06:39 (7)	07:00		07:27 (4)	07:55			07:53	08:28
	21:23	11	06:30 (8)	20:23	20	06:59 (7)	19:09	10	07:37 (4)	17:58			16:05	15:56
25	05:15		06:18 (8)	06:08		06:39 (7)	07:02			06:57			07:54	08:28
	21:22	14	06:32 (8)	20:21	20	06:59 (7)	19:06			16:56			16:04	15:57
26	05:17		06:17 (8)	06:10		06:39 (7)	07:04			06:58			07:56	08:28
	21:20	16	06:33 (8)	20:18	19	06:58 (7)	19:04			16:54			16:03	15:57
27	05:19		06:15 (8)	06:11		06:39 (7)	07:05			07:00			07:58	08:29
	21:19	19	06:34 (8)	20:16	18	06:57 (7)	19:01			16:52			16:02	15:58
28	05:20		06:15 (8)	06:13		06:41 (7)	07:07			07:02			07:59	08:29
	21:17	20	06:35 (8)	20:14	16	06:57 (7)	18:59			16:50			16:01	15:59
29	05:22		06:14 (8)	06:15		06:42 (7)	07:09			07:04			08:01	08:29
	21:15	21	06:35 (8)	20:12	13	06:55 (7)	18:56			16:48			16:00	16:00
30	05:23		06:14 (8)	06:17		06:44 (7)	07:11			07:06			08:03	08:29
	21:14	22	06:36 (8)	20:09	9	06:53 (7)	18:54			16:46			15:59	16:01
31	05:25		06:13 (8)	06:18		06:46 (7)				07:08				08:29
	21:12	23	06:36 (8)	20:07	3	06:49 (7)				16:44				16:02
Sonnenscheinstunden	510			459			382			329			260	235
astr.max.mögl.Beschattung		152			502			257			196			
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91			
Reduktion Windrichtung		0.69			0.69			0.69			0.67			
Gesamte Reduktion		0.28			0.31			0.25			0.20			
Met.wahrsch.Beschattung		43			153			65			39			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HW - IO231

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März			April			Mai			Juni	
1	08:29		07:59		07:03		07:27 (3)	06:48		07:41 (4)	05:40		06:07 (8)	04:51
	16:03		16:54		17:49	8	07:35 (3)	19:46	9	07:50 (4)	20:41	18	06:25 (8)	21:30
2	08:29		07:58		07:00		07:25 (3)	06:46			05:38		06:06 (8)	04:50
	16:04		16:56		17:51	12	07:37 (3)	19:48			20:43	20	06:26 (8)	21:31
3	08:29		07:56		06:58		07:22 (3)	06:43			05:36		06:06 (8)	04:49
	16:05		16:58		17:53	16	07:38 (3)	19:50			20:44	21	06:27 (8)	21:32
4	08:28		07:54		06:56		07:21 (3)	06:41			05:34		06:05 (8)	04:49
	16:07		17:00		17:54	18	07:39 (3)	19:52			20:46	23	06:28 (8)	21:34
5	08:28		07:52		06:53		07:19 (3)	06:39			05:32		06:04 (8)	04:48
	16:08		17:02		17:56	19	07:38 (3)	19:54			20:48	24	06:28 (8)	21:35
6	08:28		07:51		06:51		07:19 (3)	06:36			05:30		06:04 (8)	04:47
	16:09		17:04		17:58	20	07:39 (3)	19:55			20:50	24	06:28 (8)	21:36
7	08:27		07:49		06:49		07:19 (3)	06:34			05:28		06:03 (8)	04:46
	16:10		17:06		18:00	20	07:39 (3)	19:57			20:52	25	06:28 (8)	21:37
8	08:27		07:47		06:46		07:19 (3)	06:32			05:26		06:04 (8)	04:46
	16:12		17:08		18:02	19	07:38 (3)	19:59			20:53	24	06:28 (8)	21:38
9	08:26		07:45		06:44		07:20 (3)	06:29			05:24		06:04 (8)	04:45
	16:13		17:10		18:04	18	07:38 (3)	20:01			20:55	24	06:28 (8)	21:38
10	08:25		07:43		06:42		07:20 (3)	06:27			05:22		06:03 (8)	04:45
	16:15		17:12		18:06	16	07:36 (3)	20:03			20:57	25	06:28 (8)	21:39
11	08:25		07:41		06:39		07:21 (3)	06:24			05:21		06:03 (8)	04:44
	16:16		17:13		18:08	14	07:35 (3)	20:05			20:58	24	06:27 (8)	21:40
12	08:24		07:39		06:37		07:22 (3)	06:22		06:46 (7)	05:19		06:04 (8)	04:44
	16:18		17:15		18:10	10	07:32 (3)	20:06	6	06:52 (7)	21:00	23	06:27 (8)	21:41
13	08:23		07:37		06:34			06:20		06:43 (7)	05:17		06:04 (8)	04:44
	16:19		17:17		18:11			20:08	11	06:54 (7)	21:02	22	06:26 (8)	21:42
14	08:22		07:35		06:32			06:17		06:41 (7)	05:15		06:05 (8)	04:43
	16:21		17:19		18:13			20:10	14	06:55 (7)	21:04	21	06:26 (8)	21:42
15	08:22		07:33		06:30			06:15		06:39 (7)	05:14		06:05 (8)	04:43
	16:23		17:21		18:15			20:12	17	06:56 (7)	21:05	20	06:25 (8)	21:43
16	08:21		07:31		06:27			06:13		06:38 (7)	05:12		06:07 (8)	04:43
	16:24		17:23		18:17			20:14	19	06:57 (7)	21:07	18	06:25 (8)	21:43
17	08:20		07:29		06:25			06:10		06:37 (7)	05:11		06:07 (8)	04:43
	16:26		17:25		18:19			20:16	19	06:56 (7)	21:08	16	06:23 (8)	21:44
18	08:19		07:27		06:22			06:08		06:36 (7)	05:09		06:09 (8)	04:43
	16:28		17:27		18:21			20:17	20	06:56 (7)	21:10	13	06:22 (8)	21:44
19	08:17		07:25		06:20		06:44 (4)	06:06		06:36 (7)	05:07		06:10 (8)	04:43
	16:29		17:29		18:23	11	06:55 (4)	20:19	20	06:56 (7)	21:12	10	06:20 (8)	21:45
20	08:16		07:23		06:17		06:42 (4)	06:04		06:36 (7)	05:06		06:13 (8)	04:43
	16:31		17:31		18:24	15	06:57 (4)	20:21	20	06:56 (7)	21:13	5	06:18 (8)	21:45
21	08:15		07:20		06:15		06:40 (4)	06:01		06:37 (7)	05:04			04:43
	16:33		17:33		18:26	18	06:58 (4)	20:23	18	06:55 (7)	21:15			21:45
22	08:14		07:18		06:13		06:39 (4)	05:59		06:37 (7)	05:03			04:43
	16:35		17:35		18:28	20	06:59 (4)	20:25	17	06:54 (7)	21:16			21:45
23	08:13		07:16		06:10		06:38 (4)	05:57		06:37 (7)	05:02			04:44
	16:37		17:37		18:30	22	07:00 (4)	20:26	15	06:52 (7)	21:18			21:46
24	08:11		07:14		06:08		06:37 (4)	05:55		06:39 (7)	05:00			04:44
	16:38		17:39		18:32	22	06:59 (4)	20:28	12	06:51 (7)	21:19			21:46
25	08:10		07:12		06:05		06:37 (4)	05:53		06:41 (7)	04:59			04:44
	16:40		17:41		18:34	23	07:00 (4)	20:30	7	06:48 (7)	21:21			21:46
26	08:09		07:09		06:03		06:36 (4)	05:50			04:58			04:45
	16:42		17:43		18:35	23	06:59 (4)	20:32			21:22			21:46
27	08:07		07:07		06:00		06:36 (4)	05:48			04:57			04:45
	16:44		17:45		18:37	22	06:58 (4)	20:34			21:24			21:46
28	08:06		07:05		05:58		06:36 (4)	05:46			04:55			04:46
	16:46		17:47		18:39	21	06:57 (4)	20:35			21:25			21:46
29	08:04				06:56		07:37 (4)	05:44		06:11 (8)	04:54			04:46
	16:48				19:41	19	07:56 (4)	20:37	11	06:22 (8)	21:26			21:45
30	08:02				06:53		07:38 (4)	05:42		06:09 (8)	04:53			04:47
	16:50				19:43	17	07:55 (4)	20:39	15	06:24 (8)	21:28			21:45
31	08:01				06:51		07:39 (4)				04:52			
	16:52				19:45	14	07:53 (4)				21:29			
Sonnenscheinstunden	252		274		367			419			492			508	
astr.max.mögl.Beschattung						437			250			400			
Red.Sonnenscheinwahrsch.						0.31			0.41			0.51			
Reduktion Betriebsdauer						0.91			0.91			0.91			
Reduktion Windrichtung						0.68			0.69			0.69			
Gesamte Reduktion						0.19			0.26			0.32			
Met.wahrsch.Beschattung						85			64			129			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HW - IO231

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1 | 04:47			05:27		06:14 (8)	06:20			07:13		08:04 (3)	07:10	08:04
| 21:45			21:10	24	06:38 (8)	20:04			18:52	6	08:10 (3)	16:42	15:58
2 | 04:48			05:28		06:13 (8)	06:22			07:14		08:00 (3)	07:12	08:06
| 21:44			21:08	24	06:37 (8)	20:02			18:49	12	08:12 (3)	16:40	15:57
3 | 04:49			05:30		06:14 (8)	06:24			07:16		07:58 (3)	07:14	08:07
| 21:44			21:07	24	06:38 (8)	20:00			18:47	15	08:13 (3)	16:38	15:57
4 | 04:50			05:32		06:14 (8)	06:25			07:18		07:57 (3)	07:16	08:09
| 21:44			21:05	24	06:38 (8)	19:57			18:44	17	08:14 (3)	16:36	15:56
5 | 04:51			05:33		06:13 (8)	06:27			07:20		07:56 (3)	07:18	08:10
| 21:43			21:03	25	06:38 (8)	19:55			18:42	19	08:15 (3)	16:34	15:56
6 | 04:51			05:35		06:14 (8)	06:29			07:21		07:56 (3)	07:20	08:11
| 21:42			21:01	24	06:38 (8)	19:53			18:40	19	08:15 (3)	16:32	15:55
7 | 04:52			05:37		06:13 (8)	06:30			07:23		07:55 (3)	07:21	08:13
| 21:42			20:59	24	06:37 (8)	19:50			18:37	20	08:15 (3)	16:30	15:55
8 | 04:53			05:38		06:14 (8)	06:32			07:25		07:55 (3)	07:23	08:14
| 21:41			20:57	23	06:37 (8)	19:48			18:35	20	08:15 (3)	16:29	15:54
9 | 04:54			05:40		06:14 (8)	06:34			07:27		07:54 (3)	07:25	08:15
| 21:40			20:55	22	06:36 (8)	19:45			18:32	19	08:13 (3)	16:27	15:54
10 | 04:56			05:42		06:15 (8)	06:36			07:29		07:55 (3)	07:27	08:16
| 21:39			20:53	21	06:36 (8)	19:43			18:30	17	08:12 (3)	16:25	15:54
11 | 04:57			05:43		06:16 (8)	06:37		07:34 (4)	07:31		07:57 (3)	07:29	08:18
| 21:39			20:51	19	06:35 (8)	19:40	8	07:42 (4)	18:28	14	08:11 (3)	16:23	15:53
12 | 04:58			05:45		06:16 (8)	06:39		07:31 (4)	07:32		07:59 (3)	07:31	08:19
| 21:38			20:49	17	06:33 (8)	19:38	14	07:45 (4)	18:25	11	08:10 (3)	16:22	15:53
13 | 04:59			05:47		06:18 (8)	06:41		07:29 (4)	07:34		08:01 (3)	07:33	08:20
| 21:37			20:47	14	06:32 (8)	19:36	16	07:45 (4)	18:23	6	08:07 (3)	16:20	15:53
14 | 05:00			05:49		06:20 (8)	06:43		07:27 (4)	07:36			07:35	08:21
| 21:36			20:45	8	06:28 (8)	19:33	20	07:47 (4)	18:21			16:19	15:53
15 | 05:01			05:50			06:44		07:26 (4)	07:38			07:37	08:22
| 21:35			20:43			19:31	21	07:47 (4)	18:18			16:17	15:53
16 | 05:03			05:52			06:46		07:25 (4)	07:40			07:38	08:22
| 21:34			20:41			19:28	22	07:47 (4)	18:16			16:16	15:53
17 | 05:04			05:54			06:48		07:24 (4)	07:42			07:40	08:23
| 21:32			20:39			19:26	23	07:47 (4)	18:14			16:14	15:53
18 | 05:05			05:56		06:47 (7)	06:50		07:24 (4)	07:43			07:42	08:24
| 21:31			20:36	9	06:56 (7)	19:23	23	07:47 (4)	18:12			16:13	15:53
19 | 05:07			05:57		06:45 (7)	06:51		07:24 (4)	07:45			07:44	08:25
| 21:30			20:34	13	06:58 (7)	19:21	23	07:47 (4)	18:09			16:11	15:54
20 | 05:08			05:59		06:43 (7)	06:53		07:24 (4)	07:47			07:46	08:25
| 21:29			20:32	15	06:58 (7)	19:18	21	07:45 (4)	18:07			16:10	15:54
21 | 05:10			06:01		06:42 (7)	06:55		07:24 (4)	07:49			07:47	08:26
| 21:27			20:30	17	06:59 (7)	19:16	21	07:45 (4)	18:05			16:09	15:54
22 | 05:11			06:03		06:41 (7)	06:57		07:25 (4)	07:51			07:49	08:27
| 21:26			20:28	19	07:00 (7)	19:14	19	07:44 (4)	18:03			16:07	15:55
23 | 05:12			06:04		06:40 (7)	06:58		07:25 (4)	07:53			07:51	08:27
| 21:25			20:25	20	07:00 (7)	19:11	16	07:41 (4)	18:00			16:06	15:55
24 | 05:14		06:22 (8)	06:06		06:40 (7)	07:00		07:27 (4)	07:55			07:53	08:28
| 21:23	8	06:30 (8)	20:23	20	07:00 (7)	19:09	12	07:39 (4)	17:58			16:05	15:56
25 | 05:15		06:20 (8)	06:08		06:40 (7)	07:02		07:30 (4)	06:57			07:54	08:28
| 21:22	12	06:32 (8)	20:21	20	07:00 (7)	19:06	6	07:36 (4)	16:56			16:04	15:57
26 | 05:17		06:19 (8)	06:10		06:39 (7)	07:04			06:58			07:56	08:28
| 21:20	14	06:33 (8)	20:18	20	06:59 (7)	19:04			16:54			16:03	15:57
27 | 05:19		06:17 (8)	06:11		06:40 (7)	07:05			07:00			07:58	08:29
| 21:19	17	06:34 (8)	20:16	18	06:58 (7)	19:01			16:52			16:02	15:58
28 | 05:20		06:17 (8)	06:13		06:41 (7)	07:07			07:02			07:59	08:29
| 21:17	18	06:35 (8)	20:14	17	06:58 (7)	18:59			16:50			16:01	15:59
29 | 05:22		06:15 (8)	06:15		06:42 (7)	07:09			07:04			08:01	08:29
| 21:15	21	06:36 (8)	20:12	14	06:56 (7)	18:56			16:48			16:00	16:00
30 | 05:23		06:15 (8)	06:17		06:44 (7)	07:11			07:06			08:03	08:29
| 21:14	22	06:37 (8)	20:09	10	06:54 (7)	18:54			16:46			15:59	16:01
31 | 05:25		06:14 (8)	06:18		06:46 (7)				07:08				08:29
| 21:12	23	06:37 (8)	20:07	6	06:52 (7)				16:44				16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung		135		511			265			195			
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91		0.91			0.91			0.91			
Reduktion Windrichtung		0.69		0.69			0.69			0.67			
Gesamte Reduktion		0.28		0.31			0.25			0.20			
Met.wahrsch.Beschattung		38		156			67			39			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de

Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HX - IO232

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar			März			April			Mai			Juni	
1	08:29		07:59			07:03			07:27 (3)	06:48		05:40			06:08 (8)	04:51
	16:03		16:54			17:49	10		07:37 (3)	19:46		20:41	20		06:28 (8)	21:30
2	08:29		07:58			07:00			07:25 (3)	06:46		05:38			06:07 (8)	04:50
	16:04		16:56			17:51	14		07:39 (3)	19:48		20:43	21		06:28 (8)	21:31
3	08:29		07:56			06:58			07:22 (3)	06:43		05:36			06:07 (8)	04:49
	16:05		16:58			17:53	17		07:39 (3)	19:50		20:44	23		06:30 (8)	21:32
4	08:28		07:54			06:56			07:21 (3)	06:41		05:34			06:06 (8)	04:49
	16:07		17:00			17:54	19		07:40 (3)	19:52		20:46	24		06:30 (8)	21:34
5	08:28		07:52			06:53			07:20 (3)	06:39		05:32			06:06 (8)	04:48
	16:08		17:02			17:56	19		07:39 (3)	19:54		20:48	24		06:30 (8)	21:35
6	08:28		07:51			06:51			07:20 (3)	06:36		05:30			06:05 (8)	04:47
	16:09		17:04			17:58	20		07:40 (3)	19:55		20:50	25		06:30 (8)	21:36
7	08:27		07:49			06:49			07:20 (3)	06:34		05:28			06:05 (8)	04:46
	16:10		17:06			18:00	20		07:40 (3)	19:57		20:52	24		06:29 (8)	21:37
8	08:27		07:47			06:46			07:20 (3)	06:32		05:26			06:06 (8)	04:46
	16:12		17:08			18:02	18		07:38 (3)	19:59		20:53	24		06:30 (8)	21:38
9	08:26		07:45			06:44			07:21 (3)	06:29		05:24			06:06 (8)	04:45
	16:13		17:10			18:04	17		07:38 (3)	20:01		20:55	24		06:30 (8)	21:38
10	08:25		07:43			06:42			07:21 (3)	06:27		05:22			06:05 (8)	04:45
	16:15		17:12			18:06	15		07:36 (3)	20:03		20:57	24		06:29 (8)	21:39
11	08:25		07:41			06:39			07:23 (3)	06:24	06:48 (7)	05:21			06:05 (8)	04:44
	16:16		17:13			18:08	11		07:34 (3)	20:05	4 06:52 (7)	20:58	23		06:28 (8)	21:40
12	08:24		07:39			06:37			07:25 (3)	06:22	06:46 (7)	05:19			06:07 (8)	04:44
	16:18		17:15			18:10	5		07:30 (3)	20:06	9 06:55 (7)	21:00	21		06:28 (8)	21:41
13	08:23		07:37			06:34				06:20	06:43 (7)	05:17			06:07 (8)	04:44
	16:19		17:17			18:11				20:08	13 06:56 (7)	21:02	20		06:27 (8)	21:42
14	08:22		07:35			06:32				06:17	06:41 (7)	05:15			06:08 (8)	04:43
	16:21		17:19			18:13				20:10	16 06:57 (7)	21:04	19		06:27 (8)	21:42
15	08:22		07:33			06:30				06:15	06:39 (7)	05:14			06:08 (8)	04:43
	16:23		17:21			18:15				20:12	19 06:58 (7)	21:05	17		06:25 (8)	21:43
16	08:21		07:31			06:27				06:13	06:39 (7)	05:12			06:10 (8)	04:43
	16:24		17:23			18:17				20:14	19 06:58 (7)	21:07	15		06:25 (8)	21:43
17	08:20		07:29			06:25				06:10	06:38 (7)	05:11			06:11 (8)	04:43
	16:26		17:25			18:19				20:16	19 06:57 (7)	21:08	12		06:23 (8)	21:44
18	08:19		07:27			06:22			06:47 (4)	06:08	06:38 (7)	05:09			06:14 (8)	04:43
	16:28		17:27			18:21	8		06:55 (4)	20:17	19 06:57 (7)	21:10	7		06:21 (8)	21:44
19	08:17		07:25			06:20			06:44 (4)	06:06	06:38 (7)	05:07				04:43
	16:29		17:29			18:23	13		06:57 (4)	20:19	19 06:57 (7)	21:12				21:45
20	08:16		07:23			06:17			06:42 (4)	06:04	06:38 (7)	05:06				04:43
	16:31		17:31			18:24	17		06:59 (4)	20:21	19 06:57 (7)	21:13				21:45
21	08:15		07:20			06:15			06:40 (4)	06:01	06:39 (7)	05:04				04:43
	16:33		17:33			18:26	19		06:59 (4)	20:23	17 06:56 (7)	21:15				21:45
22	08:14		07:18			06:13			06:39 (4)	05:59	06:40 (7)	05:03				04:43
	16:35		17:35			18:28	21		07:00 (4)	20:25	15 06:55 (7)	21:16				21:45
23	08:13		07:16			06:10			06:39 (4)	05:57	06:40 (7)	05:02				04:44
	16:37		17:37			18:30	22		07:01 (4)	20:26	12 06:52 (7)	21:18				21:46
24	08:11		07:14			06:08			06:38 (4)	05:55	06:42 (7)	05:00				04:44
	16:38		17:39			18:32	22		07:00 (4)	20:28	8 06:50 (7)	21:19				21:46
25	08:10		07:12			06:05			06:38 (4)	05:53		04:59				04:44
	16:40		17:41			18:34	23		07:01 (4)	20:30		21:21				21:46
26	08:09		07:09			06:03			06:37 (4)	05:50		04:58				04:45
	16:42		17:43			18:35	22		06:59 (4)	20:32		21:22				21:46
27	08:07		07:07			06:00			06:38 (4)	05:48		04:57				04:45
	16:44		17:45			18:37	21		06:59 (4)	20:34		21:24				21:46
28	08:06		07:05		07:29 (3)	05:58			06:38 (4)	05:46	06:13 (8)	04:55				04:46
	16:46		17:47	5	07:34 (3)	18:39	20		06:58 (4)	20:35	11 06:24 (8)	21:25				21:46
29	08:04					06:56			07:39 (4)	05:44	06:11 (8)	04:54				04:46
	16:48					19:41	18		07:57 (4)	20:37	15 06:26 (8)	21:26				21:45
30	08:02					06:53			07:40 (4)	05:42	06:09 (8)	04:53				04:47
	16:50					19:43	15		07:55 (4)	20:39	18 06:27 (8)	21:28				21:45
31	08:01					06:51			07:41 (4)			04:52				
	16:52					19:45	11		07:52 (4)			21:29				
Sonnenscheinstunden	252		274			367				419		492				508
astr.max.mögl.Beschattung				5			437				252			367		
Red.Sonnenscheinwahrsch.				0.24			0.31				0.41			0.51		
Reduktion Betriebsdauer				0.91			0.91				0.91			0.91		
Reduktion Windrichtung				0.67			0.68				0.69			0.69		
Gesamte Reduktion				0.14			0.19				0.26			0.32		
Met.wahrsch.Beschattung				1			85				65			118		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HX - IO232

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		05:27		06:17 (8)	06:20		06:47 (7)	07:13			07:10	08:04
	21:45		21:10	22	06:39 (8)	20:04	4	06:51 (7)	18:52			16:42	15:58
2	04:48		05:28		06:16 (8)	06:22			07:14		08:02 (3)	07:12	08:06
	21:44		21:08	23	06:39 (8)	20:02			18:49	9	08:11 (3)	16:40	15:57
3	04:49		05:30		06:16 (8)	06:24			07:16		07:59 (3)	07:14	08:07
	21:44		21:07	23	06:39 (8)	20:00			18:47	14	08:13 (3)	16:38	15:57
4	04:50		05:32		06:16 (8)	06:25			07:18		07:58 (3)	07:16	08:09
	21:44		21:05	24	06:40 (8)	19:57			18:44	16	08:14 (3)	16:36	15:56
5	04:51		05:33		06:15 (8)	06:27			07:20		07:57 (3)	07:18	08:10
	21:43		21:03	24	06:39 (8)	19:55			18:42	18	08:15 (3)	16:34	15:56
6	04:51		05:35		06:15 (8)	06:29			07:21		07:56 (3)	07:20	08:11
	21:42		21:01	25	06:40 (8)	19:53			18:40	19	08:15 (3)	16:32	15:55
7	04:52		05:37		06:15 (8)	06:30			07:23		07:56 (3)	07:21	08:13
	21:42		20:59	24	06:39 (8)	19:50			18:37	20	08:16 (3)	16:30	15:55
8	04:53		05:38		06:15 (8)	06:32			07:25		07:56 (3)	07:23	08:14
	21:41		20:57	24	06:39 (8)	19:48			18:35	19	08:15 (3)	16:29	15:54
9	04:54		05:40		06:15 (8)	06:34			07:27		07:55 (3)	07:25	08:15
	21:40		20:55	23	06:38 (8)	19:45			18:32	19	08:14 (3)	16:27	15:54
10	04:56		05:42		06:16 (8)	06:36			07:29		07:55 (3)	07:27	08:16
	21:39		20:53	22	06:38 (8)	19:43			18:30	18	08:13 (3)	16:25	15:54
11	04:57		05:43		06:17 (8)	06:37			07:31		07:57 (3)	07:29	08:18
	21:39		20:51	21	06:38 (8)	19:40			18:28	15	08:12 (3)	16:23	15:53
12	04:58		05:45		06:17 (8)	06:39		07:34 (4)	07:32		07:59 (3)	07:31	08:19
	21:38		20:49	19	06:36 (8)	19:38	10	07:44 (4)	18:25	12	08:11 (3)	16:22	15:53
13	04:59		05:47		06:18 (8)	06:41		07:31 (4)	07:34		08:01 (3)	07:33	08:20
	21:37		20:47	17	06:35 (8)	19:36	14	07:45 (4)	18:23	8	08:09 (3)	16:20	15:53
14	05:00		05:49		06:19 (8)	06:43		07:29 (4)	07:36			07:35	08:21
	21:36		20:45	14	06:33 (8)	19:33	18	07:47 (4)	18:21			16:19	15:53
15	05:01		05:50		06:21 (8)	06:44		07:28 (4)	07:38			07:37	08:22
	21:35		20:43	9	06:30 (8)	19:31	20	07:48 (4)	18:18			16:17	15:53
16	05:03		05:52			06:46		07:26 (4)	07:40			07:38	08:22
	21:34		20:41			19:28	21	07:47 (4)	18:16			16:16	15:53
17	05:04		05:54			06:48		07:26 (4)	07:42			07:40	08:23
	21:32		20:39			19:26	22	07:48 (4)	18:14			16:14	15:53
18	05:05		05:56			06:50		07:26 (4)	07:43			07:42	08:24
	21:31		20:36			19:23	22	07:48 (4)	18:12			16:13	15:53
19	05:07		05:57		06:48 (7)	06:51		07:25 (4)	07:45			07:44	08:25
	21:30		20:34	9	06:57 (7)	19:21	23	07:48 (4)	18:09			16:11	15:54
20	05:08		05:59		06:45 (7)	06:53		07:25 (4)	07:47			07:46	08:25
	21:29		20:32	13	06:58 (7)	19:18	22	07:47 (4)	18:07			16:10	15:54
21	05:10		06:01		06:44 (7)	06:55		07:25 (4)	07:49			07:47	08:26
	21:27		20:30	16	07:00 (7)	19:16	21	07:46 (4)	18:05			16:09	15:54
22	05:11		06:03		06:43 (7)	06:57		07:25 (4)	07:51			07:49	08:27
	21:26		20:28	18	07:01 (7)	19:14	20	07:45 (4)	18:03			16:07	15:55
23	05:12		06:04		06:42 (7)	06:58		07:25 (4)	07:53			07:51	08:27
	21:25		20:25	18	07:00 (7)	19:11	18	07:43 (4)	18:00			16:06	15:55
24	05:14		06:06		06:42 (7)	07:00		07:27 (4)	07:55			07:53	08:28
	21:23		20:23	19	07:01 (7)	19:09	15	07:42 (4)	17:58			16:05	15:56
25	05:15	06:27 (8)	06:08		06:41 (7)	07:02		07:29 (4)	06:57			07:54	08:28
	21:22	2 06:29 (8)	20:21	20	07:01 (7)	19:06	10	07:39 (4)	16:56			16:04	15:57
26	05:17	06:23 (8)	06:10		06:41 (7)	07:04			06:58			07:56	08:28
	21:20	9 06:32 (8)	20:18	19	07:00 (7)	19:04			16:54			16:03	15:57
27	05:19	06:21 (8)	06:11		06:41 (7)	07:05			07:00			07:58	08:29
	21:19	13 06:34 (8)	20:16	19	07:00 (7)	19:01			16:52			16:02	15:58
28	05:20	06:20 (8)	06:13		06:41 (7)	07:07			07:02			07:59	08:29
	21:17	16 06:36 (8)	20:14	19	07:00 (7)	18:59			16:50			16:01	15:59
29	05:22	06:18 (8)	06:15		06:42 (7)	07:09			07:04			08:01	08:29
	21:15	18 06:36 (8)	20:12	16	06:58 (7)	18:56			16:48			16:00	16:00
30	05:23	06:18 (8)	06:17		06:44 (7)	07:11			07:06			08:03	08:29
	21:14	20 06:38 (8)	20:09	13	06:57 (7)	18:54			16:46			15:59	16:01
31	05:25	06:17 (8)	06:18		06:46 (7)				07:08				08:29
	21:12	21 06:38 (8)	20:07	9	06:55 (7)				16:44				16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung		99		522			260			187			
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91		0.91			0.91			0.91			
Reduktion Windrichtung		0.69		0.69			0.69			0.67			
Gesamte Reduktion		0.28		0.31			0.25			0.20			
Met.wahrsch.Beschattung		28		159			66			37			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HY - IO233

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:29	07:59	07:03	07:27 (3) 06:48	05:40	06:08 (8) 04:51
	16:03	16:54	17:49 10	07:37 (3) 19:46	20:41 21	06:29 (8) 21:30
2	08:29	07:58	07:00	07:25 (3) 06:46	05:38	06:07 (8) 04:50
	16:04	16:56	17:51 14	07:39 (3) 19:48	20:43 22	06:29 (8) 21:31
3	08:29	07:56	06:58	07:22 (3) 06:43	05:36	06:08 (8) 04:49
	16:05	16:58	17:53 17	07:39 (3) 19:50	20:44 23	06:31 (8) 21:32
4	08:28	07:54	06:56	07:21 (3) 06:41	05:34	06:07 (8) 04:49
	16:07	17:00	17:54 19	07:40 (3) 19:52	20:46 24	06:31 (8) 21:34
5	08:28	07:52	06:53	07:20 (3) 06:39	05:32	06:07 (8) 04:48
	16:08	17:02	17:56 20	07:40 (3) 19:54	20:48 24	06:31 (8) 21:35
6	08:28	07:51	06:51	07:20 (3) 06:36	05:30	06:06 (8) 04:47
	16:09	17:04	17:58 20	07:40 (3) 19:55	20:50 24	06:30 (8) 21:36
7	08:27	07:49	06:49	07:21 (3) 06:34	05:28	06:06 (8) 04:46
	16:10	17:06	18:00 19	07:40 (3) 19:57	20:52 24	06:30 (8) 21:37
8	08:27	07:47	06:46	07:20 (3) 06:32	05:26	06:07 (8) 04:46
	16:12	17:08	18:02 19	07:39 (3) 19:59	20:53 24	06:31 (8) 21:38
9	08:26	07:45	06:44	07:21 (3) 06:29	05:24	06:07 (8) 04:45
	16:13	17:10	18:04 17	07:38 (3) 20:01	20:55 23	06:30 (8) 21:38
10	08:25	07:43	06:42	07:22 (3) 06:27	05:22	06:06 (8) 04:45
	16:15	17:12	18:06 14	07:36 (3) 20:03	20:57 23	06:29 (8) 21:39
11	08:25	07:41	06:39	07:24 (3) 06:24 06:48 (7)	05:21	06:07 (8) 04:44
	16:16	17:13	18:08 10	07:34 (3) 20:05 6 06:54 (7)	20:58 22	06:29 (8) 21:40
12	08:24	07:39	06:37	07:27 (3) 06:22 06:46 (7)	05:19	06:08 (8) 04:44
	16:18	17:15	18:10 2	07:29 (3) 20:06 10 06:56 (7)	21:00 21	06:29 (8) 21:41
13	08:23	07:37	06:34	06:20 06:43 (7)	05:17	06:08 (8) 04:44
	16:19	17:17	18:11	20:08 14 06:57 (7)	21:02 19	06:27 (8) 21:42
14	08:22	07:35	06:32	06:17 06:41 (7)	05:15	06:09 (8) 04:43
	16:21	17:19	18:13	20:10 17 06:58 (7)	21:04 18	06:27 (8) 21:42
15	08:22	07:33	06:30	06:15 06:40 (7)	05:14	06:10 (8) 04:43
	16:23	17:21	18:15	20:12 18 06:58 (7)	21:05 16	06:26 (8) 21:43
16	08:21	07:31	06:27	06:13 06:39 (7)	05:12	06:12 (8) 04:43
	16:24	17:23	18:17	20:14 20 06:59 (7)	21:07 13	06:25 (8) 21:43
17	08:20	07:29	06:25	06:10 06:38 (7)	05:11	06:13 (8) 04:43
	16:26	17:25	18:19	20:16 20 06:58 (7)	21:08 9	06:22 (8) 21:44
18	08:19	07:27	06:22	06:47 (4) 06:08 06:38 (7)	05:09	04:43
	16:28	17:27	18:21 10	06:57 (4) 20:17 20 06:58 (7)	21:10	21:44
19	08:17	07:25	06:20	06:44 (4) 06:06 06:38 (7)	05:07	04:43
	16:29	17:29	18:23 14	06:58 (4) 20:19 20 06:58 (7)	21:12	21:45
20	08:16	07:23	06:17	06:42 (4) 06:04 06:39 (7)	05:06	04:43
	16:31	17:31	18:24 18	07:00 (4) 20:21 18 06:57 (7)	21:13	21:45
21	08:15	07:20	06:15	06:40 (4) 06:01 06:40 (7)	05:04	04:43
	16:33	17:33	18:26 20	07:00 (4) 20:23 16 06:56 (7)	21:15	21:45
22	08:14	07:18	06:13	06:40 (4) 05:59 06:41 (7)	05:03	04:43
	16:35	17:35	18:28 21	07:01 (4) 20:25 14 06:55 (7)	21:16	21:45
23	08:13	07:16	06:10	06:40 (4) 05:57 06:41 (7)	05:02	04:44
	16:37	17:37	18:30 22	07:02 (4) 20:26 11 06:52 (7)	21:18	21:46
24	08:11	07:14	06:08	06:38 (4) 05:55 06:44 (7)	05:00	04:44
	16:38	17:39	18:32 23	07:01 (4) 20:28 6 06:50 (7)	21:19	21:46
25	08:10	07:12	06:05	06:39 (4) 05:53	04:59	04:44
	16:40	17:41	18:34 22	07:01 (4) 20:30	21:21	21:46
26	08:09	07:09	06:03	06:38 (4) 05:50	04:58	04:45
	16:42	17:43	18:35 22	07:00 (4) 20:32	21:22	21:46
27	08:07	07:07	06:00	06:39 (4) 05:48 06:16 (8)	04:57	04:45
	16:44	17:45	18:37 20	06:59 (4) 20:34 6 06:22 (8)	21:24	21:46
28	08:06	07:05 07:29 (3)	05:58	06:38 (4) 05:46 06:13 (8)	04:55	04:46
	16:46	17:47 6 07:35 (3)	18:39 20	06:58 (4) 20:35 12 06:25 (8)	21:25	21:46
29	08:04		06:56	07:40 (4) 05:44 06:11 (8)	04:54	04:46
	16:48		19:41 17	07:57 (4) 20:37 16 06:27 (8)	21:26	21:45
30	08:02		06:53	07:41 (4) 05:42 06:10 (8)	04:53	04:47
	16:50		19:43 14	07:55 (4) 20:39 18 06:28 (8)	21:28	21:45
31	08:01		06:51	07:43 (4)	04:52	
	16:52		19:45 9	07:52 (4)	21:29	
Sonnenscheinstunden	252	274	367	419	492	508
astr.max.mögl.Beschattung		6	433	262	350	
Red.Sonnenscheinwahrsch.		0.24	0.31	0.41	0.51	
Reduktion Betriebsdauer		0.91	0.91	0.91	0.91	
Reduktion Windrichtung		0.67	0.68	0.69	0.69	
Gesamte Reduktion		0.14	0.19	0.26	0.32	
Met.wahrsch.Beschattung		1	84	68	113	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HY - IO233

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		05:27		06:18 (8)	06:20		06:47 (7)	07:13			07:10	08:04
	21:45		21:10	21	06:39 (8)	20:04	6	06:53 (7)	18:52			16:42	15:58
2	04:48		05:28		06:17 (8)	06:22			07:14		08:03 (3)	07:12	08:06
	21:44		21:08	22	06:39 (8)	20:02			18:49	8	08:11 (3)	16:40	15:57
3	04:49		05:30		06:17 (8)	06:24			07:16		08:00 (3)	07:14	08:07
	21:44		21:07	23	06:40 (8)	20:00			18:47	13	08:13 (3)	16:38	15:57
4	04:50		05:32		06:17 (8)	06:25			07:18		07:59 (3)	07:16	08:09
	21:44		21:05	24	06:41 (8)	19:57			18:44	15	08:14 (3)	16:36	15:56
5	04:51		05:33		06:16 (8)	06:27			07:20		07:58 (3)	07:18	08:10
	21:43		21:03	24	06:40 (8)	19:55			18:42	17	08:15 (3)	16:34	15:56
6	04:51		05:35		06:16 (8)	06:29			07:21		07:57 (3)	07:20	08:11
	21:42		21:01	25	06:41 (8)	19:53			18:40	19	08:16 (3)	16:32	15:55
7	04:52		05:37		06:16 (8)	06:30			07:23		07:56 (3)	07:21	08:13
	21:42		20:59	24	06:40 (8)	19:50			18:37	20	08:16 (3)	16:30	15:55
8	04:53		05:38		06:16 (8)	06:32			07:25		07:56 (3)	07:23	08:14
	21:41		20:57	24	06:40 (8)	19:48			18:35	20	08:16 (3)	16:29	15:54
9	04:54		05:40		06:16 (8)	06:34			07:27		07:55 (3)	07:25	08:15
	21:40		20:55	23	06:39 (8)	19:45			18:32	19	08:14 (3)	16:27	15:54
10	04:56		05:42		06:16 (8)	06:36			07:29		07:56 (3)	07:27	08:16
	21:39		20:53	23	06:39 (8)	19:43			18:30	18	08:14 (3)	16:25	15:54
11	04:57		05:43		06:17 (8)	06:37			07:31		07:57 (3)	07:29	08:18
	21:39		20:51	22	06:39 (8)	19:40			18:28	16	08:13 (3)	16:23	15:53
12	04:58		05:45		06:17 (8)	06:39		07:36 (4)	07:32		07:59 (3)	07:31	08:19
	21:38		20:49	20	06:37 (8)	19:38	7	07:43 (4)	18:25	13	08:12 (3)	16:22	15:53
13	04:59		05:47		06:18 (8)	06:41		07:32 (4)	07:34		08:01 (3)	07:33	08:20
	21:37		20:47	18	06:36 (8)	19:36	13	07:45 (4)	18:23	9	08:10 (3)	16:20	15:53
14	05:00		05:49		06:19 (8)	06:43		07:30 (4)	07:36		08:03 (3)	07:35	08:21
	21:36		20:45	15	06:34 (8)	19:33	17	07:47 (4)	18:21	3	08:06 (3)	16:19	15:53
15	05:01		05:50		06:21 (8)	06:44		07:29 (4)	07:38			07:37	08:22
	21:35		20:43	11	06:32 (8)	19:31	19	07:48 (4)	18:18			16:17	15:53
16	05:03		05:52		06:25 (8)	06:46		07:27 (4)	07:40			07:38	08:22
	21:34		20:41	4	06:29 (8)	19:28	21	07:48 (4)	18:16			16:16	15:53
17	05:04		05:54			06:48		07:26 (4)	07:42			07:40	08:23
	21:32		20:39			19:26	22	07:48 (4)	18:14			16:14	15:53
18	05:05		05:56			06:50		07:26 (4)	07:43			07:42	08:24
	21:31		20:36			19:23	22	07:48 (4)	18:12			16:13	15:53
19	05:07		05:57		06:49 (7)	06:51		07:26 (4)	07:45			07:44	08:25
	21:30		20:34	8	06:57 (7)	19:21	22	07:48 (4)	18:09			16:11	15:54
20	05:08		05:59		06:46 (7)	06:53		07:25 (4)	07:47			07:46	08:25
	21:29		20:32	12	06:58 (7)	19:18	22	07:47 (4)	18:07			16:10	15:54
21	05:10		06:01		06:45 (7)	06:55		07:25 (4)	07:49			07:47	08:26
	21:27		20:30	15	07:00 (7)	19:16	22	07:47 (4)	18:05			16:09	15:54
22	05:11		06:03		06:44 (7)	06:57		07:26 (4)	07:51			07:49	08:27
	21:26		20:28	17	07:01 (7)	19:14	20	07:46 (4)	18:03			16:07	15:55
23	05:12		06:04		06:43 (7)	06:58		07:26 (4)	07:53			07:51	08:27
	21:25		20:25	18	07:01 (7)	19:11	18	07:44 (4)	18:00			16:06	15:55
24	05:14		06:06		06:42 (7)	07:00		07:27 (4)	07:55			07:53	08:28
	21:23		20:23	19	07:01 (7)	19:09	15	07:42 (4)	17:58			16:05	15:56
25	05:15		06:08		06:42 (7)	07:02		07:29 (4)	06:57			07:54	08:28
	21:22		20:21	20	07:02 (7)	19:06	11	07:40 (4)	16:56			16:04	15:57
26	05:17		06:10		06:41 (7)	07:04		07:33 (4)	06:58			07:56	08:28
	21:20	6	06:31 (8)	20:18	20	07:01 (7)	19:04	3	07:36 (4)	16:54		16:03	15:57
27	05:19		06:22 (8)	06:11		06:41 (7)	07:05			07:00		07:58	08:29
	21:19	11	06:33 (8)	20:16	20	07:01 (7)	19:01			16:52		16:02	15:58
28	05:20		06:21 (8)	06:13		06:42 (7)	07:07			07:02		07:59	08:29
	21:17	15	06:36 (8)	20:14	18	07:00 (7)	18:59			16:50		16:01	15:59
29	05:22		06:20 (8)	06:15		06:42 (7)	07:09			07:04		08:01	08:29
	21:15	16	06:36 (8)	20:12	17	06:59 (7)	18:56			16:48		16:00	16:00
30	05:23		06:19 (8)	06:17		06:44 (7)	07:11			07:06		08:03	08:29
	21:14	19	06:38 (8)	20:09	14	06:58 (7)	18:54			16:46		15:59	16:01
31	05:25		06:18 (8)	06:18		06:46 (7)				07:08			08:29
	21:12	20	06:38 (8)	20:07	10	06:56 (7)				16:44			16:02
Sonnenscheinstunden	510			459			382			329		260	235
astr.max.mögl.Beschattung		87			531			260			190		
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33		
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91		
Reduktion Windrichtung		0.69			0.69			0.69			0.67		
Gesamte Reduktion		0.28			0.31			0.25			0.20		
Met.wahrsch.Beschattung		24			162			66			38		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HZ - IO234

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar			März			April			Mai			Juni	
1	08:29	07:59			07:03			07:27 (3)	06:48		05:40			06:10 (8)	04:51
	16:03	16:54			17:49	17		07:44 (3)	19:46		20:41	22		06:32 (8)	21:30
2	08:29	07:58			07:00			07:26 (3)	06:46		05:38			06:09 (8)	04:50
	16:04	16:56			17:51	19		07:45 (3)	19:48		20:43	24		06:33 (8)	21:31
3	08:29	07:56			06:58			07:25 (3)	06:43		05:36			06:10 (8)	04:49
	16:05	16:58			17:53	19		07:44 (3)	19:50		20:44	24		06:34 (8)	21:32
4	08:28	07:54			06:56			07:25 (3)	06:41		05:34			06:09 (8)	04:49
	16:07	17:00			17:54	20		07:45 (3)	19:52		20:46	25		06:34 (8)	21:34
5	08:28	07:52			06:53			07:24 (3)	06:39		05:32			06:09 (8)	04:48
	16:08	17:02			17:56	20		07:44 (3)	19:54		20:48	25		06:34 (8)	21:35
6	08:28	07:51			06:51			07:25 (3)	06:36		05:30			06:08 (8)	04:47
	16:09	17:04			17:58	19		07:44 (3)	19:55		20:50	25		06:33 (8)	21:36
7	08:27	07:49			06:49			07:25 (3)	06:34		05:28			06:08 (8)	04:46
	16:10	17:06			18:00	18		07:43 (3)	19:57		20:52	25		06:33 (8)	21:37
8	08:27	07:47			06:46			07:26 (3)	06:32		05:26			06:08 (8)	04:46
	16:12	17:08			18:02	15		07:41 (3)	19:59		20:53	24		06:32 (8)	21:38
9	08:26	07:45			06:44			07:27 (3)	06:29		05:24			06:09 (8)	04:45
	16:13	17:10			18:04	13		07:40 (3)	20:01		20:55	24		06:33 (8)	21:38
10	08:25	07:43			06:42			07:29 (3)	06:27	06:50 (7)	05:22			06:09 (8)	04:45
	16:15	17:12			18:06	8		07:37 (3)	20:03	7 06:57 (7)	20:57	23		06:32 (8)	21:39
11	08:25	07:41			06:39				06:24	06:48 (7)	05:21			06:09 (8)	04:44
	16:16	17:13			18:08				20:05	11 06:59 (7)	20:58	22		06:31 (8)	21:40
12	08:24	07:39			06:37				06:22	06:46 (7)	05:19			06:11 (8)	04:44
	16:18	17:15			18:10				20:06	15 07:01 (7)	21:00	20		06:31 (8)	21:41
13	08:23	07:37			06:34				06:20	06:43 (7)	05:17			06:11 (8)	04:44
	16:19	17:17			18:11				20:08	18 07:01 (7)	21:02	19		06:30 (8)	21:42
14	08:22	07:35			06:32				06:17	06:42 (7)	05:15			06:12 (8)	04:43
	16:21	17:19			18:13				20:10	19 07:01 (7)	21:04	17		06:29 (8)	21:42
15	08:22	07:33			06:30				06:15	06:42 (7)	05:14			06:13 (8)	04:43
	16:23	17:21			18:15				20:12	20 07:02 (7)	21:05	14		06:27 (8)	21:43
16	08:21	07:31			06:27			06:53 (4)	06:13	06:42 (7)	05:12			06:15 (8)	04:43
	16:24	17:23			18:17	7		07:00 (4)	20:14	20 07:02 (7)	21:07	11		06:26 (8)	21:43
17	08:20	07:29			06:25			06:49 (4)	06:10	06:41 (7)	05:11			06:18 (8)	04:43
	16:26	17:25			18:19	14		07:03 (4)	20:16	20 07:01 (7)	21:08	5		06:23 (8)	21:44
18	08:19	07:27			06:22			06:47 (4)	06:08	06:41 (7)	05:09				04:43
	16:28	17:27			18:21	17		07:04 (4)	20:17	20 07:01 (7)	21:10				21:44
19	08:17	07:25			06:20			06:45 (4)	06:06	06:41 (7)	05:07				04:43
	16:29	17:29			18:23	20		07:05 (4)	20:19	19 07:00 (7)	21:12				21:45
20	08:16	07:23			06:17			06:45 (4)	06:04	06:42 (7)	05:06				04:43
	16:31	17:31			18:24	21		07:06 (4)	20:21	17 06:59 (7)	21:13				21:45
21	08:15	07:20			06:15			06:43 (4)	06:01	06:43 (7)	05:04				04:43
	16:33	17:33			18:26	22		07:05 (4)	20:23	15 06:58 (7)	21:15				21:45
22	08:14	07:18			06:13			06:43 (4)	05:59	06:44 (7)	05:03				04:43
	16:35	17:35			18:28	23		07:06 (4)	20:25	13 06:57 (7)	21:16				21:45
23	08:13	07:16			06:10			06:43 (4)	05:57	06:46 (7)	05:02				04:44
	16:37	17:37			18:30	23		07:06 (4)	20:26	7 06:53 (7)	21:18				21:46
24	08:11	07:14			06:08			06:43 (4)	05:55		05:00				04:44
	16:38	17:39			18:32	22		07:05 (4)	20:28		21:19				21:46
25	08:10	07:12			06:05			06:43 (4)	05:53		04:59				04:44
	16:40	17:41			18:34	22		07:05 (4)	20:30		21:21				21:46
26	08:09	07:09		07:34 (3)	06:03			06:43 (4)	05:50	06:19 (8)	04:58				04:45
	16:42	17:43	4	07:38 (3)	18:35	20		07:03 (4)	20:32	6 06:25 (8)	21:22				21:46
27	08:07	07:07		07:32 (3)	06:00			06:44 (4)	05:48	06:16 (8)	04:57				04:45
	16:44	17:45	10	07:42 (3)	18:37	18		07:02 (4)	20:34	12 06:28 (8)	21:24				21:46
28	08:06	07:05		07:29 (3)	05:58			06:44 (4)	05:46	06:14 (8)	04:55				04:46
	16:46	17:47	14	07:43 (3)	18:39	16		07:00 (4)	20:35	16 06:30 (8)	21:25				21:46
29	08:04				06:56			07:46 (4)	05:44	06:12 (8)	04:54				04:46
	16:48				19:41	12		07:58 (4)	20:37	19 06:31 (8)	21:26				21:45
30	08:02				06:53			07:50 (4)	05:42	06:11 (8)	04:53				04:47
	16:50				19:43	4		07:54 (4)	20:39	21 06:32 (8)	21:28				21:45
31	08:01				06:51						04:52				
	16:52				19:45						21:29				
Sonnenscheinstunden	252	274			367			419			492			508	
astr.max.mögl.Beschattung			28			429			295			349			
Red.Sonnenscheinwahrsch.			0.24			0.31			0.41			0.51			
Reduktion Betriebsdauer			0.91			0.91			0.91			0.91			
Reduktion Windrichtung			0.66			0.68			0.69			0.69			
Gesamte Reduktion			0.14			0.19			0.26			0.32			
Met.wahrsch.Beschattung			4			83			76			112			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** HZ - IO234

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		05:27		06:21 (8)	06:20		06:47 (7)	07:13			07:10	08:04
	21:45		21:10	21	06:42 (8)	20:04	11	06:58 (7)	18:52			16:42	15:58
2	04:48		05:28		06:19 (8)	06:22		06:49 (7)	07:14			07:12	08:06
	21:44		21:08	23	06:42 (8)	20:02	7	06:56 (7)	18:49			16:40	15:57
3	04:49		05:30		06:19 (8)	06:24			07:16		08:09 (3)	07:14	08:07
	21:44		21:07	24	06:43 (8)	20:00			18:47	4	08:13 (3)	16:38	15:57
4	04:50		05:32		06:18 (8)	06:25			07:18		08:05 (3)	07:16	08:09
	21:44		21:05	24	06:42 (8)	19:57			18:44	11	08:16 (3)	16:36	15:56
5	04:51		05:33		06:18 (8)	06:27			07:20		08:03 (3)	07:18	08:10
	21:43		21:03	25	06:43 (8)	19:55			18:42	15	08:18 (3)	16:34	15:56
6	04:51		05:35		06:19 (8)	06:29			07:21		08:02 (3)	07:20	08:11
	21:42		21:01	24	06:43 (8)	19:53			18:40	17	08:19 (3)	16:32	15:55
7	04:52		05:37		06:18 (8)	06:30			07:23		08:01 (3)	07:21	08:13
	21:42		20:59	25	06:43 (8)	19:50			18:37	19	08:20 (3)	16:30	15:55
8	04:53		05:38		06:18 (8)	06:32			07:25		08:00 (3)	07:23	08:14
	21:41		20:57	25	06:43 (8)	19:48			18:35	20	08:20 (3)	16:29	15:54
9	04:54		05:40		06:18 (8)	06:34			07:27		07:59 (3)	07:25	08:15
	21:40		20:55	24	06:42 (8)	19:45			18:32	20	08:19 (3)	16:27	15:54
10	04:56		05:42		06:18 (8)	06:36			07:29		07:59 (3)	07:27	08:16
	21:39		20:53	24	06:42 (8)	19:43			18:30	20	08:19 (3)	16:25	15:54
11	04:57		05:43		06:19 (8)	06:37			07:31		07:59 (3)	07:29	08:18
	21:39		20:51	23	06:42 (8)	19:40			18:28	19	08:18 (3)	16:23	15:53
12	04:58		05:45		06:19 (8)	06:39			07:32		08:00 (3)	07:31	08:19
	21:38		20:49	22	06:41 (8)	19:38			18:25	18	08:18 (3)	16:22	15:53
13	04:59		05:47		06:20 (8)	06:41			07:34		08:01 (3)	07:33	08:20
	21:37		20:47	20	06:40 (8)	19:36			18:23	16	08:17 (3)	16:20	15:53
14	05:00		05:49		06:20 (8)	06:43		07:37 (4)	07:36		08:03 (3)	07:35	08:21
	21:36		20:45	18	06:38 (8)	19:33	11	07:48 (4)	18:21	12	08:15 (3)	16:19	15:53
15	05:01		05:50		06:22 (8)	06:44		07:35 (4)	07:38		08:05 (3)	07:37	08:22
	21:35		20:43	15	06:37 (8)	19:31	15	07:50 (4)	18:18	8	08:13 (3)	16:17	15:53
16	05:03		05:52		06:24 (8)	06:46		07:32 (4)	07:40			07:38	08:22
	21:34		20:41	11	06:35 (8)	19:28	19	07:51 (4)	18:16			16:16	15:53
17	05:04		05:54		06:27 (8)	06:48		07:31 (4)	07:42			07:40	08:23
	21:32		20:39	3	06:30 (8)	19:26	21	07:52 (4)	18:14			16:14	15:53
18	05:05		05:56			06:50		07:31 (4)	07:43			07:42	08:24
	21:31		20:36			19:23	21	07:52 (4)	18:12			16:13	15:53
19	05:07		05:57			06:51		07:30 (4)	07:45			07:44	08:25
	21:30		20:34			19:21	23	07:53 (4)	18:09			16:11	15:54
20	05:08		05:59		06:51 (7)	06:53		07:29 (4)	07:47			07:46	08:25
	21:29		20:32	8	06:59 (7)	19:18	23	07:52 (4)	18:07			16:10	15:54
21	05:10		06:01		06:49 (7)	06:55		07:29 (4)	07:49			07:47	08:26
	21:27		20:30	12	07:01 (7)	19:16	23	07:52 (4)	18:05			16:09	15:54
22	05:11		06:03		06:48 (7)	06:57		07:29 (4)	07:51			07:49	08:27
	21:26		20:28	15	07:03 (7)	19:14	22	07:51 (4)	18:03			16:07	15:55
23	05:12		06:04		06:46 (7)	06:58		07:28 (4)	07:53			07:51	08:27
	21:25		20:25	17	07:03 (7)	19:11	22	07:50 (4)	18:00			16:06	15:55
24	05:14		06:06		06:45 (7)	07:00		07:29 (4)	07:55			07:53	08:28
	21:23		20:23	19	07:04 (7)	19:09	20	07:49 (4)	17:58			16:05	15:56
25	05:15		06:08		06:45 (7)	07:02		07:30 (4)	06:57			07:54	08:28
	21:22		20:21	19	07:04 (7)	19:06	18	07:48 (4)	16:56			16:04	15:57
26	05:17		06:10		06:44 (7)	07:04		07:31 (4)	06:58			07:56	08:28
	21:20		20:18	20	07:04 (7)	19:04	15	07:46 (4)	16:54			16:03	15:57
27	05:19	06:26 (8)	06:11		06:44 (7)	07:05		07:33 (4)	07:00			07:58	08:29
	21:19	9 06:35 (8)	20:16	20	07:04 (7)	19:01	10	07:43 (4)	16:52			16:02	15:58
28	05:20	06:25 (8)	06:13		06:44 (7)	07:07			07:02			07:59	08:29
	21:17	12 06:37 (8)	20:14	20	07:04 (7)	18:59			16:50			16:01	15:59
29	05:22	06:23 (8)	06:15		06:43 (7)	07:09			07:04			08:01	08:29
	21:15	15 06:38 (8)	20:12	19	07:02 (7)	18:56			16:48			16:00	16:00
30	05:23	06:22 (8)	06:17		06:44 (7)	07:11			07:06			08:03	08:29
	21:14	18 06:40 (8)	20:09	18	07:02 (7)	18:54			16:46			15:59	16:01
31	05:25	06:21 (8)	06:18		06:46 (7)				07:08				08:29
	21:12	19 06:40 (8)	20:07	15	07:01 (7)				16:44				16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung		73		553			281			199			
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91		0.91			0.91			0.91			
Reduktion Windrichtung		0.69		0.69			0.69			0.66			
Gesamte Reduktion		0.28		0.31			0.25			0.20			
Met.wahrsch.Beschattung		20		169			71			39			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IA - IO235

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar			März			April			Mai			Juni	
1	08:29	07:59			07:03			07:27 (3)	06:48		05:40			06:12 (8)	04:51
	16:03	16:54			17:49	18		07:45 (3)	19:46		20:41	23		06:35 (8)	21:30
2	08:29	07:58			07:00			07:27 (3)	06:46		05:38			06:11 (8)	04:50
	16:04	16:56			17:51	19		07:46 (3)	19:48		20:43	24		06:35 (8)	21:31
3	08:29	07:56			06:58			07:26 (3)	06:43		05:36			06:12 (8)	04:49
	16:05	16:58			17:53	19		07:45 (3)	19:50		20:44	24		06:36 (8)	21:32
4	08:28	07:54			06:56			07:26 (3)	06:41		05:34			06:11 (8)	04:49
	16:07	17:00			17:54	19		07:45 (3)	19:52		20:46	25		06:36 (8)	21:34
5	08:28	07:52			06:53			07:25 (3)	06:39		05:32			06:11 (8)	04:48
	16:08	17:02			17:56	19		07:44 (3)	19:54		20:48	25		06:36 (8)	21:35
6	08:28	07:51			06:51			07:26 (3)	06:36		05:30			06:11 (8)	04:47
	16:09	17:04			17:58	18		07:44 (3)	19:55		20:50	24		06:35 (8)	21:36
7	08:27	07:49			06:49			07:27 (3)	06:34		05:28			06:11 (8)	04:46
	16:10	17:06			18:00	17		07:44 (3)	19:57		20:52	24		06:35 (8)	21:37
8	08:27	07:47			06:46			07:27 (3)	06:32		05:26			06:11 (8)	04:46
	16:12	17:08			18:02	15		07:42 (3)	19:59		20:53	23		06:34 (8)	21:38
9	08:26	07:45			06:44			07:29 (3)	06:29		05:24			06:12 (8)	04:45
	16:13	17:10			18:04	11		07:40 (3)	20:01	5	06:58 (7)	20:55	22	06:34 (8)	21:38
10	08:25	07:43			06:42			07:33 (3)	06:27		06:50 (7)	05:22		06:12 (8)	04:45
	16:15	17:12			18:06	1		07:34 (3)	20:03	10	07:00 (7)	20:57	21	06:33 (8)	21:39
11	08:25	07:41			06:39				06:24		06:48 (7)	05:21		06:13 (8)	04:44
	16:16	17:13			18:08				20:05	14	07:02 (7)	20:58	19	06:32 (8)	21:40
12	08:24	07:39			06:37				06:22		06:46 (7)	05:19		06:14 (8)	04:44
	16:18	17:15			18:10				20:06	17	07:03 (7)	21:00	18	06:32 (8)	21:41
13	08:23	07:37			06:34				06:20		06:44 (7)	05:17		06:15 (8)	04:44
	16:19	17:17			18:11				20:08	19	07:03 (7)	21:02	15	06:30 (8)	21:42
14	08:22	07:35			06:32				06:17		06:44 (7)	05:15		06:17 (8)	04:43
	16:21	17:19			18:13				20:10	19	07:03 (7)	21:04	12	06:29 (8)	21:42
15	08:22	07:33			06:30			06:57 (4)	06:15		06:43 (7)	05:14		06:19 (8)	04:43
	16:23	17:21			18:15	2		06:59 (4)	20:12	20	07:03 (7)	21:05	7	06:26 (8)	21:43
16	08:21	07:31			06:27			06:52 (4)	06:13		06:43 (7)	05:12			04:43
	16:24	17:23			18:17	12		07:04 (4)	20:14	20	07:03 (7)	21:07			21:43
17	08:20	07:29			06:25			06:49 (4)	06:10		06:43 (7)	05:11			04:43
	16:26	17:25			18:19	16		07:05 (4)	20:16	19	07:02 (7)	21:09			21:44
18	08:19	07:27			06:22			06:48 (4)	06:08		06:43 (7)	05:09			04:43
	16:28	17:27			18:21	19		07:07 (4)	20:17	19	07:02 (7)	21:10			21:44
19	08:17	07:25			06:20			06:46 (4)	06:06		06:44 (7)	05:07			04:43
	16:29	17:29			18:23	21		07:07 (4)	20:19	17	07:01 (7)	21:12			21:45
20	08:16	07:23			06:17			06:46 (4)	06:04		06:45 (7)	05:06			04:43
	16:31	17:31			18:24	21		07:07 (4)	20:21	15	07:00 (7)	21:13			21:45
21	08:15	07:20			06:15			06:44 (4)	06:01		06:46 (7)	05:04			04:43
	16:33	17:33			18:26	23		07:07 (4)	20:23	12	06:58 (7)	21:15			21:45
22	08:14	07:18			06:13			06:44 (4)	05:59		06:48 (7)	05:03			04:43
	16:35	17:35			18:28	23		07:07 (4)	20:25	8	06:56 (7)	21:16			21:45
23	08:13	07:16			06:10			06:45 (4)	05:57			05:02			04:44
	16:37	17:37			18:30	22		07:07 (4)	20:26			21:18			21:46
24	08:11	07:14			06:08			06:44 (4)	05:55			05:00			04:44
	16:38	17:39			18:32	22		07:06 (4)	20:28			21:19			21:46
25	08:10	07:12			06:05			06:45 (4)	05:53		06:21 (8)	04:59			04:44
	16:40	17:41			18:34	21		07:06 (4)	20:30	7	06:28 (8)	21:21			21:46
26	08:09	07:09		07:34 (3)	06:03			06:45 (4)	05:50		06:18 (8)	04:58			04:45
	16:42	17:43	7	07:41 (3)	18:35	19		07:04 (4)	20:32	13	06:31 (8)	21:22			21:46
27	08:07	07:07		07:32 (3)	06:00			06:46 (4)	05:48		06:16 (8)	04:57			04:45
	16:44	17:45	11	07:43 (3)	18:37	17		07:03 (4)	20:34	16	06:32 (8)	21:24			21:46
28	08:06	07:05		07:29 (3)	05:58			06:47 (4)	05:46		06:14 (8)	04:55			04:46
	16:46	17:47	15	07:44 (3)	18:39	13		07:00 (4)	20:35	19	06:33 (8)	21:25			21:46
29	08:04				06:56			07:50 (4)	05:44		06:13 (8)	04:54			04:46
	16:48				19:41	7		07:57 (4)	20:37	21	06:34 (8)	21:26			21:45
30	08:02				06:53				05:42		06:12 (8)	04:53			04:47
	16:50				19:43				20:39	23	06:35 (8)	21:28			21:45
31	08:01				06:51							04:52			
	16:52				19:45							21:29			
Sonnenscheinstunden		252	274		367				419			492			508
astr.max.mögl.Beschattung			33			414			313			306			
Red.Sonnenscheinwahrsch.			0.24			0.31			0.41			0.51			
Reduktion Betriebsdauer			0.91			0.91			0.91			0.91			
Reduktion Windrichtung			0.66			0.68			0.69			0.69			
Gesamte Reduktion			0.14			0.19			0.26			0.32			
Met.wahrsch.Beschattung			5			80			81			98			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IA - IO235

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47			05:27		06:24 (8)	06:20		06:47 (7)	07:13		07:10	08:04
	21:45			21:10	18	06:42 (8)	20:04	14	07:01 (7)	18:52		16:42	15:58
2	04:48			05:28		06:23 (8)	06:22		06:49 (7)	07:14		07:12	08:06
	21:44			21:08	20	06:43 (8)	20:02	10	06:59 (7)	18:49		16:40	15:57
3	04:49			05:30		06:22 (8)	06:24		06:51 (7)	07:16		07:14	08:07
	21:44			21:07	22	06:44 (8)	20:00	5	06:56 (7)	18:47		16:38	15:57
4	04:50			05:32		06:22 (8)	06:25			07:18		08:07 (3)	07:16	08:09
	21:44			21:05	23	06:45 (8)	19:57			18:44	9	08:16 (3)	16:36	15:56
5	04:51			05:33		06:21 (8)	06:27			07:20		08:05 (3)	07:18	08:10
	21:43			21:03	24	06:45 (8)	19:55			18:42	13	08:18 (3)	16:34	15:56
6	04:51			05:35		06:21 (8)	06:29			07:21		08:03 (3)	07:20	08:11
	21:42			21:01	24	06:45 (8)	19:53			18:40	16	08:19 (3)	16:32	15:55
7	04:52			05:37		06:20 (8)	06:30			07:23		08:02 (3)	07:21	08:13
	21:42			20:59	25	06:45 (8)	19:50			18:37	18	08:20 (3)	16:30	15:55
8	04:53			05:38		06:20 (8)	06:32			07:25		08:02 (3)	07:23	08:14
	21:41			20:57	25	06:45 (8)	19:48			18:35	18	08:20 (3)	16:29	15:54
9	04:54			05:40		06:20 (8)	06:34			07:27		08:00 (3)	07:25	08:15
	21:40			20:55	24	06:44 (8)	19:45			18:32	19	08:19 (3)	16:27	15:54
10	04:56			05:42		06:20 (8)	06:36			07:29		08:00 (3)	07:27	08:16
	21:40			20:53	25	06:45 (8)	19:43			18:30	19	08:19 (3)	16:25	15:54
11	04:57			05:43		06:21 (8)	06:37			07:31		08:00 (3)	07:29	08:18
	21:39			20:51	24	06:45 (8)	19:40			18:28	19	08:19 (3)	16:23	15:53
12	04:58			05:45		06:20 (8)	06:39			07:32		08:00 (3)	07:31	08:19
	21:38			20:49	23	06:43 (8)	19:38			18:25	19	08:19 (3)	16:22	15:53
13	04:59			05:47		06:21 (8)	06:41			07:34		08:01 (3)	07:33	08:20
	21:37			20:47	22	06:43 (8)	19:36			18:23	17	08:18 (3)	16:20	15:53
14	05:00			05:49		06:21 (8)	06:43		07:41 (4)	07:36		08:03 (3)	07:35	08:21
	21:36			20:45	21	06:42 (8)	19:33	5	07:46 (4)	18:21	13	08:16 (3)	16:19	15:53
15	05:01			05:50		06:22 (8)	06:44		07:38 (4)	07:38		08:05 (3)	07:37	08:22
	21:35			20:43	19	06:41 (8)	19:31	12	07:50 (4)	18:18	10	08:15 (3)	16:17	15:53
16	05:03			05:52		06:24 (8)	06:46		07:35 (4)	07:40	4	08:07 (3)	07:38	08:22
	21:34			20:41	16	06:40 (8)	19:28	16	07:51 (4)	18:16	4	08:11 (3)	16:16	15:53
17	05:04			05:54		06:25 (8)	06:48		07:33 (4)	07:42			07:40	08:23
	21:32			20:39	12	06:37 (8)	19:26	19	07:52 (4)	18:14			16:14	15:53
18	05:05			05:56		06:28 (8)	06:50		07:32 (4)	07:43			07:42	08:24
	21:31			20:36	6	06:34 (8)	19:23	21	07:53 (4)	18:12			16:13	15:53
19	05:07			05:57			06:51		07:32 (4)	07:45			07:44	08:25
	21:30			20:34			19:21	21	07:53 (4)	18:09			16:11	15:54
20	05:08			05:59			06:53		07:30 (4)	07:47			07:46	08:25
	21:29			20:32			19:18	23	07:53 (4)	18:07			16:10	15:54
21	05:10			06:01		06:52 (7)	06:55		07:30 (4)	07:49			07:47	08:26
	21:27			20:30	9	07:01 (7)	19:16	23	07:53 (4)	18:05			16:09	15:54
22	05:11			06:03		06:50 (7)	06:57		07:30 (4)	07:51			07:49	08:27
	21:26			20:28	13	07:03 (7)	19:14	23	07:53 (4)	18:03			16:07	15:55
23	05:12			06:04		06:48 (7)	06:58		07:29 (4)	07:53			07:51	08:27
	21:25			20:25	16	07:04 (7)	19:11	22	07:51 (4)	18:00			16:06	15:55
24	05:14			06:06		06:47 (7)	07:00		07:30 (4)	07:55			07:53	08:28
	21:23			20:23	18	07:05 (7)	19:09	20	07:50 (4)	17:58			16:05	15:56
25	05:15			06:08		06:47 (7)	07:02		07:30 (4)	06:57			07:54	08:28
	21:22			20:21	18	07:05 (7)	19:06	20	07:50 (4)	16:56			16:04	15:57
26	05:17			06:10		06:45 (7)	07:04		07:31 (4)	06:58			07:56	08:28
	21:20			20:18	20	07:05 (7)	19:04	17	07:48 (4)	16:54			16:03	15:57
27	05:19			06:11		06:45 (7)	07:05		07:33 (4)	07:00			07:58	08:29
	21:19			20:16	20	07:05 (7)	19:01	13	07:46 (4)	16:52			16:02	15:58
28	05:20			06:13		06:45 (7)	07:07		07:35 (4)	07:02			07:59	08:29
	21:17			20:14	20	07:05 (7)	18:59	7	07:42 (4)	16:50			16:01	15:59
29	05:22		06:28 (8)	06:15		06:45 (7)	07:09			07:04			08:01	08:29
	21:15	9	06:37 (8)	20:12	19	07:04 (7)	18:56			16:48			16:00	16:00
30	05:23		06:27 (8)	06:17		06:45 (7)	07:11			07:06			08:03	08:29
	21:14	13	06:40 (8)	20:09	19	07:04 (7)	18:54			16:46			15:59	16:01
31	05:25		06:25 (8)	06:18		06:46 (7)				07:08				08:29
	21:12	16	06:41 (8)	20:07	17	07:03 (7)				16:44				16:02
Sonnenscheinstunden	510			459			382			329			260	235
astr.max.mögl.Beschattung		38			562			291			194			
Red.Sonnenscheinwahrsch.		0.45			0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91			0.91			0.91			0.91			
Reduktion Windrichtung		0.69			0.69			0.69			0.66			
Gesamte Reduktion		0.28			0.31			0.25			0.20			
Met.wahrsch.Beschattung		11			172			74			38			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IB - IO236

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar			März			April			Mai			Juni	
1	08:29		07:59			07:03			07:27 (3)	06:48		05:40			06:10 (8)	04:51
	16:03		16:54			17:49	12		07:39 (3)	19:46		20:41	22		06:32 (8)	21:30
2	08:29		07:58			07:00			07:25 (3)	06:46		05:38			06:09 (8)	04:50
	16:04		16:56			17:51	16		07:41 (3)	19:48		20:43	23		06:32 (8)	21:31
3	08:29		07:56			06:58			07:23 (3)	06:43		05:36			06:10 (8)	04:49
	16:05		16:58			17:53	18		07:41 (3)	19:50		20:44	23		06:33 (8)	21:32
4	08:28		07:54			06:56			07:22 (3)	06:41		05:34			06:09 (8)	04:49
	16:07		17:00			17:54	19		07:41 (3)	19:52		20:46	24		06:33 (8)	21:34
5	08:28		07:52			06:53			07:21 (3)	06:39		05:32			06:09 (8)	04:48
	16:08		17:02			17:56	20		07:41 (3)	19:54		20:48	24		06:33 (8)	21:35
6	08:28		07:51			06:51			07:22 (3)	06:36		05:30			06:09 (8)	04:47
	16:09		17:04			17:58	19		07:41 (3)	19:55		20:50	24		06:33 (8)	21:36
7	08:27		07:49			06:49			07:22 (3)	06:34		05:28			06:09 (8)	04:46
	16:10		17:06			18:00	19		07:41 (3)	19:57		20:52	23		06:32 (8)	21:37
8	08:27		07:47			06:46			07:22 (3)	06:32		05:26			06:10 (8)	04:46
	16:12		17:08			18:02	17		07:39 (3)	19:59		20:53	23		06:33 (8)	21:38
9	08:26		07:45			06:44			07:23 (3)	06:29		05:24			06:10 (8)	04:45
	16:13		17:10			18:04	15		07:38 (3)	20:01		20:55	22		06:32 (8)	21:38
10	08:25		07:43			06:42			07:24 (3)	06:27	06:50 (7)	05:22			06:10 (8)	04:45
	16:15		17:12			18:06	12		07:36 (3)	20:03	5 06:55 (7)	20:57	21		06:31 (8)	21:39
11	08:25		07:41			06:39			07:27 (3)	06:24	06:48 (7)	05:21			06:10 (8)	04:44
	16:16		17:13			18:08	6		07:33 (3)	20:05	10 06:58 (7)	20:58	20		06:30 (8)	21:40
12	08:24		07:39			06:37				06:22	06:46 (7)	05:19			06:12 (8)	04:44
	16:18		17:15			18:10				20:06	14 07:00 (7)	21:00	18		06:30 (8)	21:41
13	08:23		07:37			06:34				06:20	06:43 (7)	05:17			06:12 (8)	04:44
	16:19		17:17			18:11				20:08	17 07:00 (7)	21:02	16		06:28 (8)	21:42
14	08:22		07:35			06:32				06:17	06:42 (7)	05:15			06:14 (8)	04:43
	16:21		17:19			18:13				20:10	18 07:00 (7)	21:04	13		06:27 (8)	21:42
15	08:22		07:33			06:30				06:15	06:41 (7)	05:14			06:15 (8)	04:43
	16:23		17:21			18:15				20:12	20 07:01 (7)	21:05	10		06:25 (8)	21:43
16	08:21		07:31			06:27				06:13	06:41 (7)	05:12				04:43
	16:24		17:23			18:17				20:14	20 07:01 (7)	21:07				21:43
17	08:20		07:29			06:25			06:49 (4)	06:10	06:40 (7)	05:11				04:43
	16:26		17:25			18:19	8		06:57 (4)	20:16	20 07:00 (7)	21:09				21:44
18	08:19		07:27			06:22			06:47 (4)	06:08	06:40 (7)	05:09				04:43
	16:28		17:27			18:21	13		07:00 (4)	20:17	19 06:59 (7)	21:10				21:44
19	08:17		07:25			06:20			06:44 (4)	06:06	06:41 (7)	05:07				04:43
	16:29		17:29			18:23	17		07:01 (4)	20:19	18 06:59 (7)	21:12				21:45
20	08:16		07:23			06:17			06:43 (4)	06:04	06:42 (7)	05:06				04:43
	16:31		17:31			18:24	19		07:02 (4)	20:21	16 06:58 (7)	21:13				21:45
21	08:15		07:20			06:15			06:41 (4)	06:01	06:43 (7)	05:04				04:43
	16:33		17:33			18:26	21		07:02 (4)	20:23	14 06:57 (7)	21:15				21:45
22	08:14		07:18			06:13			06:41 (4)	05:59	06:44 (7)	05:03				04:43
	16:35		17:35			18:28	22		07:03 (4)	20:25	11 06:55 (7)	21:16				21:45
23	08:13		07:16			06:10			06:41 (4)	05:57	06:46 (7)	05:02				04:44
	16:37		17:37			18:30	22		07:03 (4)	20:26	5 06:51 (7)	21:18				21:46
24	08:11		07:14			06:08			06:40 (4)	05:55		05:00				04:44
	16:38		17:39			18:32	22		07:02 (4)	20:28		21:19				21:46
25	08:10		07:12			06:05			06:41 (4)	05:53		04:59				04:44
	16:40		17:41			18:34	21		07:02 (4)	20:30		21:21				21:46
26	08:09		07:09			06:03			06:40 (4)	05:50	06:17 (8)	04:58				04:45
	16:42		17:43			18:35	21		07:01 (4)	20:32	9 06:26 (8)	21:22				21:46
27	08:07		07:07		07:32 (3)	06:00			06:41 (4)	05:48	06:15 (8)	04:57				04:45
	16:44		17:45	2	07:34 (3)	18:37	19		07:00 (4)	20:34	14 06:29 (8)	21:24				21:46
28	08:06		07:05		07:29 (3)	05:58			06:41 (4)	05:46	06:13 (8)	04:55				04:46
	16:46		17:47	8	07:37 (3)	18:39	17		06:58 (4)	20:35	17 06:30 (8)	21:25				21:46
29	08:04					06:56			07:43 (4)	05:44	06:12 (8)	04:54				04:46
	16:48					19:41	14		07:57 (4)	20:37	19 06:31 (8)	21:26				21:45
30	08:03					06:53			07:45 (4)	05:42	06:11 (8)	04:53				04:47
	16:50					19:43	9		07:54 (4)	20:39	21 06:32 (8)	21:28				21:45
31	08:01					06:51						04:52				
	16:52					19:45						21:29				
Sonnenscheinstunden	252		274			367				419		492				508
astr.max.mögl.Beschattung				10			418				287		306			
Red.Sonnenscheinwahrsch.				0.24			0.31				0.41		0.51			
Reduktion Betriebsdauer				0.91			0.91				0.91		0.91			
Reduktion Windrichtung				0.66			0.68				0.69		0.69			
Gesamte Reduktion				0.14			0.19				0.26		0.32			
Met.wahrsch.Beschattung				1			81				74		98			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)	
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)	

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IB - IO236

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		05:27		06:22 (8)	06:20		06:47 (7)	07:13			07:10	08:04
	21:45		21:10	18	06:40 (8)	20:04	10	06:57 (7)	18:52			16:42	15:58
2	04:48		05:28		06:20 (8)	06:22		06:49 (7)	07:14			07:12	08:06
	21:44		21:08	21	06:41 (8)	20:02	5	06:54 (7)	18:49			16:40	15:57
3	04:49		05:30		06:20 (8)	06:24			07:16		08:03 (3)	07:14	08:07
	21:44		21:07	22	06:42 (8)	20:00			18:47	10	08:13 (3)	16:38	15:57
4	04:50		05:32		06:20 (8)	06:25			07:18		08:01 (3)	07:16	08:09
	21:44		21:05	22	06:42 (8)	19:57			18:44	14	08:15 (3)	16:36	15:56
5	04:51		05:33		06:19 (8)	06:27			07:20		07:59 (3)	07:18	08:10
	21:43		21:03	23	06:42 (8)	19:55			18:42	17	08:16 (3)	16:34	15:56
6	04:51		05:35		06:19 (8)	06:29			07:21		07:58 (3)	07:20	08:11
	21:42		21:01	24	06:43 (8)	19:53			18:40	18	08:16 (3)	16:32	15:55
7	04:52		05:37		06:18 (8)	06:30			07:23		07:58 (3)	07:21	08:13
	21:42		20:59	24	06:42 (8)	19:50			18:37	19	08:17 (3)	16:30	15:55
8	04:53		05:38		06:18 (8)	06:32			07:25		07:57 (3)	07:23	08:14
	21:41		20:57	25	06:43 (8)	19:48			18:35	20	08:17 (3)	16:29	15:54
9	04:54		05:40		06:18 (8)	06:34			07:27		07:56 (3)	07:25	08:15
	21:40		20:55	24	06:42 (8)	19:45			18:32	20	08:16 (3)	16:27	15:54
10	04:56		05:42		06:18 (8)	06:36			07:29		07:57 (3)	07:27	08:16
	21:40		20:53	24	06:42 (8)	19:43			18:30	18	08:15 (3)	16:25	15:54
11	04:57		05:43		06:19 (8)	06:37			07:31		07:57 (3)	07:29	08:18
	21:39		20:51	23	06:42 (8)	19:40			18:28	17	08:14 (3)	16:23	15:53
12	04:58		05:45		06:19 (8)	06:39			07:32		07:59 (3)	07:31	08:19
	21:38		20:49	22	06:41 (8)	19:38			18:25	14	08:13 (3)	16:22	15:53
13	04:59		05:47		06:20 (8)	06:41		07:36 (4)	07:34		08:01 (3)	07:33	08:20
	21:37		20:47	20	06:40 (8)	19:36	8	07:44 (4)	18:23	11	08:12 (3)	16:20	15:53
14	05:00		05:49		06:20 (8)	06:43		07:33 (4)	07:36		08:03 (3)	07:35	08:21
	21:36		20:45	18	06:38 (8)	19:33	14	07:47 (4)	18:21	6	08:09 (3)	16:19	15:53
15	05:01		05:50		06:21 (8)	06:44		07:32 (4)	07:38			07:37	08:22
	21:35		20:43	16	06:37 (8)	19:31	16	07:48 (4)	18:18			16:17	15:53
16	05:03		05:52		06:23 (8)	06:46		07:30 (4)	07:40			07:38	08:22
	21:34		20:41	13	06:36 (8)	19:28	18	07:48 (4)	18:16			16:16	15:53
17	05:04		05:54		06:25 (8)	06:48		07:29 (4)	07:42			07:40	08:23
	21:32		20:39	7	06:32 (8)	19:26	20	07:49 (4)	18:14			16:14	15:53
18	05:05		05:56			06:50		07:28 (4)	07:43			07:42	08:24
	21:31		20:36			19:23	22	07:50 (4)	18:12			16:13	15:53
19	05:07		05:57			06:51		07:28 (4)	07:45			07:44	08:25
	21:30		20:34			19:21	22	07:50 (4)	18:09			16:11	15:54
20	05:08		05:59		06:51 (7)	06:53		07:27 (4)	07:47			07:46	08:25
	21:29		20:32	7	06:58 (7)	19:18	22	07:49 (4)	18:07			16:10	15:54
21	05:10		06:01		06:48 (7)	06:55		07:27 (4)	07:49			07:47	08:26
	21:27		20:30	12	07:00 (7)	19:16	22	07:49 (4)	18:05			16:09	15:54
22	05:11		06:03		06:47 (7)	06:57		07:27 (4)	07:51			07:49	08:27
	21:26		20:28	15	07:02 (7)	19:14	21	07:48 (4)	18:03			16:07	15:55
23	05:12		06:04		06:45 (7)	06:58		07:26 (4)	07:53			07:51	08:27
	21:25		20:25	17	07:02 (7)	19:11	20	07:46 (4)	18:00			16:06	15:55
24	05:14		06:06		06:45 (7)	07:00		07:27 (4)	07:55			07:53	08:28
	21:23		20:23	18	07:03 (7)	19:09	18	07:45 (4)	17:58			16:05	15:56
25	05:15		06:08		06:44 (7)	07:02		07:29 (4)	06:57			07:54	08:28
	21:22		20:21	19	07:03 (7)	19:06	15	07:44 (4)	16:56			16:04	15:57
26	05:17		06:10		06:43 (7)	07:04		07:31 (4)	06:58			07:56	08:28
	21:20		20:18	20	07:03 (7)	19:04	10	07:41 (4)	16:54			16:03	15:57
27	05:19		06:11		06:43 (7)	07:05			07:00			07:58	08:29
	21:19		20:16	20	07:03 (7)	19:01			16:52			16:02	15:58
28	05:20	06:28 (8)	06:13		06:43 (7)	07:07			07:02			07:59	08:29
	21:17	6 06:34 (8)	20:14	19	07:02 (7)	18:59			16:50			16:01	15:59
29	05:22	06:25 (8)	06:15		06:43 (7)	07:09			07:04			08:01	08:29
	21:15	11 06:36 (8)	20:12	18	07:01 (7)	18:56			16:48			16:00	16:00
30	05:23	06:24 (8)	06:17		06:44 (7)	07:11			07:06			08:03	08:29
	21:14	14 06:38 (8)	20:09	16	07:00 (7)	18:54			16:46			15:59	16:01
31	05:25	06:22 (8)	06:18		06:46 (7)				07:08				08:29
	21:12	17 06:39 (8)	20:07	13	06:59 (7)				16:44				16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung		48		540			263			184			
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91		0.91			0.91			0.91			
Reduktion Windrichtung		0.69		0.69			0.69			0.66			
Gesamte Reduktion		0.28		0.31			0.25			0.20			
Met.wahrsch.Beschattung		13		165			67			36			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IC - IO237

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar			März			April			Mai			Juni	
1	08:29		07:59			07:03			07:27 (3)	06:48		05:40			06:11 (8)	04:51
	16:03		16:54			17:49	13		07:40 (3)	19:46		20:41	23		06:34 (8)	21:30
2	08:29		07:58			07:00			07:25 (3)	06:46		05:38			06:10 (8)	04:50
	16:04		16:56			17:51	16		07:41 (3)	19:48		20:43	24		06:34 (8)	21:31
3	08:29		07:56			06:58			07:23 (3)	06:43		05:36			06:11 (8)	04:49
	16:05		16:58			17:53	18		07:41 (3)	19:50		20:44	24		06:35 (8)	21:32
4	08:28		07:54			06:56			07:23 (3)	06:41		05:34			06:11 (8)	04:49
	16:07		17:00			17:54	19		07:42 (3)	19:52		20:46	24		06:35 (8)	21:34
5	08:28		07:52			06:53			07:22 (3)	06:39		05:32			06:10 (8)	04:48
	16:08		17:02			17:56	19		07:41 (3)	19:54		20:48	24		06:34 (8)	21:35
6	08:28		07:51			06:51			07:22 (3)	06:36		05:30			06:10 (8)	04:47
	16:09		17:04			17:58	19		07:41 (3)	19:55		20:50	24		06:34 (8)	21:36
7	08:27		07:49			06:49			07:23 (3)	06:34		05:28			06:10 (8)	04:46
	16:10		17:06			18:00	18		07:41 (3)	19:57		20:52	23		06:33 (8)	21:37
8	08:27		07:47			06:46			07:23 (3)	06:32		05:26			06:11 (8)	04:46
	16:12		17:08			18:02	16		07:39 (3)	19:59		20:53	22		06:33 (8)	21:38
9	08:26		07:45			06:44			07:24 (3)	06:29		05:24			06:11 (8)	04:45
	16:13		17:10			18:04	14		07:38 (3)	20:01		20:55	22		06:33 (8)	21:38
10	08:25		07:43			06:42			07:25 (3)	06:27	06:50 (7)	05:22			06:12 (8)	04:45
	16:15		17:12			18:06	11		07:36 (3)	20:03	8 06:58 (7)	20:57	20		06:32 (8)	21:39
11	08:25		07:41			06:39			07:29 (3)	06:24	06:48 (7)	05:21			06:12 (8)	04:44
	16:16		17:13			18:08	3		07:32 (3)	20:05	12 07:00 (7)	20:58	18		06:30 (8)	21:40
12	08:24		07:39			06:37				06:22	06:46 (7)	05:19			06:14 (8)	04:44
	16:18		17:15			18:10				20:06	15 07:01 (7)	21:00	16		06:30 (8)	21:41
13	08:23		07:37			06:34				06:20	06:43 (7)	05:17			06:15 (8)	04:44
	16:19		17:17			18:11				20:08	18 07:01 (7)	21:02	13		06:28 (8)	21:42
14	08:22		07:35			06:32				06:17	06:43 (7)	05:15			06:17 (8)	04:43
	16:21		17:19			18:13				20:10	18 07:01 (7)	21:04	10		06:27 (8)	21:42
15	08:22		07:33			06:30				06:15	06:42 (7)	05:14			06:21 (8)	04:43
	16:23		17:21			18:15				20:12	20 07:02 (7)	21:05	1		06:22 (8)	21:43
16	08:21		07:31			06:27				06:13	06:42 (7)	05:12				04:43
	16:24		17:23			18:17				20:14	20 07:02 (7)	21:07				21:43
17	08:20		07:29			06:25			06:49 (4)	06:10	06:41 (7)	05:11				04:43
	16:26		17:25			18:19	11		07:00 (4)	20:16	19 07:00 (7)	21:09				21:44
18	08:19		07:27			06:22			06:47 (4)	06:08	06:42 (7)	05:09				04:43
	16:28		17:27			18:21	15		07:02 (4)	20:17	18 07:00 (7)	21:10				21:44
19	08:17		07:25			06:20			06:44 (4)	06:06	06:42 (7)	05:07				04:43
	16:29		17:29			18:23	18		07:02 (4)	20:19	17 06:59 (7)	21:12				21:45
20	08:16		07:23			06:17			06:44 (4)	06:04	06:43 (7)	05:06				04:43
	16:31		17:31			18:24	19		07:03 (4)	20:21	15 06:58 (7)	21:13				21:45
21	08:15		07:20			06:15			06:42 (4)	06:01	06:44 (7)	05:04				04:43
	16:33		17:33			18:26	21		07:03 (4)	20:23	13 06:57 (7)	21:15				21:45
22	08:14		07:18			06:13			06:42 (4)	05:59	06:46 (7)	05:03				04:43
	16:35		17:35			18:28	22		07:04 (4)	20:25	9 06:55 (7)	21:16				21:45
23	08:13		07:16			06:10			06:42 (4)	05:57		05:02				04:44
	16:37		17:37			18:30	22		07:04 (4)	20:26		21:18				21:46
24	08:11		07:14			06:08			06:41 (4)	05:55		05:00				04:44
	16:38		17:39			18:32	22		07:03 (4)	20:28		21:19				21:46
25	08:10		07:12			06:05			06:42 (4)	05:53	06:20 (8)	04:59				04:44
	16:40		17:41			18:34	21		07:03 (4)	20:30	6 06:26 (8)	21:21				21:46
26	08:09		07:09			06:03			06:41 (4)	05:50	06:17 (8)	04:58				04:45
	16:42		17:43			18:35	20		07:01 (4)	20:32	12 06:29 (8)	21:22				21:46
27	08:07		07:07		07:32 (3)	06:00			06:42 (4)	05:48	06:15 (8)	04:57				04:45
	16:44		17:45	4	07:36 (3)	18:37	19		07:01 (4)	20:34	16 06:31 (8)	21:24				21:46
28	08:06		07:05		07:29 (3)	05:58			06:43 (4)	05:46	06:14 (8)	04:55				04:46
	16:46		17:47	9	07:38 (3)	18:39	15		06:58 (4)	20:35	18 06:32 (8)	21:25				21:46
29	08:04					06:56			07:45 (4)	05:44	06:12 (8)	04:54				04:46
	16:48					19:41	12		07:57 (4)	20:37	21 06:33 (8)	21:26				21:45
30	08:03					06:53			07:49 (4)	05:42	06:12 (8)	04:53				04:47
	16:50					19:43	4		07:53 (4)	20:39	21 06:33 (8)	21:28				21:45
31	08:01					06:51						04:52				
	16:52					19:45						21:29				
Sonnenscheinstunden	252		274			367				419		492				508
astr.max.mögl.Beschattung				13			407				296		288			
Red.Sonnenscheinwahrsch.				0.24			0.31				0.41		0.51			
Reduktion Betriebsdauer				0.91			0.91				0.91		0.91			
Reduktion Windrichtung				0.66			0.68				0.69		0.69			
Gesamte Reduktion				0.14			0.19				0.26		0.32			
Met.wahrsch.Beschattung				2			79				76		93			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IC - IO237

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		05:27		06:24 (8)	06:20		06:47 (7)	07:13			07:10	08:04
	21:45		21:10	17	06:41 (8)	20:04	12	06:59 (7)	18:52			16:42	15:58
2	04:48		05:28		06:22 (8)	06:22		06:49 (7)	07:14			07:12	08:06
	21:44		21:08	19	06:41 (8)	20:02	8	06:57 (7)	18:49			16:40	15:57
3	04:49		05:30		06:22 (8)	06:24			07:16		08:04 (3)	07:14	08:07
	21:44		21:07	20	06:42 (8)	20:00			18:47	9	08:13 (3)	16:38	15:57
4	04:50		05:32		06:22 (8)	06:25			07:18		08:02 (3)	07:16	08:09
	21:44		21:05	21	06:43 (8)	19:57			18:44	13	08:15 (3)	16:36	15:56
5	04:51		05:33		06:20 (8)	06:27			07:20		08:00 (3)	07:18	08:10
	21:43		21:03	23	06:43 (8)	19:55			18:42	16	08:16 (3)	16:34	15:56
6	04:51		05:35		06:20 (8)	06:29			07:21		07:59 (3)	07:20	08:11
	21:42		21:01	24	06:44 (8)	19:53			18:40	18	08:17 (3)	16:32	15:55
7	04:52		05:37		06:20 (8)	06:30			07:23		07:59 (3)	07:21	08:13
	21:42		20:59	23	06:43 (8)	19:50			18:37	18	08:17 (3)	16:30	15:55
8	04:53		05:38		06:20 (8)	06:32			07:25		07:58 (3)	07:23	08:14
	21:41		20:57	24	06:44 (8)	19:48			18:35	19	08:17 (3)	16:29	15:54
9	04:54		05:40		06:19 (8)	06:34			07:27		07:57 (3)	07:25	08:15
	21:40		20:55	24	06:43 (8)	19:45			18:32	19	08:16 (3)	16:27	15:54
10	04:56		05:42		06:19 (8)	06:36			07:29		07:57 (3)	07:27	08:16
	21:40		20:53	24	06:43 (8)	19:43			18:30	19	08:16 (3)	16:25	15:54
11	04:57		05:43		06:20 (8)	06:37			07:31		07:57 (3)	07:29	08:18
	21:39		20:51	23	06:43 (8)	19:40			18:28	18	08:15 (3)	16:23	15:53
12	04:58		05:45		06:20 (8)	06:39			07:32		07:59 (3)	07:31	08:19
	21:38		20:49	22	06:42 (8)	19:38			18:25	15	08:14 (3)	16:22	15:53
13	04:59		05:47		06:20 (8)	06:41			07:34		08:01 (3)	07:33	08:20
	21:37		20:47	22	06:42 (8)	19:36			18:23	12	08:13 (3)	16:20	15:53
14	05:00		05:49		06:20 (8)	06:43		07:35 (4)	07:36		08:03 (3)	07:35	08:21
	21:36		20:45	20	06:40 (8)	19:33	11	07:46 (4)	18:21	8	08:11 (3)	16:19	15:53
15	05:01		05:50		06:21 (8)	06:44		07:33 (4)	07:38			07:37	08:22
	21:35		20:43	18	06:39 (8)	19:31	15	07:48 (4)	18:18			16:17	15:53
16	05:03		05:52		06:23 (8)	06:46		07:31 (4)	07:40			07:38	08:22
	21:34		20:41	15	06:38 (8)	19:28	18	07:49 (4)	18:16			16:16	15:53
17	05:04		05:54		06:24 (8)	06:48		07:30 (4)	07:42			07:40	08:23
	21:32		20:39	11	06:35 (8)	19:26	20	07:50 (4)	18:14			16:14	15:53
18	05:05		05:56		06:28 (8)	06:50		07:29 (4)	07:43			07:42	08:24
	21:31		20:36	3	06:31 (8)	19:23	21	07:50 (4)	18:12			16:13	15:53
19	05:07		05:57			06:51		07:29 (4)	07:45			07:44	08:25
	21:30		20:34			19:21	21	07:50 (4)	18:09			16:11	15:54
20	05:08		05:59			06:53		07:27 (4)	07:47			07:46	08:26
	21:29		20:32			19:18	23	07:50 (4)	18:07			16:10	15:54
21	05:10		06:01		06:50 (7)	06:55		07:27 (4)	07:49			07:47	08:26
	21:27		20:30	10	07:00 (7)	19:16	22	07:49 (4)	18:05			16:09	15:54
22	05:11		06:03		06:49 (7)	06:57		07:28 (4)	07:51			07:49	08:27
	21:26		20:28	13	07:02 (7)	19:14	21	07:49 (4)	18:03			16:07	15:55
23	05:12		06:04		06:47 (7)	06:58		07:27 (4)	07:53			07:51	08:27
	21:25		20:25	15	07:02 (7)	19:11	20	07:47 (4)	18:00			16:06	15:55
24	05:14		06:06		06:46 (7)	07:00		07:28 (4)	07:55			07:53	08:28
	21:23		20:23	17	07:03 (7)	19:09	18	07:46 (4)	17:58			16:05	15:56
25	05:15		06:08		06:45 (7)	07:02		07:29 (4)	06:57			07:54	08:28
	21:22		20:21	19	07:04 (7)	19:06	16	07:45 (4)	16:56			16:04	15:57
26	05:17		06:10		06:44 (7)	07:04		07:31 (4)	06:58			07:56	08:28
	21:20		20:18	19	07:03 (7)	19:04	12	07:43 (4)	16:54			16:03	15:57
27	05:19		06:11		06:44 (7)	07:05		07:34 (4)	07:00			07:58	08:29
	21:19		20:16	19	07:03 (7)	19:01	6	07:40 (4)	16:52			16:02	15:58
28	05:20		06:13		06:44 (7)	07:07			07:02			07:59	08:29
	21:17		20:14	19	07:03 (7)	18:59			16:50			16:01	15:59
29	05:22	06:29 (8)	06:15		06:43 (7)	07:09			07:04			08:01	08:29
	21:15	6 06:35 (8)	20:12	19	07:02 (7)	18:56			16:48			16:00	16:00
30	05:23	06:27 (8)	06:17		06:44 (7)	07:11			07:06			08:03	08:29
	21:14	11 06:38 (8)	20:09	18	07:02 (7)	18:54			16:46			15:59	16:01
31	05:25	06:24 (8)	06:18		06:46 (7)				07:08				08:29
	21:12	15 06:39 (8)	20:07	15	07:01 (7)				16:44				16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung		32		536			264			184			
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91		0.91			0.91			0.91			
Reduktion Windrichtung		0.69		0.69			0.69			0.66			
Gesamte Reduktion		0.28		0.31			0.25			0.20			
Met.wahrsch.Beschattung		9		164			67			36			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** ID - IO238

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar			März			April			Mai			Juni	
1	08:29	07:59			07:03		07:27 (3)	06:48			05:40		06:13 (8)	04:51	
	16:03	16:54			17:49	15	07:42 (3)	19:46			20:41	23	06:36 (8)	21:30	
2	08:29	07:58			07:00		07:25 (3)	06:46			05:38		06:12 (8)	04:50	
	16:04	16:56			17:51	18	07:43 (3)	19:48			20:43	24	06:36 (8)	21:31	
3	08:29	07:56			06:58		07:24 (3)	06:43			05:36		06:13 (8)	04:49	
	16:05	16:58			17:53	19	07:43 (3)	19:50			20:44	24	06:37 (8)	21:32	
4	08:28	07:54			06:56		07:24 (3)	06:41			05:34		06:13 (8)	04:49	
	16:07	17:00			17:54	19	07:43 (3)	19:52			20:46	24	06:37 (8)	21:34	
5	08:28	07:52			06:53		07:23 (3)	06:39			05:32		06:13 (8)	04:48	
	16:08	17:02			17:56	19	07:42 (3)	19:54			20:48	23	06:36 (8)	21:35	
6	08:28	07:51			06:51		07:24 (3)	06:36			05:30		06:13 (8)	04:47	
	16:09	17:04			17:58	18	07:42 (3)	19:55			20:50	23	06:36 (8)	21:36	
7	08:27	07:49			06:49		07:24 (3)	06:34			05:28		06:13 (8)	04:46	
	16:10	17:06			18:00	18	07:42 (3)	19:57			20:52	22	06:35 (8)	21:37	
8	08:27	07:47			06:46		07:25 (3)	06:32			05:26		06:15 (8)	04:46	
	16:12	17:08			18:02	15	07:40 (3)	19:59			20:53	20	06:35 (8)	21:38	
9	08:26	07:45			06:44		07:26 (3)	06:29		06:53 (7)	05:24		06:15 (8)	04:45	
	16:13	17:10			18:04	13	07:39 (3)	20:01	7	07:00 (7)	20:55	19	06:34 (8)	21:38	
10	08:25	07:43			06:42		07:28 (3)	06:27		06:50 (7)	05:22		06:16 (8)	04:45	
	16:15	17:12			18:06	7	07:35 (3)	20:03	11	07:01 (7)	20:57	16	06:32 (8)	21:39	
11	08:25	07:41			06:39			06:24		06:48 (7)	05:21		06:16 (8)	04:44	
	16:16	17:13			18:08			20:05	15	07:03 (7)	20:58	15	06:31 (8)	21:40	
12	08:24	07:39			06:37			06:22		06:46 (7)	05:19		06:19 (8)	04:44	
	16:18	17:15			18:10			20:06	17	07:03 (7)	21:00	10	06:29 (8)	21:41	
13	08:23	07:37			06:34			06:20		06:44 (7)	05:17		06:21 (8)	04:44	
	16:19	17:17			18:11			20:08	19	07:03 (7)	21:02	5	06:26 (8)	21:42	
14	08:22	07:35			06:32			06:17		06:44 (7)	05:15			04:43	
	16:21	17:19			18:13			20:10	19	07:03 (7)	21:04			21:42	
15	08:22	07:33			06:30			06:15		06:44 (7)	05:14			04:43	
	16:23	17:21			18:15			20:12	19	07:03 (7)	21:05			21:43	
16	08:21	07:31			06:27		06:52 (4)	06:13		06:44 (7)	05:12			04:43	
	16:24	17:23			18:17	9	07:01 (4)	20:14	19	07:03 (7)	21:07			21:43	
17	08:20	07:29			06:25		06:48 (4)	06:10		06:43 (7)	05:11			04:43	
	16:26	17:25			18:19	15	07:03 (4)	20:16	19	07:02 (7)	21:09			21:44	
18	08:19	07:27			06:22		06:47 (4)	06:08		06:44 (7)	05:09			04:43	
	16:28	17:27			18:21	18	07:05 (4)	20:17	17	07:01 (7)	21:10			21:44	
19	08:17	07:25			06:20		06:45 (4)	06:06		06:45 (7)	05:07			04:43	
	16:29	17:29			18:23	20	07:05 (4)	20:19	15	07:00 (7)	21:12			21:45	
20	08:16	07:23			06:17		06:45 (4)	06:04		06:46 (7)	05:06			04:43	
	16:31	17:31			18:24	21	07:06 (4)	20:21	13	06:59 (7)	21:13			21:45	
21	08:15	07:20			06:15		06:43 (4)	06:01		06:48 (7)	05:04			04:43	
	16:33	17:33			18:26	22	07:05 (4)	20:23	9	06:57 (7)	21:15			21:45	
22	08:14	07:18			06:13		06:43 (4)	05:59			05:03			04:43	
	16:35	17:35			18:28	22	07:05 (4)	20:25			21:16			21:45	
23	08:13	07:16			06:10		06:44 (4)	05:57			05:02			04:44	
	16:37	17:37			18:30	21	07:05 (4)	20:26			21:18			21:46	
24	08:11	07:14			06:08		06:43 (4)	05:55		06:22 (8)	05:00			04:44	
	16:38	17:39			18:32	21	07:04 (4)	20:28	8	06:30 (8)	21:19			21:46	
25	08:10	07:12			06:05		06:44 (4)	05:53		06:19 (8)	04:59			04:44	
	16:40	17:41			18:34	20	07:04 (4)	20:30	13	06:32 (8)	21:21			21:46	
26	08:09	07:09			06:03		06:44 (4)	05:50		06:17 (8)	04:58			04:45	
	16:42	17:43			18:35	18	07:02 (4)	20:32	17	06:34 (8)	21:22			21:46	
27	08:07	07:07		07:32 (3)	06:00		06:45 (4)	05:48		06:16 (8)	04:57			04:45	
	16:44	17:45	7	07:39 (3)	18:37	16	07:01 (4)	20:34	19	06:35 (8)	21:24			21:46	
28	08:06	07:05		07:29 (3)	05:58		06:46 (4)	05:46		06:15 (8)	04:55			04:46	
	16:46	17:47	12	07:41 (3)	18:39	12	06:58 (4)	20:35	21	06:36 (8)	21:25			21:46	
29	08:04				06:56		07:50 (4)	05:44		06:14 (8)	04:54			04:46	
	16:48				19:41	5	07:55 (4)	20:37	22	06:36 (8)	21:26			21:45	
30	08:03				06:53			05:42		06:13 (8)	04:53			04:47	
	16:50				19:43			20:39	23	06:36 (8)	21:28			21:45	
31	08:01				06:51						04:52				
	16:52				19:45						21:29				
Sonnenscheinstunden		252	274		367			419			492			508	
astr.max.mögl.Beschattung			19			401			322			248			
Red.Sonnenscheinwahrsch.			0.24			0.31			0.41			0.51			
Reduktion Betriebsdauer			0.91			0.91			0.91			0.91			
Reduktion Windrichtung			0.66			0.68			0.69			0.69			
Gesamte Reduktion			0.14			0.19			0.26			0.32			
Met.wahrsch.Beschattung			3			78			83			80			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** ID - IO238

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli			August			September			Oktober			November	Dezember
1	04:47		05:27		06:28 (8)	06:20		06:47 (7)	07:13			07:10	08:04
	21:45		21:10	13	06:41 (8)	20:04	15	07:02 (7)	18:52			16:42	15:58
2	04:48		05:28		06:26 (8)	06:22		06:49 (7)	07:14			07:12	08:06
	21:44		21:08	16	06:42 (8)	20:02	11	07:00 (7)	18:49			16:40	15:57
3	04:49		05:30		06:26 (8)	06:24		06:51 (7)	07:16		08:09 (3)	07:14	08:07
	21:44		21:07	17	06:43 (8)	20:00	7	06:58 (7)	18:47	1	08:10 (3)	16:38	15:57
4	04:50		05:32		06:25 (8)	06:25			07:18		08:04 (3)	07:16	08:09
	21:44		21:05	19	06:44 (8)	19:57			18:44	11	08:15 (3)	16:36	15:56
5	04:51		05:33		06:24 (8)	06:27			07:20		08:02 (3)	07:18	08:10
	21:43		21:03	21	06:45 (8)	19:55			18:42	14	08:16 (3)	16:34	15:56
6	04:51		05:35		06:24 (8)	06:29			07:21		08:01 (3)	07:20	08:11
	21:42		21:01	21	06:45 (8)	19:53			18:40	16	08:17 (3)	16:32	15:55
7	04:52		05:37		06:22 (8)	06:30			07:23		08:00 (3)	07:21	08:13
	21:42		20:59	23	06:45 (8)	19:50			18:37	18	08:18 (3)	16:30	15:55
8	04:53		05:38		06:22 (8)	06:32			07:25		07:59 (3)	07:23	08:14
	21:41		20:57	24	06:46 (8)	19:48			18:35	19	08:18 (3)	16:29	15:54
9	04:54		05:40		06:21 (8)	06:34			07:27		07:58 (3)	07:25	08:15
	21:40		20:55	24	06:45 (8)	19:45			18:32	19	08:17 (3)	16:27	15:54
10	04:56		05:42		06:22 (8)	06:36			07:29		07:58 (3)	07:27	08:16
	21:40		20:53	24	06:46 (8)	19:43			18:30	19	08:17 (3)	16:25	15:54
11	04:57		05:43		06:22 (8)	06:37			07:31		07:58 (3)	07:29	08:18
	21:39		20:51	24	06:46 (8)	19:40			18:28	18	08:16 (3)	16:23	15:53
12	04:58		05:45		06:21 (8)	06:39			07:32		07:59 (3)	07:31	08:19
	21:38		20:49	24	06:45 (8)	19:38			18:25	17	08:16 (3)	16:22	15:53
13	04:59		05:47		06:22 (8)	06:41			07:34		08:01 (3)	07:33	08:20
	21:37		20:47	23	06:45 (8)	19:36			18:23	14	08:15 (3)	16:20	15:53
14	05:00		05:49		06:22 (8)	06:43		07:41 (4)	07:36		08:03 (3)	07:35	08:21
	21:36		20:45	21	06:43 (8)	19:33	3	07:44 (4)	18:21	10	08:13 (3)	16:19	15:53
15	05:01		05:50		06:23 (8)	06:44		07:37 (4)	07:38		08:05 (3)	07:37	08:22
	21:35		20:43	20	06:43 (8)	19:31	11	07:48 (4)	18:18	5	08:10 (3)	16:17	15:53
16	05:03		05:52		06:24 (8)	06:46		07:34 (4)	07:40			07:38	08:22
	21:34		20:41	18	06:42 (8)	19:28	15	07:49 (4)	18:16			16:16	15:53
17	05:04		05:54		06:24 (8)	06:48		07:32 (4)	07:42			07:40	08:23
	21:32		20:39	16	06:40 (8)	19:26	18	07:50 (4)	18:14			16:14	15:53
18	05:05		05:56		06:26 (8)	06:50		07:31 (4)	07:43			07:42	08:24
	21:31		20:36	13	06:39 (8)	19:23	20	07:51 (4)	18:12			16:13	15:53
19	05:07		05:57		06:29 (8)	06:51		07:31 (4)	07:45			07:44	08:25
	21:30		20:34	7	06:36 (8)	19:21	21	07:52 (4)	18:09			16:11	15:54
20	05:08		05:59			06:53		07:29 (4)	07:47			07:46	08:26
	21:29		20:32			19:18	22	07:51 (4)	18:07			16:10	15:54
21	05:10		06:01			06:55		07:29 (4)	07:49			07:47	08:26
	21:27		20:30			19:16	22	07:51 (4)	18:05			16:09	15:54
22	05:11		06:03		06:52 (7)	06:57		07:29 (4)	07:51			07:49	08:27
	21:26		20:28	10	07:02 (7)	19:14	22	07:51 (4)	18:03			16:07	15:55
23	05:12		06:04		06:50 (7)	06:58		07:28 (4)	07:53			07:51	08:27
	21:25		20:25	13	07:03 (7)	19:11	21	07:49 (4)	18:00			16:06	15:55
24	05:14		06:06		06:48 (7)	07:00		07:29 (4)	07:55			07:53	08:28
	21:23		20:23	16	07:04 (7)	19:09	20	07:49 (4)	17:58			16:05	15:56
25	05:15		06:08		06:48 (7)	07:02		07:29 (4)	06:57			07:54	08:28
	21:22		20:21	17	07:05 (7)	19:06	19	07:48 (4)	16:56			16:04	15:57
26	05:17		06:10		06:46 (7)	07:04		07:31 (4)	06:58			07:56	08:28
	21:20		20:18	19	07:05 (7)	19:04	15	07:46 (4)	16:54			16:03	15:57
27	05:19		06:11		06:46 (7)	07:05		07:32 (4)	07:00			07:58	08:29
	21:19		20:16	19	07:05 (7)	19:01	12	07:44 (4)	16:52			16:02	15:58
28	05:20		06:13		06:46 (7)	07:07		07:36 (4)	07:02			07:59	08:29
	21:17		20:14	19	07:05 (7)	18:59	3	07:39 (4)	16:50			16:01	15:59
29	05:22		06:15		06:45 (7)	07:09			07:04			08:01	08:29
	21:15		20:12	19	07:04 (7)	18:56			16:48			16:00	16:00
30	05:23		06:17		06:45 (7)	07:11			07:06			08:03	08:29
	21:14		20:09	19	07:04 (7)	18:54			16:46			15:59	16:01
31	05:25	06:30 (8)	06:18		06:46 (7)				07:08				08:29
	21:12	8 06:38 (8)	20:07	17	07:03 (7)				16:44				16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung		8		536			277			181			
Red.Sonnenscheinwahrsch.		0.45		0.49			0.40			0.33			
Reduktion Betriebsdauer		0.91		0.91			0.91			0.91			
Reduktion Windrichtung		0.69		0.69			0.69			0.66			
Gesamte Reduktion		0.28		0.31			0.25			0.20			
Met.wahrsch.Beschattung		2		164			70			36			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IE - IO239

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar			März			April			Mai			Juni	
1	08:29		07:59			07:03			07:27 (3)	06:48		05:40			06:14 (8)	04:51
	16:03		16:54			17:49	16		07:43 (3)	19:46		20:41	24		06:38 (8)	21:30
2	08:29		07:58			07:00			07:26 (3)	06:46		05:38			06:14 (8)	04:50
	16:04		16:56			17:51	17		07:43 (3)	19:48		20:43	23		06:37 (8)	21:31
3	08:29		07:56			06:58			07:24 (3)	06:43		05:36			06:14 (8)	04:49
	16:05		16:58			17:53	19		07:43 (3)	19:50		20:44	24		06:38 (8)	21:32
4	08:28		07:54			06:56			07:24 (3)	06:41		05:34			06:14 (8)	04:49
	16:07		17:00			17:54	19		07:43 (3)	19:52		20:46	24		06:38 (8)	21:34
5	08:28		07:52			06:53			07:24 (3)	06:39		05:32			06:14 (8)	04:48
	16:08		17:02			17:56	19		07:43 (3)	19:54		20:48	23		06:37 (8)	21:35
6	08:28		07:51			06:51			07:24 (3)	06:36		05:30			06:15 (8)	04:47
	16:09		17:04			17:58	18		07:42 (3)	19:55		20:50	21		06:36 (8)	21:36
7	08:27		07:49			06:49			07:25 (3)	06:34		05:28			06:15 (8)	04:46
	16:10		17:06			18:00	17		07:42 (3)	19:57		20:52	20		06:35 (8)	21:37
8	08:27		07:47			06:46			07:25 (3)	06:32	06:55 (7)	05:26			06:16 (8)	04:46
	16:12		17:08			18:02	15		07:40 (3)	19:59	3 06:58 (7)	20:53	19		06:35 (8)	21:38
9	08:26		07:45			06:44			07:27 (3)	06:29	06:53 (7)	05:24			06:17 (8)	04:45
	16:13		17:10			18:04	11		07:38 (3)	20:01	9 07:02 (7)	20:55	17		06:34 (8)	21:38
10	08:25		07:43			06:42			07:30 (3)	06:27	06:50 (7)	05:22			06:18 (8)	04:45
	16:15		17:12			18:06	4		07:34 (3)	20:03	13 07:03 (7)	20:57	14		06:32 (8)	21:39
11	08:25		07:41			06:39				06:24	06:48 (7)	05:21			06:19 (8)	04:44
	16:16		17:13			18:08				20:05	16 07:04 (7)	20:58	11		06:30 (8)	21:40
12	08:24		07:39			06:37				06:22	06:47 (7)	05:19			06:22 (8)	04:44
	16:18		17:15			18:10				20:06	17 07:04 (7)	21:00	6		06:28 (8)	21:41
13	08:23		07:37			06:34				06:20	06:45 (7)	05:17				04:44
	16:19		17:17			18:11				20:08	19 07:04 (7)	21:02				21:42
14	08:22		07:35			06:32				06:17	06:45 (7)	05:15				04:43
	16:21		17:19			18:13				20:10	19 07:04 (7)	21:04				21:42
15	08:22		07:33			06:30			06:56 (4)	06:15	06:45 (7)	05:14				04:43
	16:23		17:21			18:15	2		06:58 (4)	20:12	19 07:04 (7)	21:05				21:43
16	08:21		07:31			06:27			06:51 (4)	06:13	06:45 (7)	05:12				04:43
	16:24		17:23			18:17	12		07:03 (4)	20:14	19 07:04 (7)	21:07				21:43
17	08:20		07:29			06:25			06:49 (4)	06:10	06:45 (7)	05:11				04:43
	16:26		17:25			18:19	15		07:04 (4)	20:16	17 07:02 (7)	21:09				21:44
18	08:19		07:27			06:22			06:47 (4)	06:08	06:45 (7)	05:09				04:43
	16:28		17:27			18:21	19		07:06 (4)	20:17	17 07:02 (7)	21:10				21:44
19	08:17		07:25			06:20			06:46 (4)	06:06	06:46 (7)	05:07				04:43
	16:29		17:29			18:23	20		07:06 (4)	20:19	14 07:00 (7)	21:12				21:45
20	08:16		07:23			06:17			06:45 (4)	06:04	06:48 (7)	05:06				04:43
	16:31		17:31			18:24	21		07:06 (4)	20:21	11 06:59 (7)	21:13				21:45
21	08:15		07:20			06:15			06:44 (4)	06:01	06:51 (7)	05:04				04:43
	16:33		17:33			18:26	22		07:06 (4)	20:23	5 06:56 (7)	21:15				21:45
22	08:14		07:18			06:13			06:44 (4)	05:59		05:03				04:43
	16:35		17:35			18:28	22		07:06 (4)	20:25		21:16				21:45
23	08:13		07:16			06:10			06:44 (4)	05:57	06:25 (8)	05:02				04:44
	16:37		17:37			18:30	22		07:06 (4)	20:26	4 06:29 (8)	21:18				21:46
24	08:11		07:14			06:08			06:44 (4)	05:55	06:21 (8)	05:00				04:44
	16:38		17:39			18:32	21		07:05 (4)	20:28	12 06:33 (8)	21:19				21:46
25	08:10		07:12			06:05			06:45 (4)	05:53	06:19 (8)	04:59				04:44
	16:40		17:41			18:34	19		07:04 (4)	20:30	15 06:34 (8)	21:21				21:46
26	08:09		07:09		07:34 (3)	06:03			06:45 (4)	05:50	06:18 (8)	04:58				04:45
	16:42		17:43	2	07:36 (3)	18:35	17		07:02 (4)	20:32	18 06:36 (8)	21:22				21:46
27	08:07		07:07		07:32 (3)	06:00			06:46 (4)	05:48	06:16 (8)	04:57				04:45
	16:44		17:45	8	07:40 (3)	18:37	15		07:01 (4)	20:34	20 06:36 (8)	21:24				21:46
28	08:06		07:05		07:29 (3)	05:58			06:48 (4)	05:46	06:15 (8)	04:55				04:46
	16:46		17:47	12	07:41 (3)	18:39	10		06:58 (4)	20:35	22 06:37 (8)	21:25				21:46
29	08:04					06:56				05:44	06:15 (8)	04:54				04:46
	16:48					19:41				20:37	22 06:37 (8)	21:26				21:45
30	08:03					06:53				05:42	06:14 (8)	04:53				04:47
	16:50					19:43				20:39	24 06:38 (8)	21:28				21:45
31	08:01					06:51						04:52				
	16:52					19:45						21:29				
Sonnenscheinstunden	252		274			367				419		492				508
astr.max.mögl.Beschattung				22			392				335		226			
Red.Sonnenscheinwahrsch.				0.24			0.31				0.41		0.51			
Reduktion Betriebsdauer				0.91			0.91				0.91		0.91			
Reduktion Windrichtung				0.66			0.68				0.69		0.69			
Gesamte Reduktion				0.14			0.19				0.26		0.32			
Met.wahrsch.Beschattung				3			76				87		73			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IE - IO239

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August			September			Oktober			November	Dezember
1	04:47	05:27		06:31 (8)	06:20		06:47 (7)	07:13			07:10	08:04
	21:45	21:10	9	06:40 (8)	20:04	16	07:03 (7)	18:52			16:42	15:58
2	04:48	05:28		06:29 (8)	06:22		06:49 (7)	07:14			07:12	08:06
	21:44	21:08	12	06:41 (8)	20:02	13	07:02 (7)	18:49			16:40	15:57
3	04:49	05:30		06:28 (8)	06:24		06:51 (7)	07:16			07:14	08:07
	21:44	21:07	15	06:43 (8)	20:00	9	07:00 (7)	18:47			16:38	15:57
4	04:50	05:32		06:27 (8)	06:25		06:52 (7)	07:18		08:05 (3)	07:16	08:09
	21:44	21:05	18	06:45 (8)	19:57	3	06:55 (7)	18:44	9	08:14 (3)	16:36	15:56
5	04:51	05:33		06:25 (8)	06:27			07:20		08:03 (3)	07:18	08:10
	21:43	21:03	20	06:45 (8)	19:55			18:42	13	08:16 (3)	16:34	15:56
6	04:51	05:35		06:25 (8)	06:29			07:21		08:02 (3)	07:20	08:11
	21:42	21:01	21	06:46 (8)	19:53			18:40	15	08:17 (3)	16:32	15:55
7	04:52	05:37		06:24 (8)	06:30			07:23		08:01 (3)	07:21	08:13
	21:42	20:59	22	06:46 (8)	19:50			18:37	17	08:18 (3)	16:30	15:55
8	04:53	05:38		06:24 (8)	06:32			07:25		08:00 (3)	07:23	08:14
	21:41	20:57	23	06:47 (8)	19:48			18:35	18	08:18 (3)	16:29	15:54
9	04:54	05:40		06:23 (8)	06:34			07:27		07:59 (3)	07:25	08:15
	21:40	20:55	23	06:46 (8)	19:45			18:32	19	08:18 (3)	16:27	15:54
10	04:56	05:42		06:23 (8)	06:36			07:29		07:58 (3)	07:27	08:16
	21:40	20:53	24	06:47 (8)	19:43			18:30	19	08:17 (3)	16:25	15:54
11	04:57	05:43		06:23 (8)	06:37			07:31		07:59 (3)	07:29	08:18
	21:39	20:51	24	06:47 (8)	19:40			18:28	18	08:17 (3)	16:23	15:53
12	04:58	05:45		06:22 (8)	06:39			07:32		07:59 (3)	07:31	08:19
	21:38	20:49	24	06:46 (8)	19:38			18:25	17	08:16 (3)	16:22	15:53
13	04:59	05:47		06:23 (8)	06:41			07:34		08:01 (3)	07:33	08:20
	21:37	20:47	23	06:46 (8)	19:36			18:23	14	08:15 (3)	16:20	15:53
14	05:00	05:49		06:22 (8)	06:43			07:36		08:03 (3)	07:35	08:21
	21:36	20:45	23	06:45 (8)	19:33			18:21	11	08:14 (3)	16:19	15:53
15	05:01	05:50		06:23 (8)	06:44		07:39 (4)	07:38		08:05 (3)	07:37	08:22
	21:35	20:43	21	06:44 (8)	19:31	9	07:48 (4)	18:18	7	08:12 (3)	16:17	15:53
16	05:03	05:52		06:24 (8)	06:46		07:35 (4)	07:40			07:38	08:22
	21:34	20:41	20	06:44 (8)	19:28	14	07:49 (4)	18:16			16:16	15:53
17	05:04	05:54		06:24 (8)	06:48		07:33 (4)	07:42			07:40	08:23
	21:32	20:39	18	06:42 (8)	19:26	17	07:50 (4)	18:14			16:14	15:53
18	05:05	05:56		06:26 (8)	06:50		07:32 (4)	07:43			07:42	08:24
	21:31	20:36	15	06:41 (8)	19:23	19	07:51 (4)	18:12			16:13	15:53
19	05:07	05:57		06:28 (8)	06:51		07:32 (4)	07:45			07:44	08:25
	21:30	20:34	11	06:39 (8)	19:21	20	07:52 (4)	18:09			16:11	15:54
20	05:08	05:59			06:53		07:30 (4)	07:47			07:46	08:26
	21:29	20:32			19:18	21	07:51 (4)	18:07			16:10	15:54
21	05:10	06:01			06:55		07:30 (4)	07:49			07:47	08:26
	21:27	20:30			19:16	22	07:52 (4)	18:05			16:09	15:54
22	05:11	06:03		06:55 (7)	06:57		07:30 (4)	07:51			07:49	08:27
	21:26	20:28	6	07:01 (7)	19:14	21	07:51 (4)	18:03			16:07	15:55
23	05:12	06:04		06:51 (7)	06:58		07:29 (4)	07:53			07:51	08:27
	21:25	20:25	12	07:03 (7)	19:11	21	07:50 (4)	18:00			16:06	15:55
24	05:14	06:06		06:50 (7)	07:00		07:29 (4)	07:55			07:53	08:28
	21:23	20:23	14	07:04 (7)	19:09	20	07:49 (4)	17:58			16:05	15:56
25	05:15	06:08		06:49 (7)	07:02		07:30 (4)	06:57			07:54	08:28
	21:22	20:21	16	07:05 (7)	19:06	19	07:49 (4)	16:56			16:04	15:57
26	05:17	06:10		06:47 (7)	07:04		07:31 (4)	06:58			07:56	08:28
	21:20	20:18	18	07:05 (7)	19:04	16	07:47 (4)	16:54			16:03	15:57
27	05:19	06:11		06:47 (7)	07:05		07:32 (4)	07:00			07:58	08:29
	21:19	20:16	19	07:06 (7)	19:01	14	07:46 (4)	16:52			16:02	15:58
28	05:20	06:13		06:47 (7)	07:07		07:34 (4)	07:02			07:59	08:29
	21:17	20:14	19	07:06 (7)	18:59	8	07:42 (4)	16:50			16:01	15:59
29	05:22	06:15		06:46 (7)	07:09			07:04			08:01	08:29
	21:15	20:12	19	07:05 (7)	18:56			16:48			16:00	16:00
30	05:23	06:17		06:46 (7)	07:11			07:06			08:03	08:29
	21:14	20:09	19	07:05 (7)	18:54			16:46			15:59	16:01
31	05:25	06:18		06:46 (7)				07:08				08:29
	21:12	20:07	18	07:04 (7)				16:44				16:02
Sonnenscheinstunden		510	459		382			329			260	235
astr.max.mögl.Beschattung			526			282			177			
Red.Sonnenscheinwahrsch.			0.49			0.40			0.33			
Reduktion Betriebsdauer			0.91			0.91			0.91			
Reduktion Windrichtung			0.69			0.69			0.66			
Gesamte Reduktion			0.31			0.25			0.20			
Met.wahrsch.Beschattung			161			71			35			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IF - IO240

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar			März			April			Mai			Juni	
1	08:29		07:59			07:03			07:29 (3)	06:48		05:40			06:16 (8)	04:51
	16:03		16:54			17:49	18		07:47 (3)	19:46		20:41	24		06:40 (8)	21:30
2	08:29		07:58			07:00			07:29 (3)	06:46		05:38			06:16 (8)	04:50
	16:04		16:56			17:51	19		07:48 (3)	19:48		20:43	24		06:40 (8)	21:31
3	08:29		07:56			06:58			07:28 (3)	06:43		05:36			06:16 (8)	04:49
	16:05		16:58			17:53	19		07:47 (3)	19:50		20:44	24		06:40 (8)	21:32
4	08:28		07:54			06:56			07:28 (3)	06:41		05:34			06:16 (8)	04:49
	16:07		17:00			17:54	19		07:47 (3)	19:52		20:46	24		06:40 (8)	21:34
5	08:28		07:52			06:53			07:28 (3)	06:39		05:32			06:17 (8)	04:48
	16:08		17:02			17:56	18		07:46 (3)	19:54		20:48	22		06:39 (8)	21:35
6	08:28		07:51			06:51			07:29 (3)	06:36		05:30			06:17 (8)	04:47
	16:09		17:04			17:58	16		07:45 (3)	19:55		20:50	21		06:38 (8)	21:36
7	08:27		07:49			06:49			07:30 (3)	06:34		05:28			06:17 (8)	04:46
	16:10		17:06			18:00	14		07:44 (3)	19:57		20:52	20		06:37 (8)	21:37
8	08:27		07:47			06:46			07:31 (3)	06:32	06:55 (7)	05:26			06:18 (8)	04:46
	16:12		17:08			18:02	10		07:41 (3)	19:59	9 07:04 (7)	20:53	18		06:36 (8)	21:38
9	08:26		07:45			06:44				06:29	06:53 (7)	05:24			06:19 (8)	04:45
	16:13		17:10			18:04				20:01	13 07:06 (7)	20:55	17		06:36 (8)	21:38
10	08:25		07:43			06:42				06:27	06:50 (7)	05:22			06:20 (8)	04:45
	16:15		17:12			18:06				20:03	16 07:06 (7)	20:57	14		06:34 (8)	21:39
11	08:25		07:41			06:39				06:24	06:49 (7)	05:21			06:22 (8)	04:44
	16:16		17:13			18:08				20:05	18 07:07 (7)	20:58	9		06:31 (8)	21:40
12	08:24		07:39			06:37				06:22	06:48 (7)	05:19				04:44
	16:18		17:15			18:10				20:06	19 07:07 (7)	21:00				21:41
13	08:23		07:37			06:34				06:20	06:47 (7)	05:17				04:44
	16:19		17:17			18:11				20:08	20 07:07 (7)	21:02				21:42
14	08:22		07:35			06:32			06:57 (4)	06:17	06:47 (7)	05:15				04:43
	16:21		17:19			18:13	9		07:06 (4)	20:10	20 07:07 (7)	21:04				21:42
15	08:22		07:33			06:30			06:54 (4)	06:15	06:47 (7)	05:14				04:43
	16:23		17:21			18:15	14		07:08 (4)	20:12	19 07:06 (7)	21:05				21:43
16	08:21		07:31			06:27			06:52 (4)	06:13	06:48 (7)	05:12				04:43
	16:24		17:23			18:17	17		07:09 (4)	20:14	18 07:06 (7)	21:07				21:43
17	08:20		07:29			06:25			06:50 (4)	06:10	06:47 (7)	05:11				04:43
	16:26		17:25			18:19	20		07:10 (4)	20:16	17 07:04 (7)	21:09				21:44
18	08:19		07:27			06:22			06:50 (4)	06:08	06:48 (7)	05:09				04:43
	16:28		17:27			18:21	21		07:11 (4)	20:17	15 07:03 (7)	21:10				21:44
19	08:17		07:25			06:20			06:48 (4)	06:06	06:50 (7)	05:07				04:43
	16:29		17:29			18:23	22		07:10 (4)	20:19	12 07:02 (7)	21:12				21:45
20	08:16		07:23			06:17			06:48 (4)	06:04	06:52 (7)	05:06				04:43
	16:31		17:31			18:24	23		07:11 (4)	20:21	7 06:59 (7)	21:13				21:45
21	08:15		07:20			06:15			06:47 (4)	06:01		05:04				04:43
	16:33		17:33			18:26	23		07:10 (4)	20:23		21:15				21:45
22	08:14		07:18			06:13			06:48 (4)	05:59		05:03				04:43
	16:35		17:35			18:28	22		07:10 (4)	20:25		21:16				21:45
23	08:13		07:16			06:10			06:48 (4)	05:57	06:24 (8)	05:02				04:44
	16:37		17:37			18:30	21		07:09 (4)	20:26	11 06:35 (8)	21:18				21:46
24	08:11		07:14			06:08			06:48 (4)	05:55	06:22 (8)	05:00				04:44
	16:38		17:39			18:32	20		07:08 (4)	20:28	15 06:37 (8)	21:19				21:46
25	08:10		07:12		07:36 (3)	06:05			06:49 (4)	05:53	06:20 (8)	04:59				04:44
	16:40		17:41	6	07:42 (3)	18:34	18		07:07 (4)	20:30	18 06:38 (8)	21:21				21:46
26	08:09		07:09		07:34 (3)	06:03			06:50 (4)	05:50	06:19 (8)	04:58				04:45
	16:42		17:43	11	07:45 (3)	18:35	14		07:04 (4)	20:32	20 06:39 (8)	21:22				21:46
27	08:07		07:07		07:32 (3)	06:00			06:53 (4)	05:48	06:18 (8)	04:57				04:45
	16:44		17:45	14	07:46 (3)	18:37	9		07:02 (4)	20:34	22 06:40 (8)	21:24				21:46
28	08:06		07:05		07:29 (3)	05:58				05:46	06:17 (8)	04:55				04:46
	16:46		17:47	18	07:47 (3)	18:39				20:35	23 06:40 (8)	21:25				21:46
29	08:04					06:56				05:44	06:16 (8)	04:54				04:46
	16:48					19:41				20:37	24 06:40 (8)	21:26				21:45
30	08:03					06:53				05:42	06:16 (8)	04:53				04:47
	16:50					19:43				20:39	24 06:40 (8)	21:28				21:45
31	08:01					06:51						04:52				
	16:52					19:45						21:29				
Sonnenscheinstunden	252		274			367				419		492				508
astr.max.mögl.Beschattung				49			386				360		217			
Red.Sonnenscheinwahrsch.				0.24			0.31				0.41		0.51			
Reduktion Betriebsdauer				0.91			0.91				0.91		0.91			
Reduktion Windrichtung				0.66			0.68				0.69		0.69			
Gesamte Reduktion				0.14			0.19				0.26		0.32			
Met.wahrsch.Beschattung				7			75				93		70			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IF - IO240

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August			September			Oktober			November	Dezember
1	04:47	05:27		06:35 (8)	06:20		06:48 (7)	07:13			07:10	08:04
	21:45	21:10	5	06:40 (8)	20:04	18	07:06 (7)	18:52			16:42	15:58
2	04:48	05:28		06:32 (8)	06:22		06:49 (7)	07:14			07:12	08:06
	21:44	21:08	11	06:43 (8)	20:02	16	07:05 (7)	18:49			16:40	15:57
3	04:49	05:30		06:30 (8)	06:24		06:51 (7)	07:16			07:14	08:07
	21:44	21:07	15	06:45 (8)	20:00	13	07:04 (7)	18:47			16:38	15:57
4	04:50	05:32		06:29 (8)	06:25		06:52 (7)	07:18			07:16	08:09
	21:44	21:05	18	06:47 (8)	19:57	9	07:01 (7)	18:44			16:36	15:56
5	04:51	05:33		06:28 (8)	06:27		06:55 (7)	07:20		08:10 (3)	07:18	08:10
	21:43	21:03	19	06:47 (8)	19:55	1	06:56 (7)	18:42	7	08:17 (3)	16:34	15:56
6	04:51	05:35		06:27 (8)	06:29			07:21		08:07 (3)	07:20	08:11
	21:42	21:01	21	06:48 (8)	19:53			18:40	12	08:19 (3)	16:32	15:55
7	04:52	05:37		06:26 (8)	06:30			07:23		08:05 (3)	07:21	08:13
	21:42	20:59	22	06:48 (8)	19:50			18:37	16	08:21 (3)	16:30	15:55
8	04:53	05:38		06:26 (8)	06:32			07:25		08:04 (3)	07:23	08:14
	21:41	20:57	23	06:49 (8)	19:48			18:35	17	08:21 (3)	16:29	15:54
9	04:54	05:40		06:25 (8)	06:34			07:27		08:02 (3)	07:25	08:15
	21:40	20:55	24	06:49 (8)	19:45			18:32	19	08:21 (3)	16:27	15:54
10	04:56	05:42		06:25 (8)	06:36			07:29		08:02 (3)	07:27	08:16
	21:40	20:53	24	06:49 (8)	19:43			18:30	19	08:21 (3)	16:25	15:54
11	04:57	05:43		06:25 (8)	06:37			07:31		08:02 (3)	07:29	08:18
	21:39	20:51	24	06:49 (8)	19:40			18:28	19	08:21 (3)	16:23	15:53
12	04:58	05:45		06:24 (8)	06:39			07:32		08:02 (3)	07:31	08:19
	21:38	20:49	25	06:49 (8)	19:38			18:25	19	08:21 (3)	16:22	15:53
13	04:59	05:47		06:25 (8)	06:41			07:34		08:02 (3)	07:33	08:20
	21:37	20:47	24	06:49 (8)	19:36			18:23	18	08:20 (3)	16:20	15:53
14	05:00	05:49		06:24 (8)	06:43			07:36		08:03 (3)	07:35	08:21
	21:36	20:45	24	06:48 (8)	19:33			18:21	16	08:19 (3)	16:19	15:53
15	05:01	05:50		06:25 (8)	06:44			07:38		08:05 (3)	07:37	08:22
	21:35	20:43	22	06:47 (8)	19:31			18:18	13	08:18 (3)	16:17	15:53
16	05:03	05:52		06:26 (8)	06:46		07:42 (4)	07:40		08:07 (3)	07:38	08:22
	21:34	20:41	21	06:47 (8)	19:28	7	07:40 (4)	18:16	9	08:16 (3)	16:16	15:53
17	05:04	05:54		06:26 (8)	06:48		07:39 (4)	07:42		08:09 (3)	07:40	08:23
	21:32	20:39	19	06:45 (8)	19:26	13	07:52 (4)	18:14	4	08:13 (3)	16:14	15:53
18	05:05	05:56		06:27 (8)	06:50		07:37 (4)	07:43			07:42	08:24
	21:31	20:36	17	06:44 (8)	19:23	17	07:54 (4)	18:12			16:13	15:53
19	05:07	05:57		06:29 (8)	06:51		07:36 (4)	07:45			07:44	08:25
	21:30	20:34	14	06:43 (8)	19:21	19	07:55 (4)	18:09			16:11	15:54
20	05:08	05:59		06:30 (8)	06:53		07:34 (4)	07:47			07:46	08:26
	21:29	20:32	10	06:40 (8)	19:18	21	07:55 (4)	18:07			16:10	15:54
21	05:10	06:01			06:55		07:33 (4)	07:49			07:47	08:26
	21:27	20:30			19:16	22	07:55 (4)	18:05			16:09	15:54
22	05:11	06:03			06:57		07:33 (4)	07:51			07:49	08:27
	21:26	20:28			19:14	22	07:55 (4)	18:03			16:07	15:55
23	05:12	06:04		06:55 (7)	06:58		07:32 (4)	07:53			07:51	08:27
	21:25	20:25	8	07:03 (7)	19:11	22	07:54 (4)	18:00			16:06	15:55
24	05:14	06:06		06:53 (7)	07:00		07:32 (4)	07:55			07:53	08:28
	21:23	20:23	13	07:06 (7)	19:09	22	07:54 (4)	17:58			16:05	15:56
25	05:15	06:08		06:52 (7)	07:02		07:32 (4)	06:57			07:54	08:28
	21:22	20:21	15	07:07 (7)	19:06	21	07:53 (4)	16:56			16:04	15:57
26	05:17	06:10		06:50 (7)	07:04		07:33 (4)	06:58			07:56	08:28
	21:20	20:18	17	07:07 (7)	19:04	20	07:53 (4)	16:54			16:03	15:57
27	05:19	06:11		06:49 (7)	07:05		07:34 (4)	07:00			07:58	08:29
	21:19	20:16	19	07:08 (7)	19:01	18	07:52 (4)	16:52			16:02	15:58
28	05:20	06:13		06:49 (7)	07:07		07:34 (4)	07:02			07:59	08:29
	21:17	20:14	19	07:08 (7)	18:59	15	07:49 (4)	16:50			16:01	15:59
29	05:22	06:15		06:48 (7)	07:09		07:36 (4)	07:04			08:01	08:29
	21:15	20:12	19	07:07 (7)	18:56	11	07:47 (4)	16:48			16:00	16:00
30	05:23	06:17		06:48 (7)	07:11			07:06			08:03	08:29
	21:14	20:09	19	07:07 (7)	18:54			16:46			15:59	16:01
31	05:25	06:18		06:48 (7)				07:08				08:29
	21:12	20:07	19	07:07 (7)				16:44				16:02
Sonnenscheinstunden		510	459			382			329		260	235
astr.max.mögl.Beschattung				530			307			188		
Red.Sonnenscheinwahrsch.				0.49			0.40			0.33		
Reduktion Betriebsdauer				0.91			0.91			0.91		
Reduktion Windrichtung				0.69			0.69			0.66		
Gesamte Reduktion				0.31			0.25			0.20		
Met.wahrsch.Beschattung				162			78			37		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IG - IO241

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar		März		April		Mai		Juni
1	08:29	07:59		07:03		07:29 (3)	06:48	05:40		06:17 (8) 04:51
	16:03	16:54		17:49	19	07:48 (3)	19:46	20:41	24	06:41 (8) 21:30
2	08:29	07:58		07:00		07:29 (3)	06:46	05:38		06:16 (8) 04:50
	16:04	16:56		17:51	19	07:48 (3)	19:48	20:43	25	06:41 (8) 21:31
3	08:29	07:56		06:58		07:28 (3)	06:43	05:36		06:17 (8) 04:49
	16:05	16:58		17:53	19	07:47 (3)	19:50	20:44	24	06:41 (8) 21:32
4	08:28	07:54		06:56		07:29 (3)	06:41	05:34		06:18 (8) 04:49
	16:07	17:00		17:54	18	07:47 (3)	19:52	20:46	23	06:41 (8) 21:34
5	08:28	07:52		06:53		07:28 (3)	06:39	05:32		06:18 (8) 04:48
	16:08	17:02		17:56	18	07:46 (3)	19:54	20:48	22	06:40 (8) 21:35
6	08:28	07:51		06:51		07:29 (3)	06:36	05:30		06:18 (8) 04:47
	16:09	17:04		17:58	16	07:45 (3)	19:55	20:50	21	06:39 (8) 21:36
7	08:27	07:49		06:49		07:31 (3)	06:34	05:28		06:18 (8) 04:46
	16:10	17:06		18:00	13	07:44 (3)	19:57	20:52	20	06:38 (8) 21:37
8	08:27	07:47		06:46		07:32 (3)	06:32	05:26		06:19 (8) 04:46
	16:12	17:08		18:02	9	07:41 (3)	19:59	20:53	17	06:36 (8) 21:38
9	08:26	07:45		06:44			06:29	05:24		06:21 (8) 04:45
	16:13	17:10		18:04			20:01	20:55	15	06:36 (8) 21:38
10	08:25	07:43		06:42			06:27	05:22		06:22 (8) 04:45
	16:15	17:12		18:06			20:03	20:57	12	06:34 (8) 21:39
11	08:25	07:41		06:39			06:24	05:21		06:25 (8) 04:44
	16:16	17:13		18:08			20:05	20:58	5	06:30 (8) 21:40
12	08:24	07:39		06:37			06:22	05:19		04:44
	16:18	17:15		18:10			20:06	21:00		21:41
13	08:23	07:37		06:34			06:20	05:17		04:44
	16:19	17:17		18:11			20:08	21:02		21:42
14	08:22	07:35		06:32		06:57 (4)	06:17	05:15		04:43
	16:21	17:19		18:13	10	07:07 (4)	20:10	21:04		21:42
15	08:22	07:33		06:30		06:54 (4)	06:15	05:14		04:43
	16:23	17:21		18:15	15	07:09 (4)	20:12	21:05		21:43
16	08:21	07:31		06:27		06:53 (4)	06:13	05:12		04:43
	16:24	17:23		18:17	17	07:10 (4)	20:14	21:07		21:43
17	08:20	07:29		06:25		06:51 (4)	06:10	05:11		04:43
	16:26	17:25		18:19	19	07:10 (4)	20:16	21:09		21:44
18	08:19	07:27		06:22		06:50 (4)	06:08	05:09		04:43
	16:28	17:27		18:21	21	07:11 (4)	20:17	21:10		21:44
19	08:17	07:25		06:20		06:49 (4)	06:06	05:07		04:43
	16:29	17:29		18:23	22	07:11 (4)	20:19	21:12		21:45
20	08:16	07:23		06:17		06:49 (4)	06:04	05:06		04:43
	16:31	17:31		18:24	22	07:11 (4)	20:21	21:13		21:45
21	08:15	07:20		06:15		06:48 (4)	06:01	05:04		04:43
	16:33	17:33		18:26	22	07:10 (4)	20:23	21:15		21:45
22	08:14	07:18		06:13		06:49 (4)	05:59	06:28 (8)	05:03	04:43
	16:35	17:35		18:28	21	07:10 (4)	20:25	6	06:34 (8)	21:16	21:45
23	08:13	07:16		06:10		06:49 (4)	05:57	06:24 (8)	05:02	04:44
	16:37	17:37		18:30	21	07:10 (4)	20:26	12	06:36 (8)	21:18	21:46
24	08:11	07:14		06:08		06:49 (4)	05:55	06:22 (8)	05:00	04:44
	16:38	17:39		18:32	19	07:08 (4)	20:28	16	06:38 (8)	21:19	21:46
25	08:10	07:12	07:36 (3)	06:05		06:51 (4)	05:53	06:20 (8)	04:59	04:44
	16:40	17:41	7 07:43 (3)	18:34	16	07:07 (4)	20:30	19	06:39 (8)	21:21	21:46
26	08:09	07:09	07:34 (3)	06:03		06:51 (4)	05:50	06:19 (8)	04:58	04:45
	16:42	17:43	12 07:46 (3)	18:35	13	07:04 (4)	20:32	21	06:40 (8)	21:22	21:46
27	08:07	07:07	07:32 (3)	06:00		06:55 (4)	05:48	06:18 (8)	04:57	04:45
	16:44	17:45	15 07:47 (3)	18:37	6	07:01 (4)	20:34	23	06:41 (8)	21:24	21:46
28	08:06	07:05	07:29 (3)	05:58			05:46	06:18 (8)	04:55	04:46
	16:46	17:47	18 07:47 (3)	18:39			20:35	23	06:41 (8)	21:25	21:46
29	08:04			06:56			05:44	06:17 (8)	04:54	04:46
	16:48			19:41			20:37	24	06:41 (8)	21:26	21:45
30	08:03			06:53			05:42	06:17 (8)	04:53	04:47
	16:50			19:43			20:39	24	06:41 (8)	21:28	21:45
31	08:01			06:51					04:52	
	16:52			19:45					21:29	
Sonnenscheinstunden	252	274		367			419		492		508
astr.max.mögl.Beschattung			52		375		373		208		
Red.Sonnenscheinwahrsch.			0.24		0.31		0.41		0.51		
Reduktion Betriebsdauer			0.91		0.91		0.91		0.91		
Reduktion Windrichtung			0.66		0.68		0.69		0.69		
Gesamte Reduktion			0.14		0.19		0.26		0.32		
Met.wahrsch.Beschattung			7		73		96		67		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IG - IO241

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November	Dezember
1	04:47		05:27		06:20		06:48 (7)	07:13	07:10	08:04
	21:45		21:10		20:04	19	07:07 (7)	18:52	16:42	15:58
2	04:48		05:28	06:34 (8)	06:22		06:49 (7)	07:14	07:12	08:06
	21:44		21:08	8 06:42 (8)	20:02	17	07:06 (7)	18:49	16:40	15:57
3	04:49		05:30	06:32 (8)	06:24		06:51 (7)	07:16	07:14	08:07
	21:44		21:07	13 06:45 (8)	20:00	14	07:05 (7)	18:47	16:38	15:57
4	04:50		05:32	06:31 (8)	06:25		06:52 (7)	07:18	07:16	08:09
	21:44		21:05	16 06:47 (8)	19:57	10	07:02 (7)	18:44	16:36	15:56
5	04:51		05:33	06:29 (8)	06:27		06:54 (7)	07:20	08:12 (3)	07:18	08:10
	21:43		21:03	18 06:47 (8)	19:55	5	06:59 (7)	18:42	4 08:16 (3)	16:34	15:56
6	04:51		05:35	06:29 (8)	06:29			07:21	08:08 (3)	07:20	08:11
	21:42		21:01	20 06:49 (8)	19:53			18:40	11 08:19 (3)	16:32	15:55
7	04:52		05:37	06:27 (8)	06:30			07:23	08:06 (3)	07:21	08:13
	21:42		20:59	22 06:49 (8)	19:50			18:37	15 08:21 (3)	16:30	15:55
8	04:53		05:38	06:27 (8)	06:32			07:25	08:05 (3)	07:23	08:14
	21:41		20:57	22 06:49 (8)	19:48			18:35	17 08:22 (3)	16:29	15:54
9	04:54		05:40	06:26 (8)	06:34			07:27	08:03 (3)	07:25	08:15
	21:40		20:55	23 06:49 (8)	19:45			18:32	18 08:21 (3)	16:27	15:54
10	04:56		05:42	06:26 (8)	06:36			07:29	08:03 (3)	07:27	08:16
	21:40		20:53	24 06:50 (8)	19:43			18:30	18 08:21 (3)	16:25	15:54
11	04:57		05:43	06:26 (8)	06:37			07:31	08:02 (3)	07:29	08:18
	21:39		20:51	24 06:50 (8)	19:40			18:28	19 08:21 (3)	16:23	15:53
12	04:58		05:45	06:25 (8)	06:39			07:32	08:02 (3)	07:31	08:19
	21:38		20:49	24 06:49 (8)	19:38			18:25	19 08:21 (3)	16:22	15:53
13	04:59		05:47	06:25 (8)	06:41			07:34	08:02 (3)	07:33	08:20
	21:37		20:47	25 06:50 (8)	19:36			18:23	19 08:21 (3)	16:20	15:53
14	05:00		05:49	06:25 (8)	06:43			07:36	08:03 (3)	07:35	08:21
	21:36		20:45	24 06:49 (8)	19:33			18:21	17 08:20 (3)	16:19	15:53
15	05:01		05:50	06:25 (8)	06:44			07:38	08:05 (3)	07:37	08:22
	21:35		20:43	23 06:48 (8)	19:31			18:18	14 08:19 (3)	16:17	15:53
16	05:03		05:52	06:26 (8)	06:46		07:45 (4)	07:40	08:07 (3)	07:38	08:22
	21:34		20:41	22 06:48 (8)	19:28	2	07:47 (4)	18:16	10 08:17 (3)	16:16	15:53
17	05:04		05:54	06:26 (8)	06:48		07:40 (4)	07:42	08:09 (3)	07:40	08:23
	21:32		20:39	21 06:47 (8)	19:26	12	07:52 (4)	18:14	6 08:15 (3)	16:14	15:53
18	05:05		05:56	06:27 (8)	06:50		07:38 (4)	07:43		07:42	08:24
	21:31		20:36	19 06:46 (8)	19:23	16	07:54 (4)	18:12		16:13	15:53
19	05:07		05:57	06:29 (8)	06:51		07:37 (4)	07:45		07:44	08:25
	21:30		20:34	16 06:45 (8)	19:21	18	07:55 (4)	18:09		16:11	15:54
20	05:08		05:59	06:30 (8)	06:53		07:35 (4)	07:47		07:46	08:26
	21:29		20:32	12 06:42 (8)	19:18	20	07:55 (4)	18:07		16:10	15:54
21	05:10		06:01	06:33 (8)	06:55		07:34 (4)	07:49		07:47	08:26
	21:27		20:30	5 06:38 (8)	19:16	21	07:55 (4)	18:05		16:09	15:54
22	05:11		06:03		06:57		07:34 (4)	07:51		07:49	08:27
	21:26		20:28		19:14	22	07:56 (4)	18:03		16:07	15:55
23	05:12		06:04	06:57 (7)	06:58		07:33 (4)	07:53		07:51	08:27
	21:25		20:25	6 07:03 (7)	19:11	22	07:55 (4)	18:00		16:06	15:55
24	05:14		06:06	06:54 (7)	07:00		07:33 (4)	07:55		07:53	08:28
	21:23		20:23	12 07:06 (7)	19:09	22	07:55 (4)	17:58		16:05	15:56
25	05:15		06:08	06:53 (7)	07:02		07:33 (4)	06:57		07:54	08:28
	21:22		20:21	14 07:07 (7)	19:06	21	07:54 (4)	16:56		16:04	15:57
26	05:17		06:10	06:51 (7)	07:04		07:33 (4)	06:58		07:56	08:28
	21:20		20:18	16 07:07 (7)	19:04	20	07:53 (4)	16:54		16:03	15:57
27	05:19		06:11	06:50 (7)	07:05		07:34 (4)	07:00		07:58	08:29
	21:19		20:16	18 07:08 (7)	19:01	18	07:52 (4)	16:52		16:02	15:58
28	05:20		06:13	06:50 (7)	07:07		07:34 (4)	07:02		07:59	08:29
	21:17		20:14	19 07:09 (7)	18:59	16	07:50 (4)	16:50		16:01	15:59
29	05:22		06:15	06:49 (7)	07:09		07:36 (4)	07:04		08:01	08:29
	21:15		20:12	19 07:08 (7)	18:56	12	07:48 (4)	16:48		16:00	16:00
30	05:23		06:17	06:49 (7)	07:11		07:39 (4)	07:06		08:03	08:29
	21:14		20:09	19 07:08 (7)	18:54	5	07:44 (4)	16:46		15:59	16:01
31	05:25		06:18	06:49 (7)				07:08			08:29
	21:12		20:07	19 07:08 (7)				16:44			16:02
Sonnenscheinstunden	510		459		382			329	260		235
astr.max.mögl.Beschattung				523		312		187			
Red.Sonnenscheinwahrsch.				0.49		0.40		0.33			
Reduktion Betriebsdauer				0.91		0.91		0.91			
Reduktion Windrichtung				0.69		0.69		0.66			
Gesamte Reduktion				0.31		0.25		0.20			
Met.wahrsch.Beschattung				160		79		37			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IH - IO242

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März		April		Mai		Juni
1	08:29	07:59	07:03		06:48		05:40	06:19 (8)	04:51
	16:03	16:54	17:49		19:46		20:41	24 06:43 (8)	21:30
2	08:29	07:58	07:00		06:46		05:38	06:19 (8)	04:50
	16:04	16:56	17:51		19:48		20:43	23 06:42 (8)	21:31
3	08:29	07:56	06:58		06:43		05:36	06:20 (8)	04:49
	16:05	16:58	17:53		19:50		20:44	22 06:42 (8)	21:32
4	08:28	07:54	06:56		06:41		05:34	06:20 (8)	04:49
	16:07	17:00	17:54		19:52		20:46	22 06:42 (8)	21:34
5	08:28	07:52	06:53		06:39		05:32	06:21 (8)	04:48
	16:08	17:02	17:56		19:54		20:48	20 06:41 (8)	21:35
6	08:28	07:51	06:51		06:36		05:30	06:21 (8)	04:47
	16:09	17:04	17:58		19:55		20:50	18 06:39 (8)	21:36
7	08:27	07:49	06:49		06:34	06:57 (7)	05:28	06:22 (8)	04:46
	16:10	17:06	18:00		19:57	9 07:06 (7)	20:52	16 06:38 (8)	21:37
8	08:27	07:47	06:46		06:32	06:55 (7)	05:26	06:24 (8)	04:46
	16:12	17:08	18:02		19:59	13 07:00 (7)	20:53	13 06:37 (8)	21:38
9	08:26	07:45	06:44		06:29	06:53 (7)	05:24	06:26 (8)	04:45
	16:13	17:10	18:04		20:01	16 07:09 (7)	20:55	8 06:34 (8)	21:38
10	08:25	07:43	06:42		06:27	06:51 (7)	05:22		04:45
	16:15	17:12	18:06		20:03	18 07:09 (7)	20:57		21:39
11	08:25	07:41	06:39		06:24	06:50 (7)	05:21		04:44
	16:16	17:13	18:08		20:05	19 07:09 (7)	20:58		21:40
12	08:24	07:39	06:37		06:22	06:50 (7)	05:19		04:44
	16:18	17:15	18:10		20:06	19 07:09 (7)	21:00		21:41
13	08:23	07:37	06:34	07:00 (4)	06:20	06:49 (7)	05:17		04:44
	16:19	17:17	18:11	5 07:05 (4)	20:08	19 07:08 (7)	21:02		21:42
14	08:22	07:35	06:32	06:57 (4)	06:17	06:49 (7)	05:15		04:43
	16:21	17:19	18:13	12 07:09 (4)	20:10	19 07:08 (7)	21:04		21:42
15	08:22	07:33	06:30	06:54 (4)	06:15	06:50 (7)	05:14		04:43
	16:23	17:21	18:15	16 07:10 (4)	20:12	18 07:08 (7)	21:05		21:43
16	08:21	07:31	06:27	06:53 (4)	06:13	06:50 (7)	05:12		04:43
	16:24	17:23	18:17	18 07:11 (4)	20:14	17 07:07 (7)	21:07		21:43
17	08:20	07:29	06:25	06:51 (4)	06:10	06:50 (7)	05:11		04:43
	16:26	17:25	18:19	20 07:11 (4)	20:16	15 07:05 (7)	21:09		21:44
18	08:19	07:27	06:22	06:51 (4)	06:08	06:52 (7)	05:09		04:43
	16:28	17:27	18:21	21 07:12 (4)	20:17	11 07:03 (7)	21:10		21:44
19	08:17	07:25	06:20	06:50 (4)	06:06	06:55 (7)	05:07		04:43
	16:29	17:29	18:23	21 07:11 (4)	20:19	5 07:00 (7)	21:12		21:45
20	08:16	07:23	06:17	06:50 (4)	06:04		05:06		04:43
	16:31	17:31	18:24	22 07:12 (4)	20:21		21:13		21:45
21	08:15	07:20	06:15	06:49 (4)	06:01	06:29 (8)	05:04		04:43
	16:33	17:33	18:26	22 07:11 (4)	20:23	8 06:37 (8)	21:15		21:45
22	08:14	07:18	06:13	06:50 (4)	05:59	06:26 (8)	05:03		04:43
	16:35	17:35	18:28	20 07:10 (4)	20:25	14 06:40 (8)	21:16		21:45
23	08:13	07:16	06:10	06:51 (4)	05:57	06:24 (8)	05:02		04:44
	16:37	17:37	18:30	19 07:10 (4)	20:26	16 06:40 (8)	21:18		21:46
24	08:11	07:14	06:08	06:51 (4)	05:55	06:22 (8)	05:00		04:44
	16:38	17:39	18:32	17 07:08 (4)	20:28	19 06:41 (8)	21:19		21:46
25	08:10	07:12	06:05	06:52 (4)	05:53	06:21 (8)	04:59		04:44
	16:40	17:41	18:34	14 07:06 (4)	20:30	21 06:42 (8)	21:21		21:46
26	08:09	07:09	06:03	06:54 (4)	05:50	06:21 (8)	04:58		04:45
	16:42	17:43	18:35	9 07:03 (4)	20:32	22 06:43 (8)	21:22		21:46
27	08:07	07:07	06:00		05:48	06:20 (8)	04:57		04:45
	16:44	17:45	18:37		20:34	23 06:43 (8)	21:24		21:46
28	08:06	07:05	05:58		05:46	06:19 (8)	04:55		04:46
	16:46	17:47	18:39		20:35	24 06:43 (8)	21:25		21:46
29	08:04		06:56		05:44	06:19 (8)	04:54		04:46
	16:48		19:41		20:37	24 06:43 (8)	21:26		21:45
30	08:03		06:53		05:42	06:19 (8)	04:53		04:47
	16:50		19:43		20:39	24 06:43 (8)	21:28		21:45
31	08:01		06:51				04:52		
	16:52		19:45				21:29		
Sonnenscheinstunden	252	274	367		419		492		508
astr.max.mögl.Beschattung				236		393		166	
Red.Sonnenscheinwahrsch.				0.31		0.41		0.51	
Reduktion Betriebsdauer				0.91		0.91		0.91	
Reduktion Windrichtung				0.69		0.69		0.69	
Gesamte Reduktion				0.20		0.26		0.32	
Met.wahrsch.Beschattung				46		102		53	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IH - IO242

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August			September			Oktober		November	Dezember
1	04:47		05:27			06:20		06:49 (7)	07:13		07:10	08:04
	21:45		21:10			20:04	19	07:08 (7)	18:52		16:42	15:58
2	04:48		05:28			06:22		06:50 (7)	07:14		07:12	08:06
	21:44		21:08			20:02	18	07:08 (7)	18:49		16:40	15:57
3	04:49		05:30			06:24		06:51 (7)	07:16		07:14	08:07
	21:44		21:07			20:00	16	07:07 (7)	18:47		16:38	15:57
4	04:50		05:32		06:36 (8)	06:25		06:52 (7)	07:18		07:16	08:09
	21:44		21:05	10	06:46 (8)	19:57	13	07:05 (7)	18:44		16:36	15:56
5	04:51		05:33		06:33 (8)	06:27		06:54 (7)	07:20		07:18	08:10
	21:43		21:03	14	06:47 (8)	19:55	9	07:03 (7)	18:42		16:34	15:56
6	04:51		05:35		06:32 (8)	06:29		06:57 (7)	07:21		07:20	08:11
	21:42		21:01	17	06:49 (8)	19:53	1	06:58 (7)	18:40		16:32	15:55
7	04:52		05:37		06:30 (8)	06:30			07:23		07:21	08:13
	21:42		20:59	19	06:49 (8)	19:50			18:37		16:30	15:55
8	04:53		05:38		06:30 (8)	06:32			07:25		07:23	08:14
	21:41		20:57	20	06:50 (8)	19:48			18:35		16:29	15:54
9	04:54		05:40		06:29 (8)	06:34			07:27		07:25	08:15
	21:40		20:55	21	06:50 (8)	19:45			18:32		16:27	15:54
10	04:56		05:42		06:28 (8)	06:36			07:29		07:27	08:16
	21:40		20:53	23	06:51 (8)	19:43			18:30		16:25	15:54
11	04:57		05:43		06:28 (8)	06:37			07:31		07:29	08:18
	21:39		20:51	24	06:52 (8)	19:40			18:28		16:23	15:53
12	04:58		05:45		06:27 (8)	06:39			07:32		07:31	08:19
	21:38		20:49	24	06:51 (8)	19:38			18:25		16:22	15:53
13	04:59		05:47		06:27 (8)	06:41			07:34		07:33	08:20
	21:37		20:47	24	06:51 (8)	19:36			18:23		16:20	15:53
14	05:00		05:49		06:27 (8)	06:43			07:36		07:35	08:21
	21:36		20:45	24	06:51 (8)	19:33			18:21		16:19	15:53
15	05:01		05:50		06:27 (8)	06:44			07:38		07:37	08:22
	21:35		20:43	24	06:51 (8)	19:31			18:18		16:17	15:53
16	05:03		05:52		06:28 (8)	06:46			07:40		07:38	08:22
	21:34		20:41	23	06:51 (8)	19:28			18:16		16:16	15:53
17	05:04		05:54		06:27 (8)	06:48		07:43 (4)	07:42		07:40	08:23
	21:32		20:39	22	06:49 (8)	19:26	8	07:51 (4)	18:14		16:14	15:53
18	05:05		05:56		06:28 (8)	06:50		07:40 (4)	07:43		07:42	08:24
	21:31		20:36	21	06:49 (8)	19:23	13	07:53 (4)	18:12		16:13	15:53
19	05:07		05:57		06:29 (8)	06:51		07:38 (4)	07:45		07:44	08:25
	21:30		20:34	19	06:48 (8)	19:21	17	07:55 (4)	18:09		16:11	15:54
20	05:08		05:59		06:30 (8)	06:53		07:36 (4)	07:47		07:46	08:26
	21:29		20:32	16	06:46 (8)	19:18	19	07:55 (4)	18:07		16:10	15:54
21	05:10		06:01		06:32 (8)	06:55		07:35 (4)	07:49		07:47	08:26
	21:27		20:30	12	06:44 (8)	19:16	21	07:56 (4)	18:05		16:09	15:54
22	05:11		06:03		06:35 (8)	06:57		07:35 (4)	07:51		07:49	08:27
	21:26		20:28	6	06:41 (8)	19:14	21	07:56 (4)	18:03		16:07	15:55
23	05:12		06:04			06:58		07:33 (4)	07:53		07:51	08:27
	21:25		20:25			19:11	22	07:55 (4)	18:00		16:06	15:55
24	05:14		06:06		06:58 (7)	07:00		07:33 (4)	07:55		07:53	08:28
	21:23		20:23	6	07:04 (7)	19:09	22	07:55 (4)	17:58		16:05	15:56
25	05:15		06:08		06:56 (7)	07:02		07:33 (4)	06:57		07:54	08:28
	21:22		20:21	11	07:07 (7)	19:06	22	07:55 (4)	16:56		16:04	15:57
26	05:17		06:10		06:53 (7)	07:04		07:34 (4)	06:58		07:56	08:28
	21:20		20:18	15	07:08 (7)	19:04	20	07:54 (4)	16:54		16:03	15:57
27	05:19		06:11		06:52 (7)	07:05		07:34 (4)	07:00		07:58	08:29
	21:19		20:16	17	07:09 (7)	19:01	19	07:53 (4)	16:52		16:02	15:58
28	05:20		06:13		06:51 (7)	07:07		07:34 (4)	07:02		07:59	08:29
	21:17		20:14	19	07:10 (7)	18:59	17	07:51 (4)	16:50		16:01	15:59
29	05:22		06:15		06:50 (7)	07:09		07:36 (4)	07:04		08:01	08:29
	21:15		20:12	19	07:09 (7)	18:56	14	07:50 (4)	16:48		16:00	16:00
30	05:23		06:17		06:50 (7)	07:11		07:38 (4)	07:06		08:03	08:29
	21:14		20:09	19	07:09 (7)	18:54	9	07:47 (4)	16:46		15:59	16:01
31	05:25		06:18		06:50 (7)				07:08			08:29
	21:12		20:07	19	07:09 (7)				16:44			16:02
Sonnenscheinstunden	510		459			382			329		260	235
astr.max.mögl.Beschattung				488			320					
Red.Sonnenscheinwahrsch.				0.49			0.40					
Reduktion Betriebsdauer				0.91			0.91					
Reduktion Windrichtung				0.69			0.69					
Gesamte Reduktion				0.31			0.25					
Met.wahrsch.Beschattung				149			81					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** II - IO243

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März			April			Mai			Juni	
1	08:29		07:59		07:03			06:48			05:40		06:20 (8)	04:51	
	16:03		16:54		17:49			19:46			20:41	24	06:44 (8)	21:30	
2	08:29		07:58		07:00			06:46			05:38		06:20 (8)	04:50	
	16:04		16:56		17:51			19:48			20:43	23	06:43 (8)	21:31	
3	08:29		07:56		06:58			06:43			05:36		06:22 (8)	04:49	
	16:05		16:58		17:53			19:50			20:44	21	06:43 (8)	21:32	
4	08:28		07:54		06:56			06:41			05:34		06:22 (8)	04:49	
	16:07		17:00		17:54			19:52			20:46	20	06:42 (8)	21:34	
5	08:28		07:52		06:53			06:39			05:32		06:23 (8)	04:48	
	16:08		17:02		17:56			19:54			20:48	18	06:41 (8)	21:35	
6	08:28		07:51		06:51			06:36		07:00 (7)	05:30		06:24 (8)	04:47	
	16:09		17:04		17:58			19:55	6	07:06 (7)	20:50	16	06:40 (8)	21:36	
7	08:27		07:49		06:49			06:34		06:57 (7)	05:28		06:25 (8)	04:46	
	16:10		17:06		18:00			19:57	11	07:08 (7)	20:52	13	06:38 (8)	21:37	
8	08:27		07:47		06:46			06:32		06:55 (7)	05:26		06:27 (8)	04:46	
	16:12		17:08		18:02			19:59	14	07:09 (7)	20:53	10	06:37 (8)	21:38	
9	08:26		07:45		06:44			06:29		06:53 (7)	05:24			04:45	
	16:13		17:10		18:04			20:01	17	07:10 (7)	20:55			21:38	
10	08:25		07:43		06:42			06:27		06:51 (7)	05:22			04:45	
	16:15		17:12		18:06			20:03	19	07:10 (7)	20:57			21:39	
11	08:25		07:41		06:39			06:24		06:51 (7)	05:21			04:44	
	16:16		17:13		18:08			20:05	19	07:10 (7)	20:58			21:40	
12	08:24		07:39		06:37			06:22		06:51 (7)	05:19			04:44	
	16:18		17:15		18:10			20:06	19	07:10 (7)	21:00			21:41	
13	08:23		07:37		06:34		06:59 (4)	06:20		06:50 (7)	05:17			04:44	
	16:19		17:17		18:11	9	07:08 (4)	20:08	19	07:09 (7)	21:02			21:42	
14	08:22		07:35		06:32		06:57 (4)	06:17		06:50 (7)	05:15			04:43	
	16:21		17:19		18:13	14	07:11 (4)	20:10	19	07:09 (7)	21:04			21:42	
15	08:22		07:33		06:30		06:54 (4)	06:15		06:51 (7)	05:14			04:43	
	16:23		17:21		18:15	18	07:12 (4)	20:12	17	07:08 (7)	21:05			21:43	
16	08:21		07:31		06:27		06:54 (4)	06:13		06:52 (7)	05:12			04:43	
	16:24		17:23		18:17	19	07:13 (4)	20:14	15	07:07 (7)	21:07			21:43	
17	08:20		07:29		06:25		06:52 (4)	06:10		06:52 (7)	05:11			04:43	
	16:26		17:25		18:19	21	07:13 (4)	20:16	13	07:05 (7)	21:09			21:44	
18	08:19		07:27		06:22		06:52 (4)	06:08		06:54 (7)	05:09			04:43	
	16:28		17:27		18:21	21	07:13 (4)	20:17	9	07:03 (7)	21:10			21:44	
19	08:17		07:25		06:20		06:51 (4)	06:06			05:07			04:43	
	16:29		17:29		18:23	21	07:12 (4)	20:19			21:12			21:45	
20	08:16		07:23		06:17		06:51 (4)	06:04		06:34 (8)	05:06			04:43	
	16:31		17:31		18:24	22	07:13 (4)	20:21	1	06:35 (8)	21:13			21:45	
21	08:15		07:20		06:15		06:50 (4)	06:01		06:29 (8)	05:04			04:43	
	16:33		17:33		18:26	21	07:11 (4)	20:23	11	06:40 (8)	21:15			21:45	
22	08:14		07:18		06:13		06:51 (4)	05:59		06:27 (8)	05:03			04:43	
	16:35		17:35		18:28	20	07:11 (4)	20:25	15	06:42 (8)	21:16			21:45	
23	08:13		07:16		06:10		06:52 (4)	05:57		06:24 (8)	05:02			04:44	
	16:37		17:37		18:30	18	07:10 (4)	20:26	18	06:42 (8)	21:18			21:46	
24	08:11		07:14		06:08		06:52 (4)	05:55		06:23 (8)	05:00			04:44	
	16:38		17:39		18:32	16	07:08 (4)	20:28	20	06:43 (8)	21:19			21:46	
25	08:10		07:12		06:05		06:54 (4)	05:53		06:22 (8)	04:59			04:44	
	16:40		17:41		18:34	12	07:06 (4)	20:30	22	06:44 (8)	21:21			21:46	
26	08:09		07:09		06:03		06:57 (4)	05:50		06:21 (8)	04:58			04:45	
	16:42		17:43		18:35	5	07:02 (4)	20:32	23	06:44 (8)	21:22			21:46	
27	08:07		07:07		06:00			05:48		06:21 (8)	04:57			04:45	
	16:44		17:45		18:37			20:34	23	06:44 (8)	21:24			21:46	
28	08:06		07:05		05:58			05:46		06:21 (8)	04:55			04:46	
	16:46		17:47		18:39			20:35	24	06:45 (8)	21:25			21:46	
29	08:04				06:56			05:44		06:20 (8)	04:54			04:46	
	16:48				19:41			20:37	24	06:44 (8)	21:26			21:45	
30	08:03				06:53			05:42		06:20 (8)	04:53			04:47	
	16:50				19:43			20:39	24	06:44 (8)	21:28			21:45	
31	08:01				06:51						04:52				
	16:52				19:45						21:29				
Sonnenscheinstunden	252		274		367			419			492			508	
astr.max.mögl.Beschattung						237			402			145			
Red.Sonnenscheinwahrsch.						0.31			0.41			0.51			
Reduktion Betriebsdauer						0.91			0.91			0.91			
Reduktion Windrichtung						0.69			0.69			0.69			
Gesamte Reduktion						0.20			0.26			0.32			
Met.wahrsch.Beschattung						47			104			46			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** II - IO243

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August			September			Oktober			November	Dezember
1	04:47	05:27			06:20		06:50 (7)	07:13		07:42 (4)	07:10	08:04
	21:45	21:10			20:04	19	07:09 (7)	18:52	3	07:45 (4)	16:42	15:58
2	04:48	05:28			06:22		06:50 (7)	07:14			07:12	08:06
	21:44	21:08			20:02	19	07:09 (7)	18:49			16:40	15:57
3	04:49	05:30			06:24		06:51 (7)	07:16			07:14	08:07
	21:44	21:07			20:00	17	07:08 (7)	18:47			16:38	15:57
4	04:50	05:32		06:40 (8)	06:25		06:52 (7)	07:18			07:16	08:09
	21:44	21:05	4	06:44 (8)	19:57	14	07:06 (7)	18:44			16:36	15:56
5	04:51	05:33		06:36 (8)	06:27		06:54 (7)	07:20			07:18	08:10
	21:43	21:03	11	06:47 (8)	19:55	11	07:05 (7)	18:42			16:34	15:56
6	04:51	05:35		06:35 (8)	06:29		06:56 (7)	07:21			07:20	08:11
	21:42	21:01	14	06:49 (8)	19:53	6	07:02 (7)	18:40			16:32	15:55
7	04:52	05:37		06:33 (8)	06:30			07:23			07:21	08:13
	21:42	20:59	17	06:50 (8)	19:50			18:37			16:30	15:55
8	04:53	05:38		06:32 (8)	06:32			07:25			07:23	08:14
	21:41	20:57	19	06:51 (8)	19:48			18:35			16:29	15:54
9	04:54	05:40		06:30 (8)	06:34			07:27			07:25	08:15
	21:40	20:55	21	06:51 (8)	19:45			18:32			16:27	15:54
10	04:56	05:42		06:30 (8)	06:36			07:29			07:27	08:16
	21:40	20:53	22	06:52 (8)	19:43			18:30			16:25	15:54
11	04:57	05:43		06:30 (8)	06:37			07:31			07:29	08:18
	21:39	20:51	23	06:53 (8)	19:40			18:28			16:23	15:53
12	04:58	05:45		06:29 (8)	06:39			07:32			07:31	08:19
	21:38	20:49	23	06:52 (8)	19:38			18:25			16:22	15:53
13	04:59	05:47		06:29 (8)	06:41			07:34			07:33	08:20
	21:37	20:47	24	06:53 (8)	19:36			18:23			16:20	15:53
14	05:00	05:49		06:28 (8)	06:43			07:36			07:35	08:21
	21:36	20:45	24	06:52 (8)	19:33			18:21			16:19	15:53
15	05:01	05:50		06:28 (8)	06:44			07:38			07:37	08:22
	21:35	20:43	24	06:52 (8)	19:31			18:18			16:17	15:53
16	05:03	05:52		06:29 (8)	06:46			07:40			07:38	08:22
	21:34	20:41	23	06:52 (8)	19:28			18:16			16:16	15:53
17	05:04	05:54		06:28 (8)	06:48			07:42			07:40	08:23
	21:32	20:39	23	06:51 (8)	19:26			18:14			16:14	15:53
18	05:05	05:56		06:29 (8)	06:50		07:42 (4)	07:43			07:42	08:24
	21:31	20:36	21	06:50 (8)	19:23	11	07:53 (4)	18:12			16:13	15:53
19	05:07	05:57		06:30 (8)	06:51		07:40 (4)	07:45			07:44	08:25
	21:30	20:34	20	06:50 (8)	19:21	15	07:55 (4)	18:09			16:11	15:54
20	05:08	05:59		06:30 (8)	06:53		07:38 (4)	07:47			07:46	08:26
	21:29	20:32	18	06:48 (8)	19:18	17	07:55 (4)	18:07			16:10	15:54
21	05:10	06:01		06:32 (8)	06:55		07:37 (4)	07:49			07:47	08:26
	21:27	20:30	14	06:46 (8)	19:16	19	07:56 (4)	18:05			16:09	15:54
22	05:11	06:03		06:34 (8)	06:57		07:36 (4)	07:51			07:49	08:27
	21:26	20:28	10	06:44 (8)	19:14	21	07:57 (4)	18:03			16:07	15:55
23	05:12	06:04			06:58		07:35 (4)	07:53			07:51	08:27
	21:25	20:25			19:11	21	07:56 (4)	18:00			16:06	15:55
24	05:14	06:06			07:00		07:34 (4)	07:55			07:53	08:28
	21:23	20:23			19:09	22	07:56 (4)	17:58			16:05	15:56
25	05:15	06:08		06:58 (7)	07:02		07:34 (4)	06:57			07:54	08:28
	21:22	20:21	9	07:07 (7)	19:06	22	07:56 (4)	16:56			16:04	15:57
26	05:17	06:10		06:55 (7)	07:04		07:35 (4)	06:58			07:56	08:28
	21:20	20:18	13	07:08 (7)	19:04	20	07:55 (4)	16:54			16:03	15:57
27	05:19	06:11		06:54 (7)	07:05		07:35 (4)	07:00			07:58	08:29
	21:19	20:16	15	07:09 (7)	19:01	20	07:55 (4)	16:52			16:02	15:58
28	05:20	06:13		06:53 (7)	07:07		07:35 (4)	07:02			07:59	08:29
	21:17	20:14	17	07:10 (7)	18:59	18	07:53 (4)	16:50			16:01	15:59
29	05:22	06:15		06:51 (7)	07:09		07:36 (4)	07:04			08:01	08:29
	21:15	20:12	19	07:10 (7)	18:56	15	07:51 (4)	16:48			16:00	16:00
30	05:23	06:17		06:51 (7)	07:11		07:38 (4)	07:06			08:03	08:29
	21:14	20:09	19	07:10 (7)	18:54	11	07:49 (4)	16:46			15:59	16:01
31	05:25	06:18		06:51 (7)				07:08				08:29
	21:12	20:07	19	07:10 (7)				16:44				16:02
Sonnenscheinstunden	510	459			382			329			260	235
astr.max.mögl.Beschattung			466			318			3			
Red.Sonnenscheinwahrsch.			0.49			0.40			0.33			
Reduktion Betriebsdauer			0.91			0.91			0.91			
Reduktion Windrichtung			0.69			0.69			0.69			
Gesamte Reduktion			0.31			0.25			0.21			
Met.wahrsch.Beschattung			142			80			1			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IJ - IO244

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März			April			Mai			Juni	
1	08:29		07:59		07:03			06:48			05:40		06:17 (8)	04:51	
	16:03		16:54		17:49			19:46			20:41	24	06:41 (8)	21:30	
2	08:29		07:58		07:00			06:46			05:38		06:17 (8)	04:50	
	16:04		16:56		17:51			19:48			20:43	23	06:40 (8)	21:31	
3	08:29		07:56		06:58			06:43			05:36		06:18 (8)	04:49	
	16:05		16:58		17:53			19:50			20:44	23	06:41 (8)	21:32	
4	08:28		07:54		06:56			06:41			05:34		06:18 (8)	04:49	
	16:07		17:00		17:54			19:52			20:46	22	06:40 (8)	21:34	
5	08:28		07:52		06:53			06:39			05:32		06:19 (8)	04:48	
	16:08		17:02		17:56			19:54			20:48	20	06:39 (8)	21:35	
6	08:28		07:51		06:51			06:36			05:30		06:19 (8)	04:47	
	16:09		17:04		17:58			19:55			20:50	19	06:38 (8)	21:36	
7	08:27		07:49		06:49			06:34		06:57 (7)	05:28		06:20 (8)	04:46	
	16:10		17:06		18:00			19:57	5	07:02 (7)	20:52	17	06:37 (8)	21:37	
8	08:27		07:47		06:46			06:32		06:55 (7)	05:26		06:22 (8)	04:46	
	16:12		17:08		18:02			19:59	10	07:05 (7)	20:53	14	06:36 (8)	21:38	
9	08:26		07:45		06:44			06:29		06:53 (7)	05:24		06:23 (8)	04:45	
	16:13		17:10		18:04			20:01	13	07:06 (7)	20:55	11	06:34 (8)	21:38	
10	08:25		07:43		06:42			06:27		06:50 (7)	05:22		06:27 (8)	04:45	
	16:15		17:12		18:06			20:03	16	07:06 (7)	20:57	2	06:29 (8)	21:39	
11	08:25		07:41		06:39			06:24		06:49 (7)	05:21			04:44	
	16:16		17:13		18:08			20:05	18	07:07 (7)	20:58			21:40	
12	08:24		07:39		06:37			06:22		06:48 (7)	05:19			04:44	
	16:18		17:15		18:10			20:06	19	07:07 (7)	21:00			21:41	
13	08:23		07:37		06:34			06:20		06:47 (7)	05:17			04:44	
	16:19		17:17		18:11			20:08	19	07:06 (7)	21:02			21:42	
14	08:22		07:35		06:32		06:58 (4)	06:17		06:47 (7)	05:15			04:43	
	16:21		17:19		18:13	4	07:02 (4)	20:10	19	07:06 (7)	21:04			21:42	
15	08:22		07:33		06:30		06:53 (4)	06:15		06:48 (7)	05:14			04:43	
	16:23		17:21		18:15	12	07:05 (4)	20:12	18	07:06 (7)	21:05			21:43	
16	08:21		07:31		06:27		06:52 (4)	06:13		06:48 (7)	05:12			04:43	
	16:24		17:23		18:17	15	07:07 (4)	20:14	17	07:05 (7)	21:07			21:43	
17	08:20		07:29		06:25		06:49 (4)	06:10		06:48 (7)	05:11			04:43	
	16:26		17:25		18:19	19	07:08 (4)	20:16	16	07:04 (7)	21:09			21:44	
18	08:19		07:27		06:22		06:49 (4)	06:08		06:49 (7)	05:09			04:43	
	16:28		17:27		18:21	20	07:09 (4)	20:17	13	07:02 (7)	21:10			21:44	
19	08:17		07:25		06:20		06:47 (4)	06:06		06:51 (7)	05:07			04:43	
	16:29		17:29		18:23	21	07:08 (4)	20:19	9	07:00 (7)	21:12			21:45	
20	08:16		07:23		06:17		06:47 (4)	06:04			05:06			04:43	
	16:31		17:31		18:24	22	07:09 (4)	20:21			21:13			21:45	
21	08:15		07:20		06:15		06:46 (4)	06:01			05:04			04:43	
	16:33		17:33		18:26	22	07:08 (4)	20:23			21:15			21:45	
22	08:14		07:18		06:13		06:47 (4)	05:59		06:26 (8)	05:03			04:43	
	16:35		17:35		18:28	21	07:08 (4)	20:25	10	06:36 (8)	21:16			21:45	
23	08:13		07:16		06:10		06:47 (4)	05:57		06:24 (8)	05:02			04:44	
	16:37		17:37		18:30	20	07:07 (4)	20:26	14	06:38 (8)	21:18			21:46	
24	08:11		07:14		06:08		06:47 (4)	05:55		06:21 (8)	05:00			04:44	
	16:38		17:39		18:32	19	07:06 (4)	20:28	18	06:39 (8)	21:19			21:46	
25	08:10		07:12		06:05		06:48 (4)	05:53		06:20 (8)	04:59			04:44	
	16:40		17:41		18:34	17	07:05 (4)	20:30	20	06:40 (8)	21:21			21:46	
26	08:09		07:09		06:03		06:49 (4)	05:50		06:19 (8)	04:58			04:45	
	16:42		17:43		18:35	13	07:02 (4)	20:32	21	06:40 (8)	21:22			21:46	
27	08:07		07:07		06:00		06:51 (4)	05:48		06:18 (8)	04:57			04:45	
	16:44		17:45		18:37	9	07:00 (4)	20:34	23	06:41 (8)	21:24			21:46	
28	08:06		07:05		05:58			05:46		06:18 (8)	04:55			04:46	
	16:46		17:47		18:39			20:35	23	06:41 (8)	21:25			21:46	
29	08:04				06:56			05:44		06:18 (8)	04:54			04:46	
	16:48				19:41			20:37	23	06:41 (8)	21:26			21:45	
30	08:03				06:53			05:42		06:17 (8)	04:53			04:47	
	16:50				19:43			20:39	24	06:41 (8)	21:28			21:45	
31	08:01				06:51						04:52				
	16:52				19:45						21:29				
Sonnenscheinstunden	252		274		367			419			492			508	
astr.max.mögl.Beschattung						234			368			175			
Red.Sonnenscheinwahrsch.						0.31			0.41			0.51			
Reduktion Betriebsdauer						0.91			0.91			0.91			
Reduktion Windrichtung						0.69			0.69			0.69			
Gesamte Reduktion						0.20			0.26			0.32			
Met.wahrsch.Beschattung						46			95			56			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IJ - IO244

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August			September			Oktober		November	Dezember
1	04:47		05:27			06:20		06:48 (7)	07:13		07:10	08:04
	21:45		21:10			20:04	18	07:06 (7)	18:52		16:42	15:58
2	04:48		05:28			06:22		06:49 (7)	07:14		07:12	08:06
	21:44		21:08			20:02	16	07:05 (7)	18:49		16:40	15:57
3	04:49		05:30		06:35 (8)	06:24		06:51 (7)	07:16		07:14	08:07
	21:44		21:07	7	06:42 (8)	20:00	13	07:04 (7)	18:47		16:38	15:57
4	04:50		05:32		06:33 (8)	06:25		06:52 (7)	07:18		07:16	08:09
	21:44		21:05	12	06:45 (8)	19:57	10	07:02 (7)	18:44		16:36	15:56
5	04:51		05:33		06:31 (8)	06:27		06:54 (7)	07:20		07:18	08:10
	21:43		21:03	15	06:46 (8)	19:55	5	06:59 (7)	18:42		16:34	15:56
6	04:51		05:35		06:30 (8)	06:29			07:21		07:20	08:11
	21:42		21:01	17	06:47 (8)	19:53			18:40		16:32	15:55
7	04:52		05:37		06:28 (8)	06:30			07:23		07:21	08:13
	21:42		20:59	20	06:48 (8)	19:50			18:37		16:30	15:55
8	04:53		05:38		06:28 (8)	06:32			07:25		07:23	08:14
	21:41		20:57	21	06:49 (8)	19:48			18:35		16:29	15:54
9	04:54		05:40		06:27 (8)	06:34			07:27		07:25	08:15
	21:40		20:55	22	06:49 (8)	19:45			18:32		16:27	15:54
10	04:56		05:42		06:27 (8)	06:36			07:29		07:27	08:16
	21:40		20:53	22	06:49 (8)	19:43			18:30		16:25	15:54
11	04:57		05:43		06:27 (8)	06:37			07:31		07:29	08:18
	21:39		20:51	23	06:50 (8)	19:40			18:28		16:23	15:53
12	04:58		05:45		06:26 (8)	06:39			07:32		07:31	08:19
	21:38		20:49	23	06:49 (8)	19:38			18:25		16:22	15:53
13	04:59		05:47		06:26 (8)	06:41			07:34		07:33	08:20
	21:37		20:47	23	06:49 (8)	19:36			18:23		16:20	15:53
14	05:00		05:49		06:25 (8)	06:43			07:36		07:35	08:21
	21:36		20:45	24	06:49 (8)	19:33			18:21		16:19	15:53
15	05:01		05:50		06:26 (8)	06:44			07:38		07:37	08:22
	21:35		20:43	22	06:48 (8)	19:31			18:18		16:17	15:53
16	05:03		05:52		06:26 (8)	06:46		07:41 (4)	07:40		07:38	08:22
	21:34		20:41	22	06:48 (8)	19:28	7	07:48 (4)	18:16		16:16	15:53
17	05:04		05:54		06:26 (8)	06:48		07:38 (4)	07:42		07:40	08:23
	21:32		20:39	21	06:47 (8)	19:26	13	07:51 (4)	18:14		16:14	15:53
18	05:05		05:56		06:27 (8)	06:50		07:36 (4)	07:43		07:42	08:24
	21:31		20:36	19	06:46 (8)	19:23	16	07:52 (4)	18:12		16:13	15:53
19	05:07		05:57		06:28 (8)	06:51		07:35 (4)	07:45		07:44	08:25
	21:30		20:34	17	06:45 (8)	19:21	18	07:53 (4)	18:09		16:11	15:54
20	05:08		05:59		06:29 (8)	06:53		07:33 (4)	07:47		07:46	08:26
	21:29		20:32	14	06:43 (8)	19:18	20	07:53 (4)	18:07		16:10	15:54
21	05:10		06:01		06:31 (8)	06:55		07:32 (4)	07:49		07:47	08:26
	21:27		20:30	9	06:40 (8)	19:16	21	07:53 (4)	18:05		16:09	15:54
22	05:11		06:03			06:57		07:32 (4)	07:51		07:49	08:27
	21:26		20:28			19:14	21	07:53 (4)	18:03		16:07	15:55
23	05:12		06:04			06:58		07:31 (4)	07:53		07:51	08:27
	21:25		20:25			19:11	21	07:52 (4)	18:00		16:06	15:55
24	05:14		06:06		06:55 (7)	07:00		07:31 (4)	07:55		07:53	08:28
	21:23		20:23	9	07:04 (7)	19:09	21	07:52 (4)	17:58		16:05	15:56
25	05:15		06:08		06:53 (7)	07:02		07:31 (4)	06:57		07:54	08:28
	21:22		20:21	13	07:06 (7)	19:06	20	07:51 (4)	16:56		16:04	15:57
26	05:17		06:10		06:51 (7)	07:04		07:32 (4)	06:58		07:56	08:28
	21:20		20:18	15	07:06 (7)	19:04	19	07:51 (4)	16:54		16:03	15:57
27	05:19		06:11		06:50 (7)	07:05		07:33 (4)	07:00		07:58	08:29
	21:19		20:16	17	07:07 (7)	19:01	16	07:49 (4)	16:52		16:02	15:58
28	05:20		06:13		06:49 (7)	07:07		07:33 (4)	07:02		07:59	08:29
	21:17		20:14	19	07:08 (7)	18:59	14	07:47 (4)	16:50		16:01	15:59
29	05:22		06:15		06:48 (7)	07:09		07:36 (4)	07:04		08:01	08:29
	21:15		20:12	19	07:07 (7)	18:56	8	07:44 (4)	16:48		16:00	16:00
30	05:23		06:17		06:48 (7)	07:11			07:06		08:03	08:29
	21:14		20:09	19	07:07 (7)	18:54			16:46		15:59	16:01
31	05:25		06:18		06:48 (7)				07:08			08:29
	21:12		20:07	19	07:07 (7)				16:44			16:02
Sonnenscheinstunden	510		459			382			329		260	235
astr.max.mögl.Beschattung				483			297					
Red.Sonnenscheinwahrsch.				0.49			0.40					
Reduktion Betriebsdauer				0.91			0.91					
Reduktion Windrichtung				0.69			0.69					
Gesamte Reduktion				0.31			0.25					
Met.wahrsch.Beschattung				148			75					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IK - IO245

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März			April			Mai			Juni	
1	08:29		07:59		07:03			06:48			05:40		06:29 (8)	04:51	
	16:03		16:54		17:49			19:46			20:41	17	06:46 (8)	21:30	
2	08:29		07:58		07:00			06:46			05:38		06:30 (8)	04:50	
	16:04		16:56		17:51			19:48			20:43	14	06:44 (8)	21:31	
3	08:29		07:56		06:58			06:43			05:36		06:33 (8)	04:49	
	16:05		16:58		17:53			19:50			20:44	10	06:43 (8)	21:32	
4	08:28		07:54		06:56			06:41			05:34			04:49	
	16:07		17:00		17:54			19:52			20:46			21:34	
5	08:28		07:52		06:53			06:39			05:32			04:48	
	16:08		17:02		17:56			19:54			20:48			21:35	
6	08:28		07:51		06:51			06:36			05:30			04:47	
	16:09		17:04		17:58			19:55			20:50			21:36	
7	08:27		07:49		06:49			06:34			05:28			04:46	
	16:10		17:06		18:00			19:57			20:52			21:37	
8	08:27		07:47		06:46			06:32			05:26			04:46	
	16:12		17:08		18:02			19:59			20:53			21:38	
9	08:26		07:45		06:44			06:29			05:24			04:45	
	16:13		17:10		18:04			20:01			20:55			21:38	
10	08:25		07:43		06:42			06:27			05:22			04:45	
	16:15		17:12		18:06			20:03			20:57			21:39	
11	08:25		07:41		06:39			06:24			05:21			04:44	
	16:16		17:13		18:08			20:05			20:58			21:40	
12	08:24		07:39		06:37		07:00 (4)	06:22			05:19			04:44	
	16:18		17:15		18:10	11	07:11 (4)	20:06			21:00			21:41	
13	08:23		07:37		06:34		06:58 (4)	06:20			05:17			04:44	
	16:19		17:17		18:11	15	07:13 (4)	20:08			21:02			21:42	
14	08:22		07:35		06:32		06:57 (4)	06:17			05:15			04:43	
	16:21		17:19		18:13	17	07:14 (4)	20:10			21:04			21:42	
15	08:22		07:33		06:30		06:55 (4)	06:15			05:14			04:43	
	16:23		17:21		18:15	19	07:14 (4)	20:12			21:05			21:43	
16	08:21		07:31		06:27		06:55 (4)	06:13			05:12			04:43	
	16:24		17:23		18:17	20	07:15 (4)	20:14			21:07			21:43	
17	08:20		07:29		06:25		06:54 (4)	06:10		06:36 (8)	05:11			04:43	
	16:26		17:25		18:19	20	07:14 (4)	20:16	8	06:44 (8)	21:09			21:44	
18	08:19		07:27		06:22		06:54 (4)	06:08		06:34 (8)	05:09			04:43	
	16:28		17:27		18:21	20	07:14 (4)	20:17	13	06:47 (8)	21:10			21:44	
19	08:17		07:25		06:20		06:53 (4)	06:06		06:32 (8)	05:07			04:43	
	16:29		17:29		18:23	20	07:13 (4)	20:19	16	06:48 (8)	21:12			21:45	
20	08:16		07:23		06:17		06:54 (4)	06:04		06:31 (8)	05:06			04:43	
	16:31		17:31		18:24	19	07:13 (4)	20:21	18	06:49 (8)	21:13			21:45	
21	08:15		07:20		06:15		06:54 (4)	06:01		06:30 (8)	05:04			04:43	
	16:33		17:33		18:26	17	07:11 (4)	20:23	20	06:50 (8)	21:15			21:45	
22	08:14		07:18		06:13		06:55 (4)	05:59		06:29 (8)	05:03			04:43	
	16:35		17:35		18:28	15	07:10 (4)	20:25	22	06:51 (8)	21:16			21:45	
23	08:13		07:16		06:10		06:57 (4)	05:57		06:28 (8)	05:02			04:44	
	16:37		17:37		18:30	12	07:09 (4)	20:26	23	06:51 (8)	21:18			21:46	
24	08:11		07:14		06:08		06:59 (4)	05:55		06:27 (8)	05:00			04:44	
	16:38		17:39		18:32	5	07:04 (4)	20:28	23	06:50 (8)	21:19			21:46	
25	08:10		07:12		06:05			05:53		06:27 (8)	04:59			04:44	
	16:40		17:41		18:34			20:30	23	06:50 (8)	21:21			21:46	
26	08:09		07:09		06:03			05:50		06:27 (8)	04:58			04:45	
	16:42		17:43		18:35			20:32	23	06:50 (8)	21:22			21:46	
27	08:07		07:07		06:00			05:48		06:27 (8)	04:57			04:45	
	16:44		17:45		18:37			20:34	22	06:49 (8)	21:24			21:46	
28	08:06		07:05		05:58			05:46		06:27 (8)	04:55			04:46	
	16:46		17:47		18:39			20:35	22	06:49 (8)	21:25			21:46	
29	08:04				06:56			05:44		06:28 (8)	04:54			04:46	
	16:48				19:41			20:37	20	06:48 (8)	21:26			21:45	
30	08:03				06:53			05:42		06:28 (8)	04:53			04:47	
	16:50				19:43			20:39	19	06:47 (8)	21:28			21:45	
31	08:01				06:51						04:52				
	16:52				19:45						21:29				
Sonnenscheinstunden	252		274		367			419			492			508	
astr.max.mögl.Beschattung						210			272			41			
Red.Sonnenscheinwahrsch.						0.31			0.41			0.51			
Reduktion Betriebsdauer						0.91			0.91			0.91			
Reduktion Windrichtung						0.69			0.68			0.68			
Gesamte Reduktion						0.20			0.26			0.32			
Met.wahrsch.Beschattung						41			70			13			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IK - IO245

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August			September			Oktober			November	Dezember
1	04:47		05:27			06:20			07:13		07:39 (4)	07:10	08:04
	21:45		21:10			20:04			18:52	12	07:51 (4)	16:42	15:58
2	04:48		05:28			06:22			07:14		07:40 (4)	07:12	08:06
	21:44		21:08			20:02			18:49	7	07:47 (4)	16:40	15:57
3	04:49		05:30			06:24			07:16			07:14	08:07
	21:44		21:07			20:00			18:47			16:38	15:57
4	04:50		05:32			06:25			07:18			07:16	08:09
	21:44		21:05			19:57			18:44			16:36	15:56
5	04:51		05:33			06:27			07:20			07:18	08:10
	21:43		21:03			19:55			18:42			16:34	15:56
6	04:51		05:35			06:29			07:21			07:20	08:11
	21:42		21:01			19:53			18:40			16:32	15:55
7	04:52		05:37			06:30			07:23			07:21	08:13
	21:42		20:59			19:50			18:37			16:30	15:55
8	04:53		05:38			06:32			07:25			07:23	08:14
	21:41		20:57			19:48			18:35			16:29	15:54
9	04:54		05:40		06:44 (8)	06:34			07:27			07:25	08:15
	21:40		20:55	4	06:48 (8)	19:45			18:32			16:27	15:54
10	04:56		05:42		06:41 (8)	06:36			07:29			07:27	08:16
	21:40		20:53	11	06:52 (8)	19:43			18:30			16:25	15:54
11	04:57		05:43		06:39 (8)	06:37			07:31			07:29	08:18
	21:39		20:51	15	06:54 (8)	19:40			18:28			16:23	15:53
12	04:58		05:45		06:37 (8)	06:39			07:32			07:31	08:19
	21:38		20:49	17	06:54 (8)	19:38			18:25			16:22	15:53
13	04:59		05:47		06:37 (8)	06:41			07:34			07:33	08:20
	21:37		20:47	19	06:56 (8)	19:36			18:23			16:20	15:53
14	05:00		05:49		06:35 (8)	06:43			07:36			07:35	08:21
	21:36		20:45	21	06:56 (8)	19:33			18:21			16:19	15:53
15	05:01		05:50		06:35 (8)	06:44			07:38			07:37	08:22
	21:35		20:43	21	06:56 (8)	19:31			18:18			16:17	15:53
16	05:03		05:52		06:35 (8)	06:46			07:40			07:38	08:23
	21:34		20:41	22	06:57 (8)	19:28			18:16			16:16	15:53
17	05:04		05:54		06:33 (8)	06:48			07:42			07:40	08:23
	21:32		20:39	23	06:56 (8)	19:26			18:14			16:14	15:53
18	05:05		05:56		06:34 (8)	06:50			07:43			07:42	08:24
	21:31		20:36	23	06:57 (8)	19:23			18:12			16:13	15:53
19	05:07		05:57		06:34 (8)	06:51			07:45			07:44	08:25
	21:30		20:34	23	06:57 (8)	19:21			18:09			16:11	15:54
20	05:08		05:59		06:33 (8)	06:53		07:43 (4)	07:47			07:46	08:26
	21:29		20:32	22	06:55 (8)	19:18	11	07:54 (4)	18:07			16:10	15:54
21	05:10		06:01		06:34 (8)	06:55		07:41 (4)	07:49			07:47	08:26
	21:27		20:30	21	06:55 (8)	19:16	15	07:56 (4)	18:05			16:09	15:54
22	05:11		06:03		06:34 (8)	06:57		07:39 (4)	07:51			07:49	08:27
	21:26		20:28	21	06:55 (8)	19:14	18	07:57 (4)	18:03			16:07	15:55
23	05:12		06:04		06:34 (8)	06:58		07:37 (4)	07:53			07:51	08:27
	21:25		20:25	19	06:53 (8)	19:11	19	07:56 (4)	18:00			16:06	15:55
24	05:14		06:06		06:36 (8)	07:00		07:37 (4)	07:55			07:53	08:28
	21:23		20:23	16	06:52 (8)	19:09	20	07:57 (4)	17:58			16:05	15:56
25	05:15		06:08		06:38 (8)	07:02		07:36 (4)	06:57			07:54	08:28
	21:22		20:21	12	06:50 (8)	19:06	21	07:57 (4)	16:56			16:04	15:57
26	05:17		06:10		06:40 (8)	07:04		07:36 (4)	06:58			07:56	08:28
	21:20		20:18	6	06:46 (8)	19:04	21	07:57 (4)	16:54			16:03	15:57
27	05:19		06:11			07:05		07:36 (4)	07:00			07:58	08:29
	21:19		20:16			19:01	21	07:57 (4)	16:52			16:02	15:58
28	05:20		06:13			07:07		07:36 (4)	07:02			07:59	08:29
	21:17		20:14			18:59	19	07:55 (4)	16:50			16:01	15:59
29	05:22		06:15			07:09		07:36 (4)	07:04			08:01	08:29
	21:15		20:12			18:56	18	07:54 (4)	16:48			16:00	16:00
30	05:23		06:17			07:11		07:37 (4)	07:06			08:03	08:29
	21:14		20:09			18:54	16	07:53 (4)	16:46			15:59	16:01
31	05:25		06:18						07:08				08:29
	21:12		20:07						16:44				16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung				316			199			19			
Red.Sonnenscheinwahrsch.				0.49			0.40			0.33			
Reduktion Betriebsdauer				0.91			0.91			0.91			
Reduktion Windrichtung				0.68			0.69			0.69			
Gesamte Reduktion				0.30			0.25			0.21			
Met.wahrsch.Beschattung				96			50			4			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IL - IO246

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März			April			Mai			Juni	
1	08:29		07:59		07:03			06:48			05:40		06:33 (8)	04:51	
	16:03		16:54		17:49			19:46			20:41	14	06:47 (8)	21:30	
2	08:29		07:58		07:00			06:46			05:38		06:34 (8)	04:50	
	16:04		16:56		17:51			19:48			20:43	11	06:45 (8)	21:31	
3	08:29		07:56		06:58			06:43			05:36		06:40 (8)	04:49	
	16:05		16:58		17:53			19:50			20:44	1	06:41 (8)	21:32	
4	08:28		07:54		06:56			06:41			05:34			04:49	
	16:07		17:00		17:54			19:52			20:46			21:34	
5	08:28		07:52		06:53			06:39			05:32			04:48	
	16:08		17:02		17:56			19:54			20:48			21:35	
6	08:28		07:51		06:51			06:36			05:30			04:47	
	16:09		17:04		17:58			19:55			20:50			21:36	
7	08:27		07:49		06:49			06:34			05:28			04:46	
	16:10		17:06		18:00			19:57			20:52			21:37	
8	08:27		07:47		06:46			06:32			05:26			04:46	
	16:12		17:08		18:02			19:59			20:53			21:38	
9	08:26		07:45		06:44			06:29			05:24			04:45	
	16:13		17:10		18:04			20:01			20:55			21:38	
10	08:25		07:43		06:42		07:06 (4)	06:27			05:22			04:45	
	16:15		17:12		18:06	5	07:11 (4)	20:03			20:57			21:39	
11	08:25		07:41		06:39		07:03 (4)	06:24			05:21			04:44	
	16:16		17:13		18:08	12	07:15 (4)	20:05			20:58			21:40	
12	08:24		07:39		06:37		07:00 (4)	06:22			05:19			04:44	
	16:18		17:15		18:10	16	07:16 (4)	20:06			21:00			21:41	
13	08:23		07:37		06:34		06:59 (4)	06:20			05:17			04:44	
	16:19		17:17		18:11	18	07:17 (4)	20:08			21:02			21:42	
14	08:22		07:35		06:32		06:59 (4)	06:17			05:15			04:43	
	16:21		17:19		18:13	19	07:18 (4)	20:10			21:04			21:42	
15	08:22		07:33		06:30		06:57 (4)	06:15			05:14			04:43	
	16:23		17:21		18:15	21	07:18 (4)	20:12			21:05			21:43	
16	08:21		07:31		06:27		06:57 (4)	06:13		06:40 (8)	05:12			04:43	
	16:24		17:23		18:17	21	07:18 (4)	20:14	7	06:47 (8)	21:07			21:43	
17	08:20		07:29		06:25		06:56 (4)	06:10		06:36 (8)	05:11			04:43	
	16:26		17:25		18:19	21	07:17 (4)	20:16	13	06:49 (8)	21:09			21:44	
18	08:19		07:27		06:22		06:57 (4)	06:08		06:34 (8)	05:09			04:43	
	16:28		17:27		18:21	20	07:17 (4)	20:17	17	06:51 (8)	21:10			21:44	
19	08:17		07:25		06:20		06:56 (4)	06:06		06:33 (8)	05:07			04:43	
	16:29		17:29		18:23	20	07:16 (4)	20:19	19	06:52 (8)	21:12			21:45	
20	08:16		07:23		06:17		06:57 (4)	06:04		06:32 (8)	05:06			04:43	
	16:31		17:31		18:24	18	07:15 (4)	20:21	21	06:53 (8)	21:13			21:45	
21	08:15		07:20		06:15		06:58 (4)	06:01		06:31 (8)	05:04			04:43	
	16:33		17:33		18:26	15	07:13 (4)	20:23	22	06:53 (8)	21:15			21:45	
22	08:14		07:18		06:13		07:00 (4)	05:59		06:31 (8)	05:03			04:43	
	16:35		17:35		18:28	11	07:11 (4)	20:25	22	06:53 (8)	21:16			21:45	
23	08:13		07:16		06:10		07:04 (4)	05:57		06:30 (8)	05:02			04:44	
	16:37		17:37		18:30	4	07:08 (4)	20:26	24	06:54 (8)	21:18			21:46	
24	08:11		07:14		06:08			05:55		06:29 (8)	05:00			04:44	
	16:38		17:39		18:32			20:28	24	06:53 (8)	21:19			21:46	
25	08:10		07:12		06:05			05:53		06:29 (8)	04:59			04:44	
	16:40		17:41		18:34			20:30	23	06:52 (8)	21:21			21:46	
26	08:09		07:09		06:03			05:50		06:29 (8)	04:58			04:45	
	16:42		17:43		18:35			20:32	23	06:52 (8)	21:22			21:46	
27	08:07		07:07		06:00			05:48		06:30 (8)	04:57			04:45	
	16:44		17:45		18:37			20:34	21	06:51 (8)	21:24			21:46	
28	08:06		07:05		05:58			05:46		06:30 (8)	04:55			04:46	
	16:46		17:47		18:39			20:35	21	06:51 (8)	21:25			21:46	
29	08:04				06:56			05:44		06:31 (8)	04:54			04:46	
	16:48				19:41			20:37	19	06:50 (8)	21:26			21:45	
30	08:03				06:53			05:42		06:31 (8)	04:53			04:47	
	16:50				19:43			20:39	17	06:48 (8)	21:28			21:45	
31	08:01				06:51						04:52				
	16:52				19:45						21:29				
Sonnenscheinstunden	252		274		367			419			492			508	
astr.max.mögl.Beschattung						221			293			26			
Red.Sonnenscheinwahrsch.						0.31			0.41			0.51			
Reduktion Betriebsdauer						0.91			0.91			0.91			
Reduktion Windrichtung						0.68			0.68			0.68			
Gesamte Reduktion						0.20			0.26			0.32			
Met.wahrsch.Beschattung						43			75			8			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IL - IO246

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August			September			Oktober			November	Dezember
1	04:47		05:27			06:20			07:13		07:40 (4)	07:10	08:04
	21:45		21:10			20:04			18:52	16	07:56 (4)	16:42	15:58
2	04:48		05:28			06:22			07:14		07:40 (4)	07:12	08:06
	21:44		21:08			20:02			18:49	14	07:54 (4)	16:40	15:57
3	04:49		05:30			06:24			07:16		07:42 (4)	07:14	08:07
	21:44		21:07			20:00			18:47	9	07:51 (4)	16:38	15:57
4	04:50		05:32			06:25			07:18			07:16	08:09
	21:44		21:05			19:57			18:44			16:36	15:56
5	04:51		05:33			06:27			07:20			07:18	08:10
	21:43		21:03			19:55			18:42			16:34	15:56
6	04:51		05:35			06:29			07:21			07:20	08:11
	21:42		21:01			19:53			18:40			16:32	15:55
7	04:52		05:37			06:30			07:23			07:21	08:13
	21:42		20:59			19:50			18:37			16:30	15:55
8	04:53		05:38			06:32			07:25			07:23	08:14
	21:41		20:57			19:48			18:35			16:29	15:54
9	04:54		05:40			06:34			07:27			07:25	08:15
	21:40		20:55			19:45			18:32			16:27	15:54
10	04:56		05:42		06:46 (8)	06:36			07:29			07:27	08:16
	21:40		20:53	6	06:52 (8)	19:43			18:30			16:25	15:54
11	04:57		05:43		06:43 (8)	06:37			07:31			07:29	08:18
	21:39		20:51	12	06:55 (8)	19:40			18:28			16:23	15:53
12	04:58		05:45		06:41 (8)	06:39			07:32			07:31	08:19
	21:38		20:49	15	06:56 (8)	19:38			18:25			16:22	15:53
13	04:59		05:47		06:40 (8)	06:41			07:34			07:33	08:20
	21:37		20:47	17	06:57 (8)	19:36			18:23			16:20	15:53
14	05:00		05:49		06:38 (8)	06:43			07:36			07:35	08:21
	21:36		20:45	19	06:57 (8)	19:33			18:21			16:19	15:53
15	05:01		05:50		06:37 (8)	06:44			07:38			07:37	08:22
	21:35		20:43	21	06:58 (8)	19:31			18:18			16:17	15:53
16	05:03		05:52		06:37 (8)	06:46			07:40			07:38	08:23
	21:34		20:41	22	06:59 (8)	19:28			18:16			16:16	15:53
17	05:04		05:54		06:36 (8)	06:48			07:42			07:40	08:23
	21:32		20:39	23	06:59 (8)	19:26			18:14			16:14	15:53
18	05:05		05:56		06:36 (8)	06:50			07:43			07:42	08:24
	21:31		20:36	23	06:59 (8)	19:23			18:12			16:13	15:53
19	05:07		05:57		06:36 (8)	06:51			07:45			07:44	08:25
	21:30		20:34	23	06:59 (8)	19:21			18:09			16:11	15:54
20	05:08		05:59		06:35 (8)	06:53			07:47			07:46	08:26
	21:29		20:32	23	06:58 (8)	19:18			18:07			16:10	15:54
21	05:10		06:01		06:36 (8)	06:55		07:46 (4)	07:49			07:47	08:26
	21:27		20:30	22	06:58 (8)	19:16	10	07:56 (4)	18:05			16:09	15:54
22	05:11		06:03		06:36 (8)	06:57		07:44 (4)	07:51			07:49	08:27
	21:26		20:28	22	06:58 (8)	19:14	14	07:58 (4)	18:03			16:07	15:55
23	05:12		06:04		06:36 (8)	06:58		07:41 (4)	07:53			07:51	08:27
	21:25		20:25	20	06:56 (8)	19:11	18	07:59 (4)	18:00			16:06	15:55
24	05:14		06:06		06:37 (8)	07:00		07:40 (4)	07:55			07:53	08:28
	21:23		20:23	18	06:55 (8)	19:09	19	07:59 (4)	17:58			16:05	15:56
25	05:15		06:08		06:38 (8)	07:02		07:40 (4)	06:57			07:54	08:28
	21:22		20:21	16	06:54 (8)	19:06	20	08:00 (4)	16:56			16:04	15:57
26	05:17		06:10		06:39 (8)	07:04		07:39 (4)	06:58			07:56	08:28
	21:20		20:18	12	06:51 (8)	19:04	21	08:00 (4)	16:54			16:03	15:57
27	05:19		06:11		06:43 (8)	07:05		07:39 (4)	07:00			07:58	08:29
	21:19		20:16	5	06:48 (8)	19:01	21	08:00 (4)	16:52			16:02	15:58
28	05:20		06:13			07:07		07:38 (4)	07:02			07:59	08:29
	21:17		20:14			18:59	21	07:59 (4)	16:50			16:01	15:59
29	05:22		06:15			07:09		07:38 (4)	07:04			08:01	08:29
	21:15		20:12			18:56	20	07:58 (4)	16:48			16:00	16:00
30	05:23		06:17			07:11		07:39 (4)	07:06			08:03	08:29
	21:14		20:09			18:54	18	07:57 (4)	16:46			15:59	16:01
31	05:25		06:18						07:08				08:29
	21:12		20:07						16:44				16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung				319			182			39			
Red.Sonnenscheinwahrsch.				0.49			0.40			0.33			
Reduktion Betriebsdauer				0.91			0.91			0.91			
Reduktion Windrichtung				0.68			0.68			0.68			
Gesamte Reduktion				0.30			0.25			0.20			
Met.wahrsch.Beschattung				97			46			8			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IM - IO247

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März			April			Mai			Juni	
1	08:29		07:59		07:03			06:48			05:40		06:35 (8)	04:51	
	16:03		16:54		17:49			19:46			20:41	12	06:47 (8)	21:30	
2	08:29		07:58		07:00			06:46			05:38		06:38 (8)	04:50	
	16:04		16:56		17:51			19:48			20:43	5	06:43 (8)	21:31	
3	08:29		07:56		06:58			06:43			05:36			04:49	
	16:05		16:58		17:53			19:50			20:44			21:32	
4	08:28		07:54		06:56			06:41			05:34			04:49	
	16:07		17:00		17:54			19:52			20:46			21:34	
5	08:28		07:52		06:53			06:39			05:32			04:48	
	16:08		17:02		17:56			19:54			20:48			21:35	
6	08:28		07:51		06:51			06:36			05:30			04:47	
	16:09		17:04		17:58			19:55			20:50			21:36	
7	08:27		07:49		06:49			06:34			05:28			04:46	
	16:10		17:06		18:00			19:57			20:52			21:37	
8	08:27		07:47		06:46			06:32			05:26			04:46	
	16:12		17:08		18:02			19:59			20:53			21:38	
9	08:26		07:45		06:44			06:29			05:24			04:45	
	16:13		17:10		18:04			20:01			20:55			21:39	
10	08:25		07:43		06:42		07:05 (4)	06:27			05:22			04:45	
	16:15		17:12		18:06	9	07:14 (4)	20:03			20:57			21:39	
11	08:25		07:41		06:39		07:03 (4)	06:24			05:21			04:44	
	16:16		17:13		18:08	13	07:16 (4)	20:05			20:58			21:40	
12	08:24		07:39		06:37		07:01 (4)	06:22			05:19			04:44	
	16:18		17:15		18:10	16	07:17 (4)	20:06			21:00			21:41	
13	08:23		07:37		06:34		07:00 (4)	06:20			05:17			04:44	
	16:19		17:17		18:11	18	07:18 (4)	20:08			21:02			21:42	
14	08:22		07:35		06:32		06:59 (4)	06:17			05:15			04:43	
	16:21		17:19		18:13	20	07:19 (4)	20:10			21:04			21:42	
15	08:22		07:33		06:30		06:58 (4)	06:15			05:14			04:43	
	16:23		17:21		18:15	21	07:19 (4)	20:12			21:05			21:43	
16	08:21		07:31		06:27		06:58 (4)	06:13		06:39 (8)	05:12			04:43	
	16:24		17:23		18:17	21	07:19 (4)	20:14	11	06:50 (8)	21:07			21:43	
17	08:20		07:29		06:25		06:57 (4)	06:10		06:36 (8)	05:11			04:43	
	16:26		17:25		18:19	21	07:18 (4)	20:16	15	06:51 (8)	21:09			21:44	
18	08:19		07:27		06:22		06:58 (4)	06:08		06:35 (8)	05:09			04:43	
	16:28		17:27		18:21	20	07:18 (4)	20:17	17	06:52 (8)	21:10			21:44	
19	08:17		07:25		06:20		06:57 (4)	06:06		06:33 (8)	05:07			04:43	
	16:29		17:29		18:23	19	07:16 (4)	20:19	20	06:53 (8)	21:12			21:45	
20	08:16		07:23		06:17		06:59 (4)	06:04		06:33 (8)	05:06			04:43	
	16:31		17:31		18:24	16	07:15 (4)	20:21	21	06:54 (8)	21:13			21:45	
21	08:15		07:20		06:15		06:59 (4)	06:01		06:32 (8)	05:04			04:43	
	16:33		17:33		18:26	14	07:13 (4)	20:23	22	06:54 (8)	21:15			21:45	
22	08:14		07:18		06:13		07:02 (4)	05:59		06:32 (8)	05:03			04:43	
	16:35		17:35		18:28	9	07:11 (4)	20:25	23	06:55 (8)	21:16			21:45	
23	08:13		07:16		06:10			05:57		06:32 (8)	05:02			04:44	
	16:37		17:37		18:30			20:26	23	06:55 (8)	21:18			21:46	
24	08:11		07:14		06:08			05:55		06:30 (8)	05:00			04:44	
	16:38		17:39		18:32			20:28	24	06:54 (8)	21:19			21:46	
25	08:10		07:12		06:05			05:53		06:30 (8)	04:59			04:44	
	16:40		17:41		18:34			20:30	23	06:53 (8)	21:21			21:46	
26	08:09		07:09		06:03			05:50		06:31 (8)	04:58			04:45	
	16:42		17:43		18:35			20:32	22	06:53 (8)	21:22			21:46	
27	08:07		07:07		06:00			05:48		06:31 (8)	04:57			04:45	
	16:44		17:45		18:37			20:34	21	06:52 (8)	21:24			21:46	
28	08:06		07:05		05:58			05:46		06:32 (8)	04:55			04:46	
	16:46		17:47		18:39			20:35	19	06:51 (8)	21:25			21:46	
29	08:04				06:56			05:44		06:32 (8)	04:54			04:46	
	16:48				19:41			20:37	18	06:50 (8)	21:26			21:45	
30	08:03				06:53			05:42		06:33 (8)	04:53			04:47	
	16:50				19:43			20:39	16	06:49 (8)	21:28			21:45	
31	08:01				06:51						04:52				
	16:52				19:45						21:29				
Sonnenscheinstunden	252		274		367			419			492			508	
astr.max.mögl.Beschattung						217			295			17			
Red.Sonnenscheinwahrsch.						0.31			0.41			0.51			
Reduktion Betriebsdauer						0.91			0.91			0.91			
Reduktion Windrichtung						0.68			0.68			0.68			
Gesamte Reduktion						0.20			0.26			0.32			
Met.wahrsch.Beschattung						42			76			5			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IM - IO247

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August			September			Oktober			November	Dezember
1	04:47		05:27			06:20			07:13		07:40 (4)	07:10	08:04
	21:45		21:10			20:04			18:52	17	07:57 (4)	16:42	15:58
2	04:48		05:28			06:22			07:14		07:40 (4)	07:12	08:06
	21:44		21:08			20:02			18:49	15	07:55 (4)	16:40	15:57
3	04:49		05:30			06:24			07:16		07:42 (4)	07:14	08:07
	21:44		21:07			20:00			18:47	11	07:53 (4)	16:38	15:57
4	04:50		05:32			06:25			07:18			07:16	08:09
	21:44		21:05			19:57			18:44			16:36	15:56
5	04:51		05:33			06:27			07:20			07:18	08:10
	21:43		21:03			19:55			18:42			16:34	15:56
6	04:51		05:35			06:29			07:21			07:20	08:11
	21:42		21:01			19:53			18:40			16:32	15:55
7	04:52		05:37			06:30			07:23			07:21	08:13
	21:42		20:59			19:50			18:37			16:30	15:55
8	04:53		05:38			06:32			07:25			07:23	08:14
	21:41		20:57			19:48			18:35			16:29	15:54
9	04:54		05:40			06:34			07:27			07:25	08:15
	21:40		20:55			19:45			18:32			16:27	15:54
10	04:56		05:42			06:36			07:29			07:27	08:16
	21:40		20:53			19:43			18:30			16:25	15:54
11	04:57		05:43		06:46 (8)	06:37			07:31			07:29	08:18
	21:39		20:51	8	06:54 (8)	19:40			18:28			16:23	15:53
12	04:58		05:45		06:43 (8)	06:39			07:32			07:31	08:19
	21:38		20:49	13	06:56 (8)	19:38			18:25			16:22	15:53
13	04:59		05:47		06:42 (8)	06:41			07:34			07:33	08:20
	21:37		20:47	15	06:57 (8)	19:36			18:23			16:20	15:53
14	05:00		05:49		06:40 (8)	06:43			07:36			07:35	08:21
	21:36		20:45	18	06:58 (8)	19:33			18:21			16:19	15:53
15	05:01		05:50		06:39 (8)	06:44			07:38			07:37	08:22
	21:35		20:43	20	06:59 (8)	19:31			18:18			16:17	15:53
16	05:03		05:52		06:39 (8)	06:46			07:40			07:38	08:23
	21:34		20:41	21	07:00 (8)	19:28			18:16			16:16	15:53
17	05:04		05:54		06:37 (8)	06:48			07:42			07:40	08:23
	21:32		20:39	22	06:59 (8)	19:26			18:14			16:14	15:53
18	05:05		05:56		06:37 (8)	06:50			07:43			07:42	08:24
	21:31		20:36	23	07:00 (8)	19:23			18:12			16:13	15:53
19	05:07		05:57		06:37 (8)	06:51			07:45			07:44	08:25
	21:30		20:34	23	07:00 (8)	19:21			18:09			16:11	15:54
20	05:08		05:59		06:36 (8)	06:53			07:47			07:46	08:26
	21:29		20:32	23	06:59 (8)	19:18			18:07			16:10	15:54
21	05:10		06:01		06:36 (8)	06:55		07:48 (4)	07:49			07:47	08:26
	21:27		20:30	23	06:59 (8)	19:16	8	07:56 (4)	18:05			16:09	15:54
22	05:11		06:03		06:37 (8)	06:57		07:45 (4)	07:51			07:49	08:27
	21:26		20:28	22	06:59 (8)	19:14	13	07:58 (4)	18:03			16:07	15:55
23	05:12		06:04		06:37 (8)	06:58		07:43 (4)	07:53			07:51	08:27
	21:25		20:25	21	06:58 (8)	19:11	16	07:59 (4)	18:00			16:06	15:55
24	05:14		06:06		06:37 (8)	07:00		07:41 (4)	07:55			07:53	08:28
	21:23		20:23	20	06:57 (8)	19:09	19	08:00 (4)	17:58			16:05	15:56
25	05:15		06:08		06:38 (8)	07:02		07:41 (4)	06:57			07:54	08:28
	21:22		20:21	18	06:56 (8)	19:06	19	08:00 (4)	16:56			16:04	15:57
26	05:17		06:10		06:39 (8)	07:04		07:40 (4)	06:58			07:56	08:28
	21:20		20:18	15	06:54 (8)	19:04	21	08:01 (4)	16:54			16:03	15:57
27	05:19		06:11		06:41 (8)	07:05		07:40 (4)	07:00			07:58	08:29
	21:19		20:16	10	06:51 (8)	19:01	21	08:01 (4)	16:52			16:02	15:58
28	05:20		06:13			07:07		07:39 (4)	07:02			07:59	08:29
	21:17		20:14			18:59	20	07:59 (4)	16:50			16:01	15:59
29	05:22		06:15			07:09		07:39 (4)	07:04			08:01	08:29
	21:15		20:12			18:56	20	07:59 (4)	16:48			16:00	16:00
30	05:23		06:17			07:11		07:39 (4)	07:06			08:03	08:29
	21:14		20:09			18:54	19	07:58 (4)	16:46			15:59	16:01
31	05:25		06:18						07:08				08:29
	21:12		20:07						16:44				16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung				315			176			43			
Red.Sonnenscheinwahrsch.				0.49			0.40			0.33			
Reduktion Betriebsdauer				0.91			0.91			0.91			
Reduktion Windrichtung				0.68			0.68			0.68			
Gesamte Reduktion				0.30			0.25			0.20			
Met.wahrsch.Beschattung				96			44			9			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IN - IO248

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März			April			Mai			Juni	
1	08:29		07:59		07:03			06:48			05:40		06:37 (8)	04:51	
	16:03		16:54		17:49			19:46			20:41	9	06:46 (8)	21:30	
2	08:29		07:58		07:00			06:46			05:38			04:50	
	16:04		16:56		17:51			19:48			20:43			21:31	
3	08:29		07:56		06:58			06:43			05:36			04:49	
	16:05		16:58		17:53			19:50			20:44			21:32	
4	08:28		07:54		06:56			06:41			05:34			04:49	
	16:07		17:00		17:54			19:52			20:46			21:34	
5	08:28		07:52		06:53			06:39			05:32			04:48	
	16:08		17:02		17:56			19:54			20:48			21:35	
6	08:28		07:51		06:51			06:36			05:30			04:47	
	16:09		17:04		17:58			19:55			20:50			21:36	
7	08:27		07:49		06:49			06:34			05:28			04:46	
	16:10		17:06		18:00			19:57			20:52			21:37	
8	08:27		07:47		06:46			06:32			05:26			04:46	
	16:12		17:08		18:02			19:59			20:53			21:38	
9	08:26		07:45		06:44			06:29			05:24			04:45	
	16:13		17:10		18:04			20:01			20:55			21:39	
10	08:25		07:43		06:42		07:05 (4)	06:27			05:22			04:45	
	16:15		17:12		18:06	10	07:15 (4)	20:03			20:57			21:39	
11	08:25		07:41		06:39		07:03 (4)	06:24			05:21			04:44	
	16:16		17:13		18:08	14	07:17 (4)	20:05			20:58			21:40	
12	08:24		07:39		06:37		07:01 (4)	06:22			05:19			04:44	
	16:18		17:15		18:10	17	07:18 (4)	20:06			21:00			21:41	
13	08:23		07:37		06:34		07:00 (4)	06:20			05:17			04:44	
	16:19		17:17		18:11	19	07:19 (4)	20:08			21:02			21:42	
14	08:22		07:35		06:32		07:00 (4)	06:17			05:15			04:43	
	16:21		17:19		18:13	20	07:20 (4)	20:10			21:04			21:42	
15	08:22		07:33		06:30		06:58 (4)	06:15		06:42 (8)	05:14			04:43	
	16:23		17:21		18:15	21	07:19 (4)	20:12	6	06:48 (8)	21:05			21:43	
16	08:21		07:31		06:27		06:58 (4)	06:13		06:39 (8)	05:12			04:43	
	16:24		17:23		18:17	21	07:19 (4)	20:14	12	06:51 (8)	21:07			21:43	
17	08:20		07:29		06:25		06:58 (4)	06:10		06:36 (8)	05:11			04:43	
	16:26		17:25		18:19	20	07:18 (4)	20:16	16	06:52 (8)	21:09			21:44	
18	08:19		07:27		06:22		06:58 (4)	06:08		06:35 (8)	05:09			04:43	
	16:28		17:27		18:21	20	07:18 (4)	20:17	18	06:53 (8)	21:10			21:44	
19	08:17		07:25		06:20		06:58 (4)	06:06		06:34 (8)	05:07			04:43	
	16:29		17:29		18:23	18	07:16 (4)	20:19	20	06:54 (8)	21:12			21:45	
20	08:16		07:23		06:17		06:59 (4)	06:04		06:33 (8)	05:06			04:43	
	16:31		17:31		18:24	17	07:16 (4)	20:21	22	06:55 (8)	21:13			21:45	
21	08:15		07:20		06:15		07:00 (4)	06:01		06:33 (8)	05:04			04:43	
	16:33		17:33		18:26	13	07:13 (4)	20:23	22	06:55 (8)	21:15			21:45	
22	08:14		07:18		06:13		07:03 (4)	05:59		06:32 (8)	05:03			04:43	
	16:35		17:35		18:28	7	07:10 (4)	20:25	23	06:55 (8)	21:16			21:45	
23	08:13		07:16		06:10			05:57		06:32 (8)	05:02			04:44	
	16:37		17:37		18:30			20:26	23	06:55 (8)	21:18			21:46	
24	08:11		07:14		06:08			05:55		06:31 (8)	05:00			04:44	
	16:38		17:39		18:32			20:28	23	06:54 (8)	21:19			21:46	
25	08:10		07:12		06:05			05:53		06:31 (8)	04:59			04:44	
	16:40		17:41		18:34			20:30	23	06:54 (8)	21:21			21:46	
26	08:09		07:09		06:03			05:50		06:32 (8)	04:58			04:45	
	16:42		17:43		18:35			20:32	21	06:53 (8)	21:22			21:46	
27	08:07		07:07		06:00			05:48		06:32 (8)	04:57			04:45	
	16:44		17:45		18:37			20:34	20	06:52 (8)	21:24			21:46	
28	08:06		07:05		05:58			05:46		06:33 (8)	04:55			04:46	
	16:46		17:47		18:39			20:35	18	06:51 (8)	21:25			21:46	
29	08:04				06:56			05:44		06:34 (8)	04:54			04:46	
	16:48				19:41			20:37	16	06:50 (8)	21:26			21:45	
30	08:03				06:53			05:42		06:35 (8)	04:53			04:47	
	16:50				19:43			20:39	14	06:49 (8)	21:28			21:45	
31	08:01				06:51						04:52				
	16:52				19:45						21:29				
Sonnenscheinstunden	252		274		367			419			492			508	
astr.max.mögl.Beschattung						217			297			9			
Red.Sonnenscheinwahrsch.						0.31			0.41			0.51			
Reduktion Betriebsdauer						0.91			0.91			0.91			
Reduktion Windrichtung						0.68			0.68			0.68			
Gesamte Reduktion						0.20			0.26			0.32			
Met.wahrsch.Beschattung						42			76			3			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IN - IO248

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August			September			Oktober			November	Dezember
1	04:47	05:27			06:20			07:13		07:40 (4)	07:10	08:04
	21:45	21:10			20:04			18:52	18	07:58 (4)	16:42	15:58
2	04:48	05:28			06:22			07:14		07:40 (4)	07:12	08:06
	21:44	21:08			20:02			18:49	16	07:56 (4)	16:40	15:57
3	04:49	05:30			06:24			07:16		07:42 (4)	07:14	08:07
	21:44	21:07			20:00			18:47	12	07:54 (4)	16:38	15:57
4	04:50	05:32			06:25			07:18		07:45 (4)	07:16	08:09
	21:44	21:05			19:57			18:44	5	07:50 (4)	16:36	15:56
5	04:51	05:33			06:27			07:20			07:18	08:10
	21:43	21:03			19:55			18:42			16:34	15:56
6	04:51	05:35			06:29			07:21			07:20	08:11
	21:42	21:01			19:53			18:40			16:32	15:55
7	04:52	05:37			06:30			07:23			07:21	08:13
	21:42	20:59			19:50			18:37			16:30	15:55
8	04:53	05:38			06:32			07:25			07:23	08:14
	21:41	20:57			19:48			18:35			16:29	15:54
9	04:54	05:40			06:34			07:27			07:25	08:15
	21:40	20:55			19:45			18:32			16:27	15:54
10	04:56	05:42			06:36			07:29			07:27	08:16
	21:40	20:53			19:43			18:30			16:25	15:54
11	04:57	05:43		06:49 (8)	06:37			07:31			07:29	08:18
	21:39	20:51	3	06:52 (8)	19:40			18:28			16:23	15:53
12	04:58	05:45		06:45 (8)	06:39			07:32			07:31	08:19
	21:38	20:49	10	06:55 (8)	19:38			18:25			16:22	15:53
13	04:59	05:47		06:43 (8)	06:41			07:34			07:33	08:20
	21:37	20:47	14	06:57 (8)	19:36			18:23			16:20	15:53
14	05:00	05:49		06:41 (8)	06:43			07:36			07:35	08:21
	21:36	20:45	17	06:58 (8)	19:33			18:21			16:19	15:53
15	05:01	05:50		06:40 (8)	06:44			07:38			07:37	08:22
	21:35	20:43	19	06:59 (8)	19:31			18:18			16:17	15:53
16	05:03	05:52		06:39 (8)	06:46			07:40			07:38	08:23
	21:34	20:41	21	07:00 (8)	19:28			18:16			16:16	15:53
17	05:04	05:54		06:38 (8)	06:48			07:42			07:40	08:23
	21:32	20:39	22	07:00 (8)	19:26			18:14			16:14	15:53
18	05:05	05:56		06:38 (8)	06:50			07:43			07:42	08:24
	21:31	20:36	22	07:00 (8)	19:23			18:12			16:13	15:53
19	05:07	05:57		06:38 (8)	06:51			07:45			07:44	08:25
	21:30	20:34	23	07:01 (8)	19:21			18:09			16:11	15:54
20	05:08	05:59		06:37 (8)	06:53			07:47			07:46	08:26
	21:29	20:32	23	07:00 (8)	19:18			18:07			16:10	15:54
21	05:10	06:01		06:37 (8)	06:55		07:50 (4)	07:49			07:47	08:26
	21:27	20:30	23	07:00 (8)	19:16	5	07:55 (4)	18:05			16:09	15:54
22	05:11	06:03		06:37 (8)	06:57		07:46 (4)	07:51			07:49	08:27
	21:26	20:28	23	07:00 (8)	19:14	12	07:58 (4)	18:03			16:07	15:55
23	05:12	06:04		06:37 (8)	06:58		07:43 (4)	07:53			07:51	08:27
	21:25	20:25	22	06:59 (8)	19:11	16	07:59 (4)	18:00			16:06	15:55
24	05:14	06:06		06:38 (8)	07:00		07:42 (4)	07:55			07:53	08:28
	21:23	20:23	20	06:58 (8)	19:09	18	08:00 (4)	17:58			16:05	15:56
25	05:15	06:08		06:39 (8)	07:02		07:41 (4)	06:57			07:54	08:28
	21:22	20:21	18	06:57 (8)	19:06	20	08:01 (4)	16:56			16:04	15:57
26	05:17	06:10		06:39 (8)	07:04		07:41 (4)	06:58			07:56	08:28
	21:20	20:18	16	06:55 (8)	19:04	20	08:01 (4)	16:54			16:03	15:57
27	05:19	06:11		06:41 (8)	07:05		07:40 (4)	07:00			07:58	08:29
	21:19	20:16	12	06:53 (8)	19:01	21	08:01 (4)	16:52			16:02	15:58
28	05:20	06:13		06:45 (8)	07:07		07:39 (4)	07:02			07:59	08:29
	21:17	20:14	5	06:50 (8)	18:59	21	08:00 (4)	16:50			16:01	15:59
29	05:22	06:15			07:09		07:39 (4)	07:04			08:01	08:29
	21:15	20:12			18:56	21	08:00 (4)	16:48			16:00	16:00
30	05:23	06:17			07:11		07:40 (4)	07:06			08:03	08:29
	21:14	20:09			18:54	19	07:59 (4)	16:46			15:59	16:01
31	05:25	06:18						07:08				08:29
	21:12	20:07						16:44				16:02
Sonnenscheinstunden		510	459			382			329			260	235
astr.max.mögl.Beschattung				313			173			51			
Red.Sonnenscheinwahrsch.				0.49			0.40			0.33			
Reduktion Betriebsdauer				0.91			0.91			0.91			
Reduktion Windrichtung				0.68			0.68			0.68			
Gesamte Reduktion				0.30			0.25			0.20			
Met.wahrsch.Beschattung				95			43			10			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IO - IO249

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April		Mai		Juni	
1	08:29		07:59		07:03		06:48		05:40		06:40 (8)	04:51
	16:03		16:54		17:49		19:46		20:41	5	06:45 (8)	21:30
2	08:29		07:58		07:00		06:46		05:38			04:50
	16:04		16:56		17:51		19:48		20:43			21:31
3	08:29		07:56		06:58		06:43		05:36			04:49
	16:05		16:58		17:53		19:50		20:44			21:32
4	08:28		07:54		06:56		06:41		05:34			04:49
	16:07		17:00		17:54		19:52		20:46			21:34
5	08:28		07:52		06:53		06:39		05:32			04:48
	16:08		17:02		17:56		19:54		20:48			21:35
6	08:28		07:51		06:51		06:36		05:30			04:47
	16:09		17:04		17:58		19:55		20:50			21:36
7	08:27		07:49		06:49		06:34		05:28			04:46
	16:10		17:06		18:00		19:57		20:52			21:37
8	08:27		07:47		06:46		06:32		05:26			04:46
	16:12		17:08		18:02		19:59		20:53			21:38
9	08:26		07:45		06:44		06:29		05:24			04:45
	16:13		17:10		18:04		20:01		20:55			21:39
10	08:25		07:43		06:42	07:05 (4)	06:27		05:22			04:45
	16:15		17:12		18:06	11 07:16 (4)	20:03		20:57			21:39
11	08:25		07:41		06:39	07:03 (4)	06:24		05:21			04:44
	16:16		17:13		18:08	15 07:18 (4)	20:05		20:58			21:40
12	08:24		07:39		06:37	07:01 (4)	06:22		05:19			04:44
	16:18		17:15		18:10	17 07:18 (4)	20:06		21:00			21:41
13	08:23		07:37		06:34	07:00 (4)	06:20		05:17			04:44
	16:19		17:17		18:11	19 07:19 (4)	20:08		21:02			21:42
14	08:22		07:35		06:32	07:00 (4)	06:17		05:15			04:43
	16:21		17:19		18:13	20 07:20 (4)	20:10		21:04			21:42
15	08:22		07:33		06:30	06:59 (4)	06:15		05:14			04:43
	16:23		17:21		18:15	21 07:20 (4)	20:12	10 06:41 (8)	21:05			21:43
16	08:21		07:31		06:27	06:59 (4)	06:13	06:51 (8)	05:12			04:43
	16:24		17:23		18:17	21 07:20 (4)	20:14	14 06:53 (8)	21:07			21:43
17	08:20		07:29		06:25	06:58 (4)	06:10	06:36 (8)	05:11			04:43
	16:26		17:25		18:19	21 07:19 (4)	20:16	18 06:54 (8)	21:09			21:44
18	08:19		07:27		06:22	06:59 (4)	06:08	06:35 (8)	05:09			04:43
	16:28		17:27		18:21	19 07:18 (4)	20:17	20 06:55 (8)	21:10			21:44
19	08:17		07:25		06:20	06:59 (4)	06:06	06:34 (8)	05:07			04:43
	16:29		17:29		18:23	18 07:17 (4)	20:19	21 06:55 (8)	21:12			21:45
20	08:16		07:23		06:17	07:00 (4)	06:04	06:34 (8)	05:06			04:43
	16:31		17:31		18:24	16 07:16 (4)	20:21	22 06:56 (8)	21:13			21:45
21	08:15		07:20		06:15	07:01 (4)	06:01	06:33 (8)	05:04			04:43
	16:33		17:33		18:26	12 07:13 (4)	20:23	23 06:56 (8)	21:15			21:45
22	08:14		07:18		06:13	07:05 (4)	05:59	06:33 (8)	05:03			04:43
	16:35		17:35		18:28	4 07:09 (4)	20:25	23 06:56 (8)	21:16			21:45
23	08:13		07:16		06:10		05:57	06:33 (8)	05:02			04:44
	16:37		17:37		18:30		20:26	23 06:56 (8)	21:18			21:46
24	08:11		07:14		06:08		05:55	06:32 (8)	05:00			04:44
	16:38		17:39		18:32		20:28	23 06:55 (8)	21:19			21:46
25	08:10		07:12		06:05		05:53	06:32 (8)	04:59			04:44
	16:40		17:41		18:34		20:30	22 06:54 (8)	21:21			21:46
26	08:09		07:09		06:03		05:50	06:33 (8)	04:58			04:45
	16:42		17:43		18:35		20:32	21 06:54 (8)	21:22			21:46
27	08:07		07:07		06:00		05:48	06:33 (8)	04:57			04:45
	16:44		17:45		18:37		20:34	20 06:53 (8)	21:24			21:46
28	08:06		07:05		05:58		05:46	06:34 (8)	04:55			04:46
	16:46		17:47		18:39		20:35	18 06:52 (8)	21:25			21:46
29	08:04				06:56		05:44	06:35 (8)	04:54			04:46
	16:48				19:41		20:37	15 06:50 (8)	21:26			21:45
30	08:03				06:53		05:42	06:37 (8)	04:53			04:47
	16:50				19:43		20:39	11 06:48 (8)	21:28			21:45
31	08:01				06:51				04:52			
	16:52				19:45				21:29			
Sonnenscheinstunden	252		274		367		419		492		508	
astr.max.mögl.Beschattung						214		304		5		
Red.Sonnenscheinwahrsch.						0.31		0.41		0.51		
Reduktion Betriebsdauer						0.91		0.91		0.91		
Reduktion Windrichtung						0.68		0.68		0.68		
Gesamte Reduktion						0.19		0.26		0.32		
Met.wahrsch.Beschattung						42		78		2		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IO - IO249

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November	Dezember
1	04:47		05:27		06:20		07:13	07:40 (4)	07:10	08:04
	21:45		21:10		20:04		18:52 19	07:59 (4)	16:42	15:58
2	04:48		05:28		06:22		07:14	07:40 (4)	07:12	08:06
	21:44		21:08		20:02		18:49 17	07:57 (4)	16:40	15:57
3	04:49		05:30		06:24		07:16	07:42 (4)	07:14	08:07
	21:44		21:07		20:00		18:47 13	07:55 (4)	16:38	15:57
4	04:50		05:32		06:25		07:18	07:44 (4)	07:16	08:09
	21:44		21:05		19:57		18:44 8	07:52 (4)	16:36	15:56
5	04:51		05:33		06:27		07:20		07:18	08:10
	21:43		21:03		19:55		18:42		16:34	15:56
6	04:51		05:35		06:29		07:21		07:20	08:11
	21:42		21:01		19:53		18:40		16:32	15:55
7	04:52		05:37		06:30		07:23		07:21	08:13
	21:42		20:59		19:50		18:37		16:30	15:55
8	04:53		05:38		06:32		07:25		07:23	08:14
	21:41		20:57		19:48		18:35		16:29	15:54
9	04:54		05:40		06:34		07:27		07:25	08:15
	21:40		20:55		19:45		18:32		16:27	15:54
10	04:56		05:42		06:36		07:29		07:27	08:16
	21:40		20:53		19:43		18:30		16:25	15:54
11	04:57		05:43		06:37		07:31		07:29	08:18
	21:39		20:51		19:40		18:28		16:23	15:53
12	04:58		05:45		06:47 (8) 06:39		07:32		07:31	08:19
	21:38		20:49	7	06:54 (8) 19:38		16:25		16:22	15:53
13	04:59		05:47		06:45 (8) 06:41		07:34		07:33	08:20
	21:37		20:47	12	06:57 (8) 19:36		18:23		16:20	15:53
14	05:00		05:49		06:42 (8) 06:43		07:36		07:35	08:21
	21:36		20:45	16	06:58 (8) 19:33		18:21		16:19	15:53
15	05:01		05:50		06:41 (8) 06:44		07:38		07:37	08:22
	21:35		20:43	19	07:00 (8) 19:31		18:18		16:17	15:53
16	05:03		05:52		06:41 (8) 06:46		07:40		07:38	08:23
	21:34		20:41	20	07:01 (8) 19:28		18:16		16:16	15:53
17	05:04		05:54		06:39 (8) 06:48		07:42		07:40	08:23
	21:32		20:39	21	07:00 (8) 19:26		18:14		16:14	15:53
18	05:05		05:56		06:39 (8) 06:50		07:43		07:42	08:24
	21:31		20:36	22	07:01 (8) 19:23		18:12		16:13	15:53
19	05:07		05:57		06:39 (8) 06:51		07:45		07:44	08:25
	21:30		20:34	23	07:02 (8) 19:21		18:09		16:11	15:54
20	05:08		05:59		06:38 (8) 06:53		07:47		07:46	08:26
	21:29		20:32	23	07:01 (8) 19:18		18:07		16:10	15:54
21	05:10		06:01		06:38 (8) 06:55		07:49		07:47	08:26
	21:27		20:30	23	07:01 (8) 19:16		18:05		16:09	15:54
22	05:11		06:03		06:38 (8) 06:57		07:47 (4)	07:51	07:49	08:27
	21:26		20:28	23	07:01 (8) 19:14	11	07:58 (4)	18:03	16:07	15:55
23	05:12		06:04		06:38 (8) 06:58		07:44 (4)	07:53	07:51	08:27
	21:25		20:25	22	07:00 (8) 19:11	15	07:59 (4)	18:00	16:06	15:55
24	05:14		06:06		06:38 (8) 07:00		07:43 (4)	07:55	07:53	08:28
	21:23		20:23	21	06:59 (8) 19:09	17	08:00 (4)	17:58	16:05	15:56
25	05:15		06:08		06:39 (8) 07:02		07:42 (4)	06:57	07:54	08:28
	21:22		20:21	19	06:58 (8) 19:06	19	08:01 (4)	16:56	16:04	15:57
26	05:17		06:10		06:39 (8) 07:04		07:41 (4)	06:58	07:56	08:28
	21:20		20:18	17	06:56 (8) 19:04	20	08:01 (4)	16:54	16:03	15:57
27	05:19		06:11		06:41 (8) 07:05		07:41 (4)	07:00	07:58	08:29
	21:19		20:16	14	06:55 (8) 19:01	20	08:01 (4)	16:52	16:02	15:58
28	05:20		06:13		06:43 (8) 07:07		07:40 (4)	07:02	07:59	08:29
	21:17		20:14	9	06:52 (8) 18:59	20	08:00 (4)	16:50	16:01	15:59
29	05:22		06:15		07:09		07:40 (4)	07:04	08:01	08:29
	21:15		20:12		18:56	20	08:00 (4)	16:48	16:00	16:00
30	05:23		06:17		07:11		07:40 (4)	07:06	08:03	08:29
	21:14		20:09		18:54	20	08:00 (4)	16:46	15:59	16:01
31	05:25		06:18					07:08		08:29
	21:12		20:07					16:44		16:02
Sonnenscheinstunden	510		459		382		329		260	235
astr.max.mögl.Beschattung				311		162		57		
Red.Sonnenscheinwahrsch.				0.49		0.40		0.33		
Reduktion Betriebsdauer				0.91		0.91		0.91		
Reduktion Windrichtung				0.68		0.68		0.68		
Gesamte Reduktion				0.30		0.25		0.20		
Met.wahrsch.Beschattung				94		41		12		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IP - IO250

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März			April			Mai		Juni	
1	08:29		07:59		07:03			06:48			05:40		04:51	
	16:03		16:54		17:49			19:46			20:41		21:30	
2	08:29		07:58		07:00			06:46			05:38		04:50	
	16:04		16:56		17:51			19:48			20:43		21:31	
3	08:29		07:56		06:58			06:43			05:36		04:49	
	16:05		16:58		17:53			19:50			20:44		21:32	
4	08:28		07:54		06:56			06:41			05:34		04:49	
	16:07		17:00		17:54			19:52			20:46		21:34	
5	08:28		07:52		06:53			06:39			05:32		04:48	
	16:08		17:02		17:56			19:54			20:48		21:35	
6	08:28		07:51		06:51			06:36			05:30		04:47	
	16:09		17:04		17:58			19:55			20:50		21:36	
7	08:27		07:49		06:49			06:34			05:28		04:46	
	16:10		17:06		18:00			19:57			20:52		21:37	
8	08:27		07:47		06:46			06:32			05:26		04:46	
	16:12		17:08		18:02			19:59			20:53		21:38	
9	08:26		07:45		06:44		07:09 (4)	06:29			05:24		04:45	
	16:13		17:10		18:04	4	07:13 (4)	20:01			20:55		21:39	
10	08:25		07:43		06:42		07:05 (4)	06:27			05:22		04:45	
	16:15		17:12		18:06	11	07:16 (4)	20:03			20:57		21:39	
11	08:25		07:41		06:39		07:03 (4)	06:24			05:21		04:44	
	16:16		17:13		18:08	15	07:18 (4)	20:05			20:58		21:40	
12	08:24		07:39		06:37		07:01 (4)	06:22			05:19		04:44	
	16:18		17:15		18:10	18	07:19 (4)	20:06			21:00		21:41	
13	08:23		07:37		06:34		07:00 (4)	06:20			05:17		04:44	
	16:19		17:17		18:11	20	07:20 (4)	20:08			21:02		21:42	
14	08:22		07:35		06:32		07:00 (4)	06:17			05:15		04:43	
	16:21		17:19		18:13	20	07:20 (4)	20:10			21:04		21:42	
15	08:22		07:33		06:30		06:59 (4)	06:15		06:41 (8)	05:14		04:43	
	16:23		17:21		18:15	21	07:20 (4)	20:12	11	06:52 (8)	21:05		21:43	
16	08:21		07:31		06:27		06:59 (4)	06:13		06:39 (8)	05:12		04:43	
	16:24		17:23		18:17	21	07:20 (4)	20:14	15	06:54 (8)	21:07		21:43	
17	08:20		07:29		06:25		06:59 (4)	06:10		06:36 (8)	05:11		04:43	
	16:26		17:25		18:19	20	07:19 (4)	20:16	18	06:54 (8)	21:09		21:44	
18	08:19		07:27		06:22		06:59 (4)	06:08		06:35 (8)	05:09		04:43	
	16:28		17:27		18:21	19	07:18 (4)	20:17	20	06:55 (8)	21:10		21:44	
19	08:17		07:25		06:20		06:59 (4)	06:06		06:35 (8)	05:07		04:43	
	16:29		17:29		18:23	18	07:17 (4)	20:19	21	06:56 (8)	21:12		21:45	
20	08:16		07:23		06:17		07:01 (4)	06:04		06:34 (8)	05:06		04:43	
	16:31		17:31		18:24	14	07:15 (4)	20:21	22	06:56 (8)	21:13		21:45	
21	08:15		07:20		06:15		07:02 (4)	06:01		06:34 (8)	05:04		04:43	
	16:33		17:33		18:26	11	07:13 (4)	20:23	23	06:57 (8)	21:15		21:45	
22	08:14		07:18		06:13			05:59		06:34 (8)	05:03		04:43	
	16:35		17:35		18:28			20:25	23	06:57 (8)	21:16		21:45	
23	08:13		07:16		06:10			05:57		06:34 (8)	05:02		04:44	
	16:37		17:37		18:30			20:26	22	06:56 (8)	21:18		21:46	
24	08:11		07:14		06:08			05:55		06:33 (8)	05:00		04:44	
	16:38		17:39		18:32			20:28	22	06:55 (8)	21:19		21:46	
25	08:10		07:12		06:05			05:53		06:33 (8)	04:59		04:44	
	16:40		17:41		18:34			20:30	22	06:55 (8)	21:21		21:46	
26	08:09		07:09		06:03			05:50		06:33 (8)	04:58		04:45	
	16:42		17:43		18:35			20:32	21	06:54 (8)	21:22		21:46	
27	08:07		07:07		06:00			05:48		06:34 (8)	04:57		04:45	
	16:44		17:45		18:37			20:34	19	06:53 (8)	21:24		21:46	
28	08:06		07:05		05:58			05:46		06:35 (8)	04:55		04:46	
	16:46		17:47		18:39			20:35	17	06:52 (8)	21:25		21:46	
29	08:04				06:56			05:44		06:36 (8)	04:54		04:46	
	16:48				19:41			20:37	14	06:50 (8)	21:26		21:45	
30	08:03				06:53			05:42		06:38 (8)	04:53		04:47	
	16:50				19:43			20:39	10	06:48 (8)	21:28		21:45	
31	08:01				06:51						04:52			
	16:52				19:45						21:29			
Sonnenscheinstunden	252		274		367			419			492		508	
astr.max.mögl.Beschattung						212			300					
Red.Sonnenscheinwahrsch.						0.31			0.41					
Reduktion Betriebsdauer						0.91			0.91					
Reduktion Windrichtung						0.68			0.68					
Gesamte Reduktion						0.19			0.26					
Met.wahrsch.Beschattung						41			77					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IP - IO250

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August			September			Oktober			November	Dezember
1	04:47		05:27			06:20			07:13		07:41 (4)	07:10	08:04
	21:45		21:10			20:04			18:52	18	07:59 (4)	16:42	15:58
2	04:48		05:28			06:22			07:14		07:40 (4)	07:12	08:06
	21:44		21:08			20:02			18:49	17	07:57 (4)	16:40	15:57
3	04:49		05:30			06:24			07:16		07:42 (4)	07:14	08:07
	21:44		21:07			20:00			18:47	13	07:55 (4)	16:38	15:57
4	04:50		05:32			06:25			07:18		07:44 (4)	07:16	08:09
	21:44		21:05			19:57			18:44	9	07:53 (4)	16:36	15:56
5	04:51		05:33			06:27			07:20			07:18	08:10
	21:43		21:03			19:55			18:42			16:34	15:56
6	04:51		05:35			06:29			07:21			07:20	08:11
	21:42		21:01			19:53			18:40			16:32	15:55
7	04:52		05:37			06:30			07:23			07:21	08:13
	21:42		20:59			19:50			18:37			16:30	15:55
8	04:53		05:38			06:32			07:25			07:23	08:14
	21:41		20:57			19:48			18:35			16:29	15:54
9	04:54		05:40			06:34			07:27			07:25	08:15
	21:40		20:55			19:45			18:32			16:27	15:54
10	04:56		05:42			06:36			07:29			07:27	08:16
	21:40		20:53			19:43			18:30			16:25	15:54
11	04:57		05:43			06:37			07:31			07:29	08:18
	21:39		20:51			19:40			18:28			16:23	15:53
12	04:58		05:45		06:49 (8)	06:39			07:32			07:31	08:19
	21:38		20:49	4	06:53 (8)	19:38			18:25			16:22	15:53
13	04:59		05:47		06:46 (8)	06:41			07:34			07:33	08:20
	21:37		20:47	11	06:57 (8)	19:36			18:23			16:20	15:53
14	05:00		05:49		06:43 (8)	06:43			07:36			07:35	08:21
	21:36		20:45	15	06:58 (8)	19:33			18:21			16:19	15:53
15	05:01		05:50		06:42 (8)	06:44			07:38			07:37	08:22
	21:35		20:43	18	07:00 (8)	19:31			18:18			16:17	15:53
16	05:03		05:52		06:41 (8)	06:46			07:40			07:38	08:23
	21:34		20:41	20	07:01 (8)	19:28			18:16			16:16	15:53
17	05:04		05:54		06:40 (8)	06:48			07:42			07:40	08:23
	21:32		20:39	21	07:01 (8)	19:26			18:14			16:14	15:53
18	05:05		05:56		06:40 (8)	06:50			07:43			07:42	08:24
	21:31		20:36	21	07:01 (8)	19:23			18:12			16:13	15:53
19	05:07		05:57		06:39 (8)	06:51			07:45			07:44	08:25
	21:30		20:34	23	07:02 (8)	19:21			18:09			16:11	15:54
20	05:08		05:59		06:38 (8)	06:53			07:47			07:46	08:26
	21:29		20:32	23	07:01 (8)	19:18			18:07			16:10	15:54
21	05:10		06:01		06:38 (8)	06:55			07:49			07:47	08:26
	21:27		20:30	23	07:01 (8)	19:16			18:05			16:09	15:54
22	05:11		06:03		06:39 (8)	06:57		07:48 (4)	07:51			07:49	08:27
	21:26		20:28	22	07:01 (8)	19:14	9	07:57 (4)	18:03			16:07	15:55
23	05:12		06:04		06:38 (8)	06:58		07:45 (4)	07:53			07:51	08:27
	21:25		20:25	22	07:00 (8)	19:11	14	07:59 (4)	18:00			16:06	15:55
24	05:14		06:06		06:39 (8)	07:00		07:43 (4)	07:55			07:53	08:28
	21:23		20:23	21	07:00 (8)	19:09	17	08:00 (4)	17:58			16:05	15:56
25	05:15		06:08		06:39 (8)	07:02		07:42 (4)	06:57			07:54	08:28
	21:22		20:21	20	06:59 (8)	19:06	19	08:01 (4)	16:56			16:04	15:57
26	05:17		06:10		06:39 (8)	07:04		07:41 (4)	06:58			07:56	08:28
	21:20		20:18	18	06:57 (8)	19:04	20	08:01 (4)	16:54			16:03	15:57
27	05:19		06:11		06:41 (8)	07:05		07:41 (4)	07:00			07:58	08:29
	21:19		20:16	15	06:56 (8)	19:01	21	08:02 (4)	16:52			16:02	15:58
28	05:20		06:13		06:43 (8)	07:07		07:40 (4)	07:02			07:59	08:29
	21:17		20:14	11	06:54 (8)	18:59	20	08:00 (4)	16:50			16:01	15:59
29	05:22		06:15			07:09		07:40 (4)	07:04			08:01	08:29
	21:15		20:12			18:56	20	08:00 (4)	16:48			16:00	16:00
30	05:23		06:17			07:11		07:40 (4)	07:06			08:03	08:29
	21:14		20:09			18:54	20	08:00 (4)	16:46			15:59	16:01
31	05:25		06:18						07:08				08:29
	21:12		20:07						16:44				16:02
Sonnenscheinstunden	510		459			382			329			260	235
astr.max.mögl.Beschattung				308			160			57			
Red.Sonnenscheinwahrsch.				0.49			0.40			0.33			
Reduktion Betriebsdauer				0.91			0.91			0.91			
Reduktion Windrichtung				0.68			0.68			0.68			
Gesamte Reduktion				0.30			0.25			0.20			
Met.wahrsch.Beschattung				93			40			12			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IQ - IO251

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März		April		Mai	Juni
1 | 08:29		09:14 (4) | 07:59		08:28 (5) | 07:03		08:07 (7) | 06:48	05:40	04:51
| 16:03	32	09:46 (3) | 16:54	15	08:43 (5) | 17:49	43	08:50 (8) | 19:46	20:41	21:30
2 | 08:29		09:15 (4) | 07:58		08:27 (5) | 07:00		08:08 (7) | 06:46	05:38	04:50
| 16:04	31	09:46 (3) | 16:56	18	08:45 (5) | 17:51	41	08:49 (8) | 19:48	20:43	21:31
3 | 08:29		09:15 (4) | 07:56		08:26 (5) | 06:58		08:09 (8) | 06:43	05:36	04:49
| 16:05	32	09:47 (3) | 16:58	19	08:45 (5) | 17:52	40	08:49 (8) | 19:50	20:44	21:32
4 | 08:28		09:15 (4) | 07:54		08:25 (5) | 06:56		08:10 (8) | 06:41	05:34	04:49
| 16:07	31	09:46 (3) | 17:00	21	08:46 (5) | 17:54	38	08:48 (8) | 19:52	20:46	21:34
5 | 08:28		09:16 (4) | 07:52		08:25 (5) | 06:53		08:10 (8) | 06:39	05:32	04:48
| 16:08	31	09:47 (3) | 17:02	22	08:47 (5) | 17:56	37	08:47 (8) | 19:54	20:48	21:35
6 | 08:28		09:16 (4) | 07:51		08:25 (5) | 06:51		08:11 (8) | 06:36	05:30	04:47
| 16:09	30	09:46 (3) | 17:04	22	08:47 (5) | 17:58	35	08:46 (8) | 19:55	20:50	21:36
7 | 08:27		09:17 (4) | 07:49		08:25 (5) | 06:49		08:12 (8) | 06:34	05:28	04:46
| 16:10	30	09:47 (3) | 17:05	22	08:47 (5) | 18:00	33	08:45 (8) | 19:57	20:52	21:37
8 | 08:27		09:17 (4) | 07:47		08:25 (5) | 06:46		08:12 (8) | 06:31	05:26	04:46
| 16:12	29	09:46 (3) | 17:07	22	08:47 (5) | 18:02	31	08:43 (8) | 19:59	20:53	21:38
9 | 08:26		09:17 (4) | 07:45		08:25 (5) | 06:44		08:14 (8) | 06:29	05:24	04:45
| 16:13	29	09:46 (3) | 17:09	22	08:47 (5) | 18:04	27	08:41 (8) | 20:01	20:55	21:38
10 | 08:25		09:17 (4) | 07:43		08:25 (5) | 06:41		08:15 (8) | 06:27	05:22	04:45
| 16:15	28	09:45 (3) | 17:11	22	08:47 (5) | 18:06	23	08:38 (8) | 20:03	20:57	21:39
11 | 08:25		09:17 (4) | 07:41		08:26 (5) | 06:39		07:03 (10) | 06:24	05:21	04:44
| 16:16	27	09:44 (4) | 17:13	21	08:47 (5) | 18:08	21	08:36 (8) | 20:05	20:58	21:40
12 | 08:24		09:18 (4) | 07:39		08:15 (7) | 06:37		07:00 (10) | 06:22	05:19	04:44
| 16:18	27	09:45 (4) | 17:15	23	08:46 (5) | 18:10	25	08:30 (8) | 20:06	21:00	21:41
13 | 08:23		09:19 (4) | 07:37		08:11 (7) | 06:34		06:58 (10) | 06:20	05:17	04:44
| 16:19	27	09:46 (4) | 17:17	30	08:45 (5) | 18:11	22	07:20 (9) | 20:08	21:02	21:42
14 | 08:22		09:18 (4) | 07:35		08:09 (7) | 06:32		06:56 (10) | 06:17	05:15	04:43
| 16:21	27	09:45 (4) | 17:19	35	08:44 (5) | 18:13	25	07:21 (9) | 20:10	21:04	21:42
15 | 08:22		09:19 (4) | 07:33		08:07 (7) | 06:30		06:53 (10) | 06:15	05:14	04:43
| 16:23	26	09:45 (4) | 17:21	35	08:42 (5) | 18:15	29	07:22 (9) | 20:12	21:05	21:43
16 | 08:21		09:19 (4) | 07:31		08:06 (7) | 06:27		06:53 (10) | 06:13	05:12	04:43
| 16:24	27	09:46 (4) | 17:23	38	08:44 (8) | 18:17	29	07:22 (9) | 20:14	21:07	21:43
17 | 08:20		09:20 (4) | 07:29		08:04 (7) | 06:25		06:52 (10) | 06:10	05:10	04:43
| 16:26	26	09:46 (4) | 17:25	41	08:45 (8) | 18:19	30	07:22 (9) | 20:15	21:08	21:44
18 | 08:19		09:21 (4) | 07:27		08:04 (7) | 06:22		06:53 (10) | 06:08	05:09	04:43
| 16:28	25	09:46 (4) | 17:27	42	08:46 (8) | 18:21	30	07:23 (9) | 20:17	21:10	21:44
19 | 08:17		09:21 (4) | 07:25		08:04 (7) | 06:20		06:52 (10) | 06:06	05:07	04:43
| 16:29	25	09:46 (4) | 17:29	44	08:48 (8) | 18:23	30	07:22 (9) | 20:19	21:12	21:45
20 | 08:16		09:22 (4) | 07:23		08:03 (7) | 06:17		06:53 (10) | 06:04	05:06	04:43
| 16:31	24	09:46 (4) | 17:31	46	08:49 (8) | 18:24	29	07:22 (9) | 20:21	21:13	21:45
21 | 08:15		09:23 (4) | 07:20		08:02 (7) | 06:15		06:54 (10) | 06:01	05:04	04:43
| 16:33	23	09:46 (4) | 17:33	47	08:49 (8) | 18:26	27	07:21 (9) | 20:23	21:15	21:45
22 | 08:14		09:24 (4) | 07:18		08:02 (7) | 06:13		06:56 (10) | 05:59	05:03	04:43
| 16:35	21	09:45 (4) | 17:35	48	08:50 (8) | 18:28	24	07:20 (9) | 20:25	21:16	21:45
23 | 08:13		09:25 (4) | 07:16		08:03 (7) | 06:10		06:58 (9) | 05:57	05:02	04:43
| 16:37	20	09:45 (4) | 17:37	47	08:50 (8) | 18:30	22	07:20 (9) | 20:26	21:18	21:46
24 | 08:11		09:26 (4) | 07:14		08:03 (7) | 06:08		06:58 (9) | 05:55	05:00	04:44
| 16:38	18	09:44 (4) | 17:39	48	08:51 (8) | 18:32	20	07:18 (9) | 20:28	21:19	21:46
25 | 08:10		09:28 (4) | 07:12		08:03 (7) | 06:05		06:59 (9) | 05:53	04:59	04:44
| 16:40	15	09:43 (4) | 17:41	47	08:50 (8) | 18:34	18	07:17 (9) | 20:30	21:21	21:46
26 | 08:09		09:30 (4) | 07:09		08:03 (7) | 06:03		07:00 (9) | 05:50	04:58	04:45
| 16:42	11	09:41 (4) | 17:43	48	08:51 (8) | 18:35	14	07:14 (9) | 20:32	21:22	21:46
27 | 08:07		09:33 (4) | 07:07		08:05 (7) | 06:00		07:04 (9) | 05:48	04:56	04:45
| 16:44	4	09:37 (4) | 17:45	46	08:51 (8) | 18:37	6	07:10 (9) | 20:34	21:24	21:46
28 | 08:06		| 07:05		08:05 (7) | 05:58		| 05:46	04:55	04:45
| 16:46		| 17:47	45	08:50 (8) | 18:39		| 20:35	21:25	21:46
29 | 08:04		|		| 06:56		| 05:44	04:54	04:46
| 16:48		|		| 19:41		| 20:37	21:26	21:45
30 | 08:02		08:31 (5) |		| 06:53		| 05:42	04:53	04:47
| 16:50	8	08:39 (5) |		| 19:43		| 20:39	21:28	21:45
31 | 08:01		08:29 (5) |		| 06:51		|	04:52	
| 16:52	13	08:42 (5) |		| 19:44		|	21:29	
Sonnenscheinstunden	251	| 274		| 367		| 419	492	508
astr.max.mögl.Beschattung	697	|	936	|	749	|	|	|
Red.Sonnenscheinwahrsch.	0.17	|	0.24	|	0.31	|	|	|
Reduktion Betriebsdauer	0.91	|	0.91	|	0.91	|	|	|
Reduktion Windrichtung	0.60	|	0.65	|	0.67	|	|	|
Gesamte Reduktion	0.09	|	0.14	|	0.19	|	|	|
Met.wahrsch.Beschattung	65	|	131	|	141	|	|	|

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IQ - IO251

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September			Oktober			November			Dezember		
1	04:47	05:27		06:20			07:12		07:39 (10)	07:10		07:55 (5)	08:04		08:59 (4)
	21:45	21:10		20:04			18:52	19	07:58 (9)	16:42	22	08:17 (5)	15:58	27	09:26 (4)
2	04:48	05:28		06:22			07:14		07:40 (10)	07:12		07:54 (5)	08:06		09:00 (4)
	21:44	21:08		20:02			18:49	27	09:12 (8)	16:40	23	08:17 (5)	15:57	28	09:28 (3)
3	04:49	05:30		06:23			07:16		08:54 (8)	07:14		07:54 (5)	08:07		09:01 (4)
	21:44	21:07		20:00			18:47	21	09:15 (8)	16:38	23	08:17 (5)	15:57	29	09:30 (3)
4	04:50	05:32		06:25			07:18		08:52 (8)	07:16		07:54 (5)	08:09		09:01 (4)
	21:44	21:05		19:57			18:44	25	09:17 (8)	16:36	23	08:17 (5)	15:56	29	09:30 (3)
5	04:50	05:33		06:27			07:20		08:50 (8)	07:18		07:54 (5)	08:10		09:02 (4)
	21:43	21:03		19:55			18:42	29	09:19 (8)	16:34	23	08:17 (5)	15:55	30	09:32 (3)
6	04:51	05:35		06:29			07:21		08:49 (8)	07:19		07:56 (5)	08:11		09:02 (4)
	21:42	21:01		19:53			18:39	31	09:20 (8)	16:32	21	08:17 (5)	15:55	31	09:33 (3)
7	04:52	05:37		06:30			07:23		08:47 (8)	07:21		07:56 (5)	08:13		09:03 (4)
	21:42	20:59		19:50			18:37	34	09:21 (8)	16:30	21	08:17 (5)	15:54	31	09:34 (3)
8	04:53	05:38		06:32			07:25		08:45 (8)	07:23		07:57 (5)	08:14		09:03 (4)
	21:41	20:57		19:48			18:35	36	09:21 (8)	16:29	19	08:16 (5)	15:54	31	09:34 (3)
9	04:54	05:40		06:34			07:27		08:44 (8)	07:25		07:58 (5)	08:15		09:03 (4)
	21:40	20:55		19:45			18:32	38	09:22 (8)	16:27	17	08:15 (5)	15:54	32	09:35 (3)
10	04:55	05:42		06:36			07:29		08:44 (8)	07:27		07:59 (5)	08:16		09:04 (4)
	21:40	20:53		19:43			18:30	39	09:23 (8)	16:25	15	08:14 (5)	15:53	31	09:35 (3)
11	04:57	05:43		06:37			07:30		08:43 (8)	07:29		08:00 (5)	08:18		09:05 (4)
	21:39	20:51		19:40			18:28	40	09:23 (8)	16:23	13	08:13 (5)	15:53	32	09:37 (3)
12	04:58	05:45		06:39			07:32		08:41 (7)	07:31		08:03 (5)	08:19		09:06 (4)
	21:38	20:49		19:38			18:25	42	09:23 (8)	16:22	8	08:11 (5)	15:53	31	09:37 (3)
13	04:59	05:47		06:41			07:34		08:39 (7)	07:33			08:20		09:06 (4)
	21:37	20:47		19:36			18:23	44	09:23 (8)	16:20			15:53	32	09:38 (3)
14	05:00	05:49		06:43			07:36		08:37 (7)	07:35			08:21		09:07 (4)
	21:36	20:45		19:33			18:21	46	09:23 (8)	16:18			15:53	31	09:38 (3)
15	05:01	05:50		06:44			07:38		08:36 (7)	07:37		09:06 (4)	08:22		09:08 (4)
	21:35	20:43		19:31			18:18	47	09:23 (8)	16:17	5	09:11 (4)	15:53	31	09:39 (3)
16	05:03	05:52		06:46			07:40		08:35 (7)	07:38		09:03 (4)	08:22		09:08 (4)
	21:34	20:41		19:28			18:16	48	09:23 (8)	16:15	11	09:14 (4)	15:53	32	09:40 (3)
17	05:04	05:54		06:48		07:49 (9)	07:42		08:35 (7)	07:40		09:01 (4)	08:23		09:09 (4)
	21:32	20:39		19:26	12	08:01 (9)	18:14	48	09:23 (8)	16:14	15	09:16 (4)	15:53	31	09:40 (3)
18	05:05	05:56		06:50		07:47 (9)	07:43		08:34 (7)	07:42		09:00 (4)	08:24		09:09 (4)
	21:31	20:36		19:23	17	08:04 (9)	18:12	48	09:22 (8)	16:13	18	09:18 (4)	15:53	31	09:40 (3)
19	05:07	05:57		06:51		07:45 (9)	07:45		08:34 (7)	07:44		08:59 (4)	08:25		09:10 (4)
	21:30	20:34		19:21	20	08:05 (9)	18:09	47	09:21 (8)	16:11	20	09:19 (4)	15:54	31	09:41 (3)
20	05:08	05:59		06:53		07:43 (9)	07:47		08:34 (7)	07:46		08:59 (4)	08:26		09:11 (4)
	21:29	20:32		19:18	22	08:05 (9)	18:07	47	09:21 (8)	16:10	21	09:20 (4)	15:54	31	09:42 (3)
21	05:09	06:01		06:55		07:42 (10)	07:49		08:34 (7)	07:47		08:58 (4)	08:26		09:10 (4)
	21:27	20:30		19:16	24	08:06 (9)	18:05	46	09:20 (8)	16:08	23	09:21 (4)	15:54	32	09:42 (3)
22	05:11	06:03		06:57		07:40 (10)	07:51		08:34 (7)	07:49		08:58 (4)	08:27		09:11 (4)
	21:26	20:28		19:13	26	08:06 (9)	18:03	45	09:19 (8)	16:07	24	09:22 (4)	15:55	32	09:43 (3)
23	05:12	06:04		06:58		07:37 (10)	07:53		08:34 (7)	07:51		08:58 (4)	08:27		09:12 (4)
	21:25	20:25		19:11	29	08:06 (9)	18:00	44	09:18 (8)	16:06	25	09:23 (4)	15:55	31	09:43 (3)
24	05:14	06:06		07:00		07:36 (10)	07:55		08:34 (7)	07:53		08:58 (4)	08:28		09:12 (4)
	21:23	20:23		19:09	30	08:06 (9)	17:58	42	09:16 (8)	16:05	26	09:24 (4)	15:56	31	09:43 (3)
25	05:15	06:08		07:02		07:35 (10)	06:57		08:35 (7)	07:54		08:58 (4)	08:28		09:13 (4)
	21:22	20:21		19:06	30	08:05 (9)	16:56	40	08:15 (8)	16:04	26	09:24 (4)	15:57	31	09:44 (3)
26	05:17	06:09		07:04		07:35 (10)	06:58		07:36 (7)	07:56		08:58 (4)	08:28		09:13 (4)
	21:20	20:18		19:04	30	08:05 (9)	16:54	37	08:13 (8)	16:03	27	09:25 (4)	15:57	31	09:44 (3)
27	05:19	06:11		07:05		07:34 (10)	07:00		07:37 (7)	07:58		08:59 (4)	08:29		09:13 (4)
	21:19	20:16		19:01	29	08:03 (9)	16:52	35	08:12 (5)	16:02	27	09:26 (4)	15:58	31	09:44 (3)
28	05:20	06:13		07:07		07:34 (10)	07:02		07:39 (7)	07:59		08:58 (4)	08:29		09:13 (4)
	21:17	20:14		18:59	29	08:03 (9)	16:50	35	08:14 (5)	16:01	27	09:25 (4)	15:59	32	09:45 (3)
29	05:22	06:15		07:09		07:35 (10)	07:04		07:41 (7)	08:01		08:59 (4)	08:29		09:14 (4)
	21:15	20:12		18:56	27	08:02 (9)	16:48	29	08:15 (5)	16:00	27	09:26 (4)	16:00	31	09:45 (3)
30	05:23	06:16		07:11		07:37 (10)	07:06		07:56 (5)	08:03		08:59 (4)	08:29		09:14 (4)
	21:14	20:09		18:54	23	08:00 (9)	16:46	20	08:16 (5)	15:59	27	09:26 (4)	16:01	32	09:46 (3)
31	05:25	06:18					07:08		07:55 (5)				08:29		09:15 (4)
	21:12	20:07					16:44	21	08:16 (5)				16:02	31	09:46 (3)
Sonnenscheinstunden	510		459	382			329			260			235		
astr.max.mögl.Beschattung					348			1150			577			957	
Red.Sonnenscheinwahrsch.					0.40			0.33			0.21			0.14	
Reduktion Betriebsdauer					0.91			0.91			0.91			0.91	
Reduktion Windrichtung					0.69			0.66			0.62			0.60	
Gesamte Reduktion					0.25			0.19			0.11			0.07	
Met.wahrsch.Beschattung					86			223			66			70	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IR - IO252

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April		Mai	Juni
1	08:29		09:11 (4)	07:59		08:27 (5)	07:03		05:40	04:51
	16:03	24	09:35 (4)	16:54	19	08:46 (5)	17:49	28 08:46 (8)	19:46	20:41	21:30
2	08:29		09:12 (4)	07:58		08:27 (5)	07:00	08:19 (8)	06:46	05:38	04:50
	16:04	24	09:36 (4)	16:56	20	08:47 (5)	17:51	26 08:45 (8)	19:48	20:43	21:31
3	08:29		09:12 (4)	07:56		08:26 (5)	06:58	08:20 (8)	06:43	05:36	04:49
	16:05	24	09:36 (4)	16:58	21	08:47 (5)	17:52	22 08:42 (8)	19:50	20:44	21:32
4	08:28		09:12 (4)	07:54		08:26 (5)	06:56	08:23 (8)	06:41	05:34	04:49
	16:07	24	09:36 (4)	17:00	21	08:47 (5)	17:54	17 08:40 (8)	19:52	20:46	21:34
5	08:28		09:13 (4)	07:52		08:26 (5)	06:53	08:26 (8)	06:39	05:32	04:48
	16:08	25	09:38 (4)	17:02	21	08:47 (5)	17:56	9 08:35 (8)	19:54	20:48	21:35
6	08:28		09:13 (4)	07:51		08:26 (5)	06:51		06:36	05:30	04:47
	16:09	25	09:38 (4)	17:04	21	08:47 (5)	17:58		19:55	20:50	21:36
7	08:27		09:14 (4)	07:49		08:27 (5)	06:49	07:16 (9)	06:34	05:28	04:46
	16:10	25	09:39 (4)	17:05	20	08:47 (5)	18:00	8 07:24 (9)	19:57	20:52	21:37
8	08:27		09:14 (4)	07:47		08:27 (5)	06:46	07:12 (9)	06:31	05:26	04:46
	16:12	25	09:39 (4)	17:07	20	08:47 (5)	18:02	14 07:26 (9)	19:59	20:53	21:38
9	08:26		09:14 (4)	07:45		08:16 (7)	06:44	07:11 (9)	06:29	05:24	04:45
	16:13	25	09:39 (4)	17:09	26	08:46 (5)	18:04	17 07:28 (9)	20:01	20:55	21:39
10	08:25		09:14 (4)	07:43		08:13 (7)	06:41	07:09 (9)	06:27	05:22	04:45
	16:15	25	09:39 (4)	17:11	33	08:46 (5)	18:06	19 07:28 (9)	20:03	20:57	21:39
11	08:25		09:15 (4)	07:41		08:11 (7)	06:39	07:08 (9)	06:24	05:21	04:44
	16:16	25	09:40 (4)	17:13	34	08:45 (5)	18:08	21 07:29 (9)	20:05	20:58	21:40
12	08:24		09:16 (4)	07:39		08:10 (7)	06:37	07:06 (9)	06:22	05:19	04:44
	16:18	25	09:41 (4)	17:15	36	08:46 (8)	18:10	23 07:29 (9)	20:06	21:00	21:41
13	08:23		09:16 (4)	07:37		08:09 (7)	06:34	07:06 (9)	06:20	05:17	04:44
	16:19	25	09:41 (4)	17:17	38	08:47 (8)	18:11	24 07:30 (9)	20:08	21:02	21:42
14	08:22		09:16 (4)	07:35		08:08 (7)	06:32	07:06 (9)	06:17	05:15	04:43
	16:21	24	09:40 (4)	17:19	41	08:49 (8)	18:13	24 07:30 (9)	20:10	21:04	21:42
15	08:22		09:17 (4)	07:33		08:08 (7)	06:30	07:05 (9)	06:15	05:14	04:43
	16:23	24	09:41 (4)	17:21	42	08:50 (8)	18:15	24 07:29 (9)	20:12	21:05	21:43
16	08:21		09:17 (4)	07:31		08:08 (7)	06:27	07:06 (9)	06:13	05:12	04:43
	16:24	24	09:41 (4)	17:23	42	08:50 (8)	18:17	23 07:29 (9)	20:14	21:07	21:43
17	08:20		09:18 (4)	07:29		08:07 (7)	06:25	07:06 (9)	06:10	05:10	04:43
	16:26	23	09:41 (4)	17:25	43	08:50 (8)	18:19	22 07:28 (9)	20:16	21:09	21:44
18	08:19		09:19 (4)	07:27		08:07 (7)	06:22	07:06 (9)	06:08	05:09	04:43
	16:28	22	09:41 (4)	17:27	44	08:51 (8)	18:21	21 07:27 (9)	20:17	21:10	21:44
19	08:17		09:19 (4)	07:25		08:07 (7)	06:20	07:07 (9)	06:06	05:07	04:43
	16:29	21	09:40 (4)	17:29	44	08:51 (8)	18:23	18 07:25 (9)	20:19	21:12	21:45
20	08:16		09:21 (4)	07:23		08:07 (7)	06:17	07:08 (9)	06:04	05:06	04:43
	16:31	19	09:40 (4)	17:31	45	08:52 (8)	18:24	15 07:23 (9)	20:21	21:13	21:45
21	08:15		09:22 (4)	07:20		08:07 (7)	06:15	07:10 (9)	06:01	05:04	04:43
	16:33	18	09:40 (4)	17:33	44	08:51 (8)	18:26	10 07:20 (9)	20:23	21:15	21:45
22	08:14		09:23 (4)	07:18		08:08 (7)	06:13		05:59	05:03	04:43
	16:35	16	09:39 (4)	17:35	43	08:51 (8)	18:28		20:25	21:16	21:45
23	08:13		09:25 (4)	07:16		08:09 (7)	06:10		05:57	05:02	04:43
	16:37	13	09:38 (4)	17:37	42	08:51 (8)	18:30		20:26	21:18	21:46
24	08:11		09:27 (4)	07:14		08:10 (7)	06:08		05:55	05:00	04:44
	16:38	9	09:36 (4)	17:39	41	08:51 (8)	18:32		20:28	21:19	21:46
25	08:10			07:12		08:11 (7)	06:05		05:53	04:59	04:44
	16:40			17:41	39	08:50 (8)	18:34		20:30	21:21	21:46
26	08:09			07:09		08:13 (7)	06:03		05:50	04:58	04:45
	16:42			17:43	36	08:49 (8)	18:35		20:32	21:22	21:46
27	08:07			07:07		08:16 (8)	06:00		05:48	04:56	04:45
	16:44			17:45	33	08:49 (8)	18:37		20:34	21:24	21:46
28	08:06		08:34 (5)	07:05		08:16 (8)	05:58		05:46	04:55	04:45
	16:46	6	08:40 (5)	17:47	31	08:47 (8)	18:39		20:35	21:25	21:46
29	08:04		08:32 (5)				06:56		05:44	04:54	04:46
	16:48	10	08:42 (5)				19:41		20:37	21:26	21:45
30	08:02		08:30 (5)				06:53		05:42	04:53	04:47
	16:50	13	08:43 (5)				19:43		20:39	21:28	21:45
31	08:01		08:29 (5)				06:51			04:52	
	16:52	16	08:45 (5)				19:44			21:29	
Sonnenscheinstunden	251			274			367		419	492	508
astr.max.mögl.Beschattung		579			940			385			
Red.Sonnenscheinwahrsch.		0.17			0.24			0.31			
Reduktion Betriebsdauer		0.91			0.91			0.91			
Reduktion Windrichtung		0.60			0.65			0.67			
Gesamte Reduktion		0.09			0.14			0.19			
Met.wahrsch.Beschattung		54			131			73			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IR - IO252

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September			Oktober			November			Dezember		
1	04:47		05:27		06:20			07:12		07:46 (9)	07:10		07:43 (7)	08:04		08:57 (4)
	21:45		21:10		20:04			18:52	23	08:09 (9)	16:42	32	08:15 (5)	15:58	25	09:22 (4)
2	04:48		05:28		06:22			07:14		07:45 (9)	07:12		07:46 (7)	08:06		08:57 (4)
	21:44		21:08		20:02			18:49	23	08:08 (9)	16:40	25	08:16 (5)	15:57	26	09:23 (4)
3	04:49		05:30		06:23			07:16		07:46 (9)	07:14		07:57 (5)	08:07		08:58 (4)
	21:44		21:07		20:00			18:47	21	08:07 (9)	16:38	20	08:17 (5)	15:57	25	09:23 (4)
4	04:50		05:32		06:25			07:18		07:47 (9)	07:16		07:56 (5)	08:09		08:58 (4)
	21:44		21:05		19:57			18:44	19	08:06 (9)	16:36	21	08:17 (5)	15:56	25	09:23 (4)
5	04:50		05:33		06:27			07:20		07:48 (9)	07:18		07:56 (5)	08:10		08:59 (4)
	21:43		21:03		19:55			18:42	16	08:04 (9)	16:34	21	08:17 (5)	15:55	25	09:24 (4)
6	04:51		05:35		06:29			07:21		07:50 (9)	07:20		07:57 (5)	08:11		08:59 (4)
	21:42		21:01		19:53			18:39	12	08:02 (9)	16:32	21	08:18 (5)	15:55	25	09:24 (4)
7	04:52		05:37		06:30			07:23			07:21		07:57 (5)	08:13		09:00 (4)
	21:42		20:59		19:50			18:37			16:30	21	08:18 (5)	15:54	25	09:25 (4)
8	04:53		05:38		06:32			07:25			07:23		07:57 (5)	08:14		09:00 (4)
	21:41		20:57		19:48			18:35			16:29	21	08:18 (5)	15:54	25	09:25 (4)
9	04:54		05:40		06:34			07:27		08:58 (8)	07:25		07:58 (5)	08:15		09:01 (4)
	21:40		20:55		19:45			18:32	14	09:12 (8)	16:27	19	08:17 (5)	15:54	24	09:25 (4)
10	04:55		05:42		06:36			07:29		08:55 (8)	07:27		07:58 (5)	08:16		09:01 (4)
	21:40		20:53		19:43			18:30	20	09:15 (8)	16:25	19	08:17 (5)	15:53	24	09:25 (4)
11	04:57		05:43		06:37			07:30		08:53 (8)	07:29		08:00 (5)	08:18		09:02 (4)
	21:39		20:51		19:40			18:28	24	09:17 (8)	16:23	16	08:16 (5)	15:53	24	09:26 (4)
12	04:58		05:45		06:39			07:32		08:52 (8)	07:31		08:02 (5)	08:19		09:03 (4)
	21:38		20:49		19:38			18:25	27	09:19 (8)	16:22	13	08:15 (5)	15:53	23	09:26 (4)
13	04:59		05:47		06:41			07:34		08:50 (8)	07:33		08:04 (5)	08:20		09:03 (4)
	21:37		20:47		19:36			18:23	30	09:20 (8)	16:20	10	08:14 (5)	15:53	23	09:26 (4)
14	05:00		05:49		06:43			07:36		08:49 (8)	07:35		08:06 (5)	08:21		09:04 (4)
	21:36		20:45		19:33			18:21	32	09:21 (8)	16:19	6	08:12 (5)	15:53	22	09:26 (4)
15	05:01		05:50		06:44			07:38		08:48 (7)	07:37			08:22		09:04 (4)
	21:35		20:43		19:31			18:18	33	09:21 (8)	16:17			15:53	23	09:27 (4)
16	05:03		05:52		06:46			07:40		08:44 (7)	07:38			08:23		09:05 (4)
	21:34		20:41		19:28			18:16	38	09:22 (8)	16:15			15:53	22	09:27 (4)
17	05:04		05:54		06:48			07:42		08:42 (7)	07:40			08:23		09:06 (4)
	21:32		20:39		19:26			18:14	40	09:22 (8)	16:14			15:53	22	09:28 (4)
18	05:05		05:56		06:50			07:43		08:41 (7)	07:42		09:01 (4)	08:24		09:06 (4)
	21:31		20:36		19:23			18:12	41	09:22 (8)	16:13	9	09:10 (4)	15:53	21	09:27 (4)
19	05:07		05:57		06:51			07:45		08:40 (7)	07:44		08:59 (4)	08:25		09:06 (4)
	21:30		20:34		19:21			18:09	43	09:23 (8)	16:11	13	09:12 (4)	15:54	22	09:28 (4)
20	05:08		05:59		06:53			07:47		08:39 (7)	07:46		08:58 (4)	08:26		09:07 (4)
	21:29		20:32		19:18			18:07	43	09:22 (8)	16:10	16	09:14 (4)	15:54	22	09:29 (4)
21	05:09		06:01		06:55			07:49		08:38 (7)	07:47		08:57 (4)	08:26		09:07 (4)
	21:27		20:30		19:16			18:05	44	09:22 (8)	16:08	18	09:15 (4)	15:54	22	09:29 (4)
22	05:11		06:03		06:57		07:57 (9)	07:51		08:37 (7)	07:49		08:57 (4)	08:27		09:08 (4)
	21:26		20:28		19:13	7	08:04 (9)	18:03	45	09:22 (8)	16:07	19	09:16 (4)	15:55	22	09:30 (4)
23	05:12		06:04		06:58		07:53 (9)	07:53		08:37 (7)	07:51		08:57 (4)	08:27		09:08 (4)
	21:25		20:25		19:11	13	08:06 (9)	18:00	45	09:22 (8)	16:06	20	09:17 (4)	15:55	22	09:30 (4)
24	05:14		06:06		07:00		07:51 (9)	07:55		08:37 (7)	07:53		08:56 (4)	08:28		09:08 (4)
	21:23		20:23		19:09	17	08:08 (9)	17:58	44	09:21 (8)	16:05	22	09:18 (4)	15:56	22	09:30 (4)
25	05:15		06:08		07:02		07:49 (9)	06:57		07:37 (7)	07:54		08:56 (4)	08:28		09:09 (4)
	21:22		20:21		19:06	20	08:09 (9)	16:56	44	08:21 (8)	16:04	23	09:19 (4)	15:57	22	09:31 (4)
26	05:17		06:09		07:04		07:49 (9)	06:58		07:37 (7)	07:56		08:56 (4)	08:28		09:10 (4)
	21:20		20:18		19:04	21	08:10 (9)	16:54	43	08:20 (8)	16:03	24	09:20 (4)	15:57	22	09:32 (4)
27	05:19		06:11		07:05		07:47 (9)	07:00		07:37 (7)	07:58		08:57 (4)	08:29		09:10 (4)
	21:19		20:16		19:01	23	08:10 (9)	16:52	42	08:19 (8)	16:02	24	09:21 (4)	15:58	22	09:32 (4)
28	05:20		06:13		07:07		07:46 (9)	07:02		07:38 (7)	07:59		08:56 (4)	08:29		09:10 (4)
	21:17		20:14		18:59	24	08:10 (9)	16:50	40	08:18 (8)	16:01	25	09:21 (4)	15:59	23	09:33 (4)
29	05:22		06:15		07:09		07:46 (9)	07:04		07:39 (7)	08:01		08:57 (4)	08:29		09:11 (4)
	21:15		20:12		18:56	24	08:10 (9)	16:48	38	08:17 (8)	16:00	24	09:21 (4)	16:00	22	09:33 (4)
30	05:23		06:16		07:11		07:46 (9)	07:06		07:40 (7)	08:03		08:57 (4)	08:29		09:11 (4)
	21:14		20:09		18:54	24	08:10 (9)	16:46	35	08:15 (8)	15:59	25	09:22 (4)	16:01	23	09:34 (4)
31	05:25		06:18					07:08		07:41 (7)				08:29		09:11 (4)
	21:12		20:07					16:44	33	08:14 (5)				16:02	24	09:35 (4)
Sonnenscheinstunden	510		459		382			329			260			235		
astr.max.mögl.Beschattung						173			952			527			719	
Red.Sonnenscheinwahrsch.						0.40			0.33			0.21			0.14	
Reduktion Betriebsdauer						0.91			0.91			0.91			0.91	
Reduktion Windrichtung						0.68			0.66			0.62			0.60	
Gesamte Reduktion						0.25			0.19			0.12			0.07	
Met.wahrsch.Beschattung						43			185			61			53	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IS - IO253

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März		April		Mai	Juni
1 | 08:29		09:02 (4) | 07:59		| 07:03		07:58 (8) | 06:48	05:40	04:51
| 16:03	9	09:11 (4) | 16:54		| 17:49	32	08:30 (8) | 19:46	20:41	21:30
2 | 08:29		09:02 (4) | 07:58	08:25 (5) | 07:00			07:59 (8) | 06:46	05:38	04:50
| 16:04	10	09:12 (4) | 16:56	5 08:30 (5) | 17:51		30	08:29 (8) | 19:48	20:43	21:31
3 | 08:29		09:02 (4) | 07:56	08:23 (5) | 06:58			07:59 (8) | 06:43	05:36	04:49
| 16:05	12	09:14 (4) | 16:58	9 08:32 (5) | 17:53		29	08:28 (8) | 19:50	20:44	21:32
4 | 08:28		09:01 (4) | 07:54	08:21 (5) | 06:56			08:00 (8) | 06:41	05:34	04:49
| 16:07	13	09:14 (4) | 17:00	12 08:33 (5) | 17:54		27	08:27 (8) | 19:52	20:46	21:34
5 | 08:28		09:01 (4) | 07:52	08:19 (5) | 06:53			08:00 (8) | 06:39	05:32	04:48
| 16:08	15	09:16 (4) | 17:02	15 08:34 (5) | 17:56		25	08:25 (8) | 19:54	20:48	21:35
6 | 08:28		09:01 (4) | 07:51	08:17 (5) | 06:51			08:02 (8) | 06:36	05:30	04:47
| 16:09	16	09:17 (4) | 17:04	18 08:35 (5) | 17:58		21	08:23 (8) | 19:55	20:50	21:36
7 | 08:27		09:01 (4) | 07:49	08:16 (5) | 06:49			08:04 (8) | 06:34	05:28	04:46
| 16:10	17	09:18 (4) | 17:06	19 08:35 (5) | 18:00		17	08:21 (8) | 19:57	20:52	21:37
8 | 08:27		09:01 (4) | 07:47	08:16 (5) | 06:46			08:07 (8) | 06:31	05:26	04:46
| 16:12	18	09:19 (4) | 17:07	20 08:36 (5) | 18:02		10	08:17 (8) | 19:59	20:53	21:38
9 | 08:26		09:00 (4) | 07:45	08:16 (5) | 06:44			07:09 (9) | 06:29	05:24	04:45
| 16:13	19	09:19 (4) | 17:09	20 08:36 (5) | 18:04		7	07:16 (9) | 20:01	20:55	21:39
10 | 08:25		09:00 (4) | 07:43	08:16 (5) | 06:41			07:05 (9) | 06:27	05:22	04:45
| 16:15	20	09:20 (4) | 17:11	20 08:36 (5) | 18:06		13	07:18 (9) | 20:03	20:57	21:39
11 | 08:25		09:00 (4) | 07:41	08:16 (5) | 06:39			07:04 (9) | 06:24	05:21	04:44
| 16:16	21	09:21 (4) | 17:13	20 08:36 (5) | 18:08		16	07:20 (9) | 20:05	20:58	21:40
12 | 08:24		09:01 (4) | 07:39	08:17 (5) | 06:37			07:02 (9) | 06:22	05:19	04:44
| 16:18	21	09:22 (4) | 17:15	18 08:35 (5) | 18:10		18	07:20 (9) | 20:06	21:00	21:41
13 | 08:23		09:01 (4) | 07:37	08:18 (5) | 06:34			07:01 (9) | 06:20	05:17	04:44
| 16:19	22	09:23 (4) | 17:17	17 08:35 (5) | 18:11		20	07:21 (9) | 20:08	21:02	21:42
14 | 08:22		09:00 (4) | 07:35	08:03 (7) | 06:32			07:01 (9) | 06:17	05:15	04:43
| 16:21	23	09:23 (4) | 17:19	25 08:34 (5) | 18:13		21	07:22 (9) | 20:10	21:04	21:42
15 | 08:22		09:00 (4) | 07:33	08:01 (7) | 06:30			07:00 (9) | 06:15	05:14	04:43
| 16:23	23	09:23 (4) | 17:21	31 08:33 (5) | 18:15		21	07:21 (9) | 20:12	21:05	21:43
16 | 08:21		09:01 (4) | 07:31	07:59 (7) | 06:27			07:00 (9) | 06:13	05:12	04:43
| 16:24	23	09:24 (4) | 17:23	31 08:30 (5) | 18:17		22	07:22 (9) | 20:14	21:07	21:43
17 | 08:20		09:01 (4) | 07:29	07:57 (7) | 06:25			06:59 (9) | 06:10	05:10	04:43
| 16:26	24	09:25 (4) | 17:25	28 08:25 (8) | 18:19		22	07:21 (9) | 20:16	21:09	21:44
18 | 08:19		09:02 (4) | 07:27	07:57 (7) | 06:22			07:00 (9) | 06:08	05:09	04:43
| 16:28	23	09:25 (4) | 17:27	30 08:27 (8) | 18:21		20	07:20 (9) | 20:17	21:10	21:44
19 | 08:17		09:01 (4) | 07:25	07:56 (7) | 06:20			06:59 (9) | 06:06	05:07	04:43
| 16:29	24	09:25 (4) | 17:29	32 08:28 (8) | 18:23		20	07:19 (9) | 20:19	21:12	21:45
20 | 08:16		09:02 (4) | 07:23	07:56 (7) | 06:17			07:01 (9) | 06:04	05:06	04:43
| 16:31	24	09:26 (4) | 17:31	34 08:30 (8) | 18:24		17	07:18 (9) | 20:21	21:13	21:45
21 | 08:15		09:03 (4) | 07:20	07:55 (7) | 06:15			07:01 (9) | 06:01	05:04	04:43
| 16:33	23	09:26 (4) | 17:33	35 08:30 (8) | 18:26		14	07:15 (9) | 20:23	21:15	21:45
22 | 08:14		09:03 (4) | 07:18	07:55 (7) | 06:13			07:04 (9) | 05:59	05:03	04:43
| 16:35	23	09:26 (4) | 17:35	35 08:30 (8) | 18:28		9	07:13 (9) | 20:25	21:16	21:45
23 | 08:13		09:04 (4) | 07:16	07:55 (7) | 06:10				| 05:57	05:02	04:43
| 16:37	22	09:26 (4) | 17:37	36 08:31 (8) | 18:30				| 20:26	21:18	21:46
24 | 08:11		09:04 (4) | 07:14	07:56 (7) | 06:08				| 05:55	05:00	04:44
| 16:38	21	09:25 (4) | 17:39	35 08:31 (8) | 18:32				| 20:28	21:19	21:46
25 | 08:10		09:06 (4) | 07:12	07:56 (7) | 06:05				| 05:53	04:59	04:44
| 16:40	20	09:26 (4) | 17:41	35 08:31 (8) | 18:34				| 20:30	21:21	21:46
26 | 08:09		09:06 (4) | 07:09	07:57 (7) | 06:03				| 05:50	04:58	04:45
| 16:42	19	09:25 (4) | 17:43	34 08:31 (8) | 18:35				| 20:32	21:22	21:46
27 | 08:07		09:08 (4) | 07:07	07:58 (7) | 06:00				| 05:48	04:56	04:45
| 16:44	17	09:25 (4) | 17:45	33 08:31 (8) | 18:37				| 20:34	21:24	21:46
28 | 08:06		09:09 (4) | 07:05	07:58 (8) | 05:58				| 05:46	04:55	04:45
| 16:46	14	09:23 (4) | 17:47	32 08:30 (8) | 18:39				| 20:35	21:25	21:46
29 | 08:04		09:11 (4)		| 06:56			| 05:44	04:54	04:46
| 16:48	10	09:21 (4)		| 19:41			| 20:37	21:26	21:45
30 | 08:03				| 06:53			| 05:42	04:53	04:47
| 16:50				| 19:43			| 20:39	21:28	21:45
31 | 08:01				| 06:51				04:52	
| 16:52				| 19:45				21:29	
Sonnenscheinstunden | 251		274		| 367		419	492	508	
astr.max.mögl.Beschattung	546		679		431					
Red.Sonnenscheinwahrsch.	0.17		0.24		0.31					
Reduktion Betriebsdauer	0.91		0.91		0.91					
Reduktion Windrichtung	0.60		0.66		0.67					
Gesamte Reduktion	0.09		0.14		0.19					
Met.wahrsch.Beschattung	51		96		82					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IS - IO253

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September			Oktober			November			Dezember		
1	04:47		05:27		06:20			07:12			07:41 (9)	07:10		07:46 (5)	08:04		08:42 (4)
	21:45		21:10		20:04			18:52	20		08:01 (9)	16:42	20	08:06 (5)	15:58	21	09:03 (4)
2	04:48		05:28		06:22			07:14			07:41 (9)	07:12		07:46 (5)	08:06		08:43 (4)
	21:44		21:08		20:02			18:49	17		07:58 (9)	16:40	20	08:06 (5)	15:57	20	09:03 (4)
3	04:49		05:30		06:23			07:16			07:42 (9)	07:14		07:46 (5)	08:07		08:44 (4)
	21:44		21:07		20:00			18:47	15		07:57 (9)	16:38	19	08:05 (5)	15:57	20	09:04 (4)
4	04:50		05:32		06:25			07:18			07:45 (9)	07:16		07:46 (5)	08:09		08:45 (4)
	21:44		21:05		19:57			18:44	9		07:54 (9)	16:36	19	08:05 (5)	15:56	18	09:03 (4)
5	04:50		05:33		06:27			07:20			08:48 (8)	07:18		07:47 (5)	08:10		08:46 (4)
	21:43		21:03		19:55			18:42	2		08:50 (8)	16:34	17	08:04 (5)	15:55	17	09:03 (4)
6	04:51		05:35		06:29			07:21			08:42 (8)	07:20		07:50 (5)	08:11		08:47 (4)
	21:42		21:01		19:53			18:39	14		08:56 (8)	16:32	15	08:05 (5)	15:55	16	09:03 (4)
7	04:52		05:37		06:30			07:23			08:39 (8)	07:21		07:52 (5)	08:13		08:48 (4)
	21:42		20:59		19:50			18:37	19		08:58 (8)	16:30	12	08:04 (5)	15:54	15	09:03 (4)
8	04:53		05:38		06:32			07:25			08:37 (8)	07:23		07:54 (5)	08:14		08:49 (4)
	21:41		20:57		19:48			18:35	23		09:00 (8)	16:29	8	08:02 (5)	15:54	14	09:03 (4)
9	04:54		05:40		06:34			07:27			08:35 (8)	07:25		07:56 (5)	08:15		08:50 (4)
	21:40		20:55		19:45			18:32	25		09:00 (8)	16:27	4	08:00 (5)	15:54	12	09:02 (4)
10	04:55		05:42		06:36			07:29			08:33 (8)	07:27			08:16		08:51 (4)
	21:40		20:53		19:43			18:30	28		09:01 (8)	16:25			15:53	10	09:01 (4)
11	04:57		05:43		06:37			07:31			08:33 (8)	07:29			08:18		08:53 (4)
	21:39		20:51		19:40			18:28	29		09:02 (8)	16:23			15:53	9	09:02 (4)
12	04:58		05:45		06:39			07:32			08:32 (8)	07:31		08:47 (4)	08:19		08:54 (4)
	21:38		20:49		19:38			18:25	31		09:03 (8)	16:22	2	08:49 (4)	15:53	7	09:01 (4)
13	04:59		05:47		06:41			07:34			08:31 (8)	07:33		08:43 (4)	08:20		08:55 (4)
	21:37		20:47		19:36			18:23	32		09:03 (8)	16:20	10	08:53 (4)	15:53	5	09:00 (4)
14	05:00		05:49		06:43			07:36			08:31 (7)	07:35		08:41 (4)	08:21		
	21:36		20:45		19:33			18:21	32		09:03 (8)	16:19	14	08:55 (4)	15:53		
15	05:01		05:50		06:44			07:38			08:30 (7)	07:37		08:40 (4)	08:22		
	21:35		20:43		19:31			18:18	33		09:03 (8)	16:17	17	08:57 (4)	15:53		
16	05:03		05:52		06:46			07:40			08:28 (7)	07:38		08:39 (4)	08:23		
	21:34		20:41		19:28			18:16	35		09:03 (8)	16:15	19	08:58 (4)	15:53		
17	05:04		05:54		06:48			07:42			08:28 (7)	07:40		08:39 (4)	08:23		
	21:32		20:39		19:26			18:14	35		09:03 (8)	16:14	20	08:59 (4)	15:53		
18	05:05		05:56		06:50			07:43			08:27 (7)	07:42		08:38 (4)	08:24		
	21:31		20:36		19:23			18:12	36		09:03 (8)	16:13	21	08:59 (4)	15:53		
19	05:07		05:57		06:51			07:45			08:27 (7)	07:44		08:38 (4)	08:25		
	21:30		20:34		19:21			18:09	35		09:02 (8)	16:11	22	09:00 (4)	15:54		
20	05:08		05:59		06:53			07:47			08:26 (7)	07:46		08:38 (4)	08:26		
	21:29		20:32		19:18			18:07	35		09:01 (8)	16:10	23	09:01 (4)	15:54		
21	05:09		06:01		06:55		07:51 (9)	07:49			08:26 (7)	07:47		08:38 (4)	08:26		
	21:27		20:30		19:16	6	07:57 (9)	18:05	35		09:01 (8)	16:09	23	09:01 (4)	15:54		
22	05:11		06:03		06:57		07:48 (9)	07:51			08:26 (7)	07:49		08:38 (4)	08:27		
	21:26		20:28		19:13	12	08:00 (9)	18:03	34		09:00 (8)	16:07	24	09:02 (4)	15:55		
23	05:12		06:04		06:58		07:45 (9)	07:53			08:27 (7)	07:51		08:38 (4)	08:27		
	21:25		20:25		19:11	16	08:01 (9)	18:00	31		08:58 (8)	16:06	24	09:02 (4)	15:55		
24	05:14		06:06		07:00		07:43 (9)	07:55			08:27 (7)	07:53		08:39 (4)	08:28		
	21:23		20:23		19:09	19	08:02 (9)	17:58	30		08:57 (8)	16:05	23	09:02 (4)	15:56		
25	05:15		06:08		07:02		07:43 (9)	06:57			07:28 (7)	07:54		08:39 (4)	08:28		
	21:22		20:21		19:06	20	08:03 (9)	16:56	27		07:55 (8)	16:04	24	09:03 (4)	15:57		
26	05:17		06:10		07:04		07:42 (9)	06:58			07:29 (7)	07:56		08:40 (4)	08:28		
	21:20		20:18		19:04	21	08:03 (9)	16:54	31		08:00 (5)	16:03	23	09:03 (4)	15:57		
27	05:19		06:11		07:05		07:42 (9)	07:00			07:31 (7)	07:58		08:41 (4)	08:29		
	21:19		20:16		19:01	21	08:03 (9)	16:52	30		08:03 (5)	16:02	23	09:04 (4)	15:58		
28	05:20		06:13		07:07		07:40 (9)	07:02			07:33 (7)	07:59		08:40 (4)	08:29		
	21:17		20:14		18:59	22	08:02 (9)	16:50	24		08:04 (5)	16:01	23	09:03 (4)	15:59		
29	05:22		06:15		07:09		07:40 (9)	07:04			07:47 (5)	08:01		08:41 (4)	08:29		
	21:15		20:12		18:56	22	08:02 (9)	16:48	18		08:05 (5)	16:00	22	09:03 (4)	16:00		
30	05:23		06:16		07:11		07:41 (9)	07:06			07:47 (5)	08:03		08:42 (4)	08:29		09:04 (4)
	21:14		20:09		18:54	20	08:01 (9)	16:46	18		08:05 (5)	15:59	22	09:04 (4)	16:01	4	09:08 (4)
31	05:25		06:18					07:08			07:46 (5)				08:29		09:03 (4)
	21:12		20:07					16:44	19		08:05 (5)				16:02	7	09:10 (4)
Sonnenscheinstunden	510		459		382			329			260			235			
astr.max.mögl.Beschattung						179			802			513				195	
Red.Sonnenscheinwahrsch.						0.40			0.33			0.21				0.14	
Reduktion Betriebsdauer						0.91			0.91			0.91				0.91	
Reduktion Windrichtung						0.68			0.66			0.61				0.60	
Gesamte Reduktion						0.25			0.20			0.11				0.07	
Met.wahrsch.Beschattung						44			157			59				14	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IT - IO254

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März		April		Mai	Juni
1 | 08:29		09:06 (4) | 07:59		08:27 (5) | 07:03		08:17 (8) | 06:48	05:40	04:51
16:03	20	09:26 (4) | 16:54	15	08:42 (5) | 17:49	20	08:37 (8) | 19:46	20:41	21:30
2 | 08:29		09:06 (4) | 07:58		08:25 (5) | 07:00		08:20 (8) | 06:46	05:38	04:50
16:04	21	09:27 (4) | 16:56	18	08:43 (5) | 17:51	15	08:35 (8) | 19:48	20:43	21:31
3 | 08:29		09:07 (4) | 07:56		08:24 (5) | 06:58		08:23 (8) | 06:43	05:36	04:49
16:05	21	09:28 (4) | 16:58	19	08:43 (5) | 17:52	7	08:30 (8) | 19:50	20:44	21:32
4 | 08:28		09:06 (4) | 07:54		08:24 (5) | 06:56		| 06:41	05:34	04:49
16:07	22	09:28 (4) | 17:00	20	08:44 (5) | 17:54		| 19:52	20:46	21:34
5 | 08:28		09:07 (4) | 07:52		08:24 (5) | 06:53		| 06:39	05:32	04:48
16:08	22	09:29 (4) | 17:02	20	08:44 (5) | 17:56		| 19:54	20:48	21:35
6 | 08:28		09:07 (4) | 07:51		08:24 (5) | 06:51		07:16 (9) | 06:36	05:30	04:47
16:09	22	09:29 (4) | 17:04	20	08:44 (5) | 17:58	11	07:27 (9) | 19:55	20:50	21:36
7 | 08:27		09:08 (4) | 07:49		08:24 (5) | 06:49		07:14 (9) | 06:34	05:28	04:46
16:10	23	09:31 (4) | 17:05	20	08:44 (5) | 18:00	15	07:29 (9) | 19:57	20:52	21:37
8 | 08:27		09:08 (4) | 07:47		08:24 (5) | 06:46		07:11 (9) | 06:31	05:26	04:46
16:12	23	09:31 (4) | 17:07	19	08:43 (5) | 18:02	18	07:29 (9) | 19:59	20:53	21:38
9 | 08:26		09:08 (4) | 07:45		08:14 (7) | 06:44		07:11 (9) | 06:29	05:24	04:45
16:13	23	09:31 (4) | 17:09	26	08:43 (5) | 18:04	20	07:31 (9) | 20:01	20:55	21:39
10 | 08:25		09:08 (4) | 07:43		08:11 (7) | 06:41		07:09 (9) | 06:27	05:22	04:45
16:15	23	09:31 (4) | 17:11	31	08:42 (5) | 18:06	21	07:30 (9) | 20:03	20:57	21:39
11 | 08:25		09:08 (4) | 07:41		08:09 (7) | 06:39		07:09 (9) | 06:24	05:21	04:44
16:16	24	09:32 (4) | 17:13	32	08:41 (5) | 18:08	22	07:31 (9) | 20:05	20:58	21:40
12 | 08:24		09:09 (4) | 07:39		08:08 (7) | 06:37		07:08 (9) | 06:22	05:19	04:44
16:18	24	09:33 (4) | 17:15	32	08:40 (8) | 18:10	22	07:30 (9) | 20:06	21:00	21:41
13 | 08:23		09:10 (4) | 07:37		08:07 (7) | 06:34		07:08 (9) | 06:20	05:17	04:44
16:19	23	09:33 (4) | 17:17	35	08:42 (8) | 18:11	22	07:30 (9) | 20:08	21:02	21:42
14 | 08:22		09:09 (4) | 07:35		08:06 (7) | 06:32		07:09 (9) | 06:17	05:15	04:43
16:21	24	09:33 (4) | 17:19	37	08:43 (8) | 18:13	21	07:30 (9) | 20:10	21:04	21:42
15 | 08:22		09:10 (4) | 07:33		08:06 (7) | 06:30		07:08 (9) | 06:15	05:14	04:43
16:23	23	09:33 (4) | 17:21	38	08:44 (8) | 18:15	21	07:29 (9) | 20:12	21:05	21:43
16 | 08:21		09:11 (4) | 07:31		08:06 (7) | 06:27		07:09 (9) | 06:13	05:12	04:43
16:24	22	09:33 (4) | 17:23	39	08:45 (8) | 18:17	19	07:28 (9) | 20:14	21:07	21:43
17 | 08:20		09:11 (4) | 07:29		08:05 (7) | 06:25		07:10 (9) | 06:10	05:10	04:43
16:26	23	09:34 (4) | 17:25	39	08:44 (8) | 18:19	16	07:26 (9) | 20:16	21:09	21:44
18 | 08:19		09:12 (4) | 07:27		08:05 (7) | 06:22		07:12 (9) | 06:08	05:09	04:43
16:28	22	09:34 (4) | 17:27	40	08:45 (8) | 18:21	12	07:24 (9) | 20:17	21:10	21:44
19 | 08:17		09:12 (4) | 07:25		08:05 (7) | 06:20		07:15 (9) | 06:06	05:07	04:43
16:29	21	09:33 (4) | 17:29	40	08:45 (8) | 18:23	5	07:20 (9) | 20:19	21:12	21:45
20 | 08:16		09:13 (4) | 07:23		08:06 (7) | 06:17		| 06:04	05:06	04:43
16:31	20	09:33 (4) | 17:31	39	08:45 (8) | 18:24		| 20:21	21:13	21:45
21 | 08:15		09:15 (4) | 07:20		08:06 (7) | 06:15		| 06:01	05:04	04:43
16:33	18	09:33 (4) | 17:33	39	08:45 (8) | 18:26		| 20:23	21:15	21:45
22 | 08:14		09:15 (4) | 07:18		08:07 (7) | 06:13		| 05:59	05:03	04:43
16:35	17	09:32 (4) | 17:35	38	08:45 (8) | 18:28		| 20:25	21:16	21:45
23 | 08:13		09:17 (4) | 07:16		08:08 (7) | 06:10		| 05:57	05:02	04:43
16:37	15	09:32 (4) | 17:37	36	08:44 (8) | 18:30		| 20:26	21:18	21:46
24 | 08:11		09:19 (4) | 07:14		08:10 (7) | 06:08		| 05:55	05:00	04:44
16:38	11	09:30 (4) | 17:39	34	08:44 (8) | 18:32		| 20:28	21:19	21:46
25 | 08:10		09:22 (4) | 07:12		08:11 (7) | 06:05		| 05:53	04:59	04:44
16:40	6	09:28 (4) | 17:41	32	08:43 (8) | 18:34		| 20:30	21:21	21:46
26 | 08:09		| 07:09		08:13 (8) | 06:03		| 05:50	04:58	04:45
16:42		| 17:43	29	08:42 (8) | 18:35		| 20:32	21:22	21:46
27 | 08:07		| 07:07		08:15 (8) | 06:00		| 05:48	04:56	04:45
16:44		| 17:45	26	08:41 (8) | 18:37		| 20:34	21:24	21:46
28 | 08:06		| 07:05		08:15 (8) | 05:58		| 05:46	04:55	04:45
16:46		| 17:47	24	08:39 (8) | 18:39		| 20:35	21:25	21:46
29 | 08:04		08:32 (5)		| 06:56		| 05:44	04:54	04:46
16:48	5	08:37 (5)		| 19:41		| 20:37	21:26	21:45
30 | 08:03		08:30 (5)		| 06:53		| 05:42	04:53	04:47
16:50	9	08:39 (5)		| 19:43		| 20:39	21:28	21:45
31 | 08:01		08:29 (5)		| 06:51			04:52	
16:52	12	08:41 (5)		| 19:45			21:29	
Sonnenscheinstunden |	251	|	274	|	367	|	419	492	508
astr.max.mögl.Beschattung |	539	|	837	|	287	|	|	|
Red.Sonnenscheinwahrsch. |	0.17	|	0.24	|	0.31	|	|	|
Reduktion Betriebsdauer |	0.91	|	0.91	|	0.91	|	|	|
Reduktion Windrichtung |	0.60	|	0.65	|	0.67	|	|	|
Gesamte Reduktion |	0.09	|	0.14	|	0.19	|	|	|
Met.wahrsch.Beschattung |	50	|	117	|	54	|	|	|

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IT - IO254

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September			Oktober			November			Dezember		
1	04:47		05:27		06:20			07:12		07:48 (9)	07:10		07:41 (7)	08:04		08:50 (4)
	21:45		21:10		20:04			18:52	22	08:10 (9)	16:42	31	08:12 (5)	15:58	24	09:14 (4)
2	04:48		05:28		06:22			07:14		07:47 (9)	07:12		07:44 (7)	08:06		08:51 (4)
	21:44		21:08		20:02			18:49	22	08:09 (9)	16:40	25	08:13 (5)	15:57	23	09:14 (4)
3	04:49		05:30		06:23			07:16		07:47 (9)	07:14		07:54 (5)	08:07		08:52 (4)
	21:44		21:07		20:00			18:47	22	08:09 (9)	16:38	19	08:13 (5)	15:57	23	09:15 (4)
4	04:50		05:32		06:25			07:18		07:47 (9)	07:16		07:54 (5)	08:09		08:52 (4)
	21:44		21:05		19:57			18:44	21	08:08 (9)	16:36	19	08:13 (5)	15:56	23	09:15 (4)
5	04:50		05:33		06:27			07:20		07:48 (9)	07:18		07:53 (5)	08:10		08:53 (4)
	21:43		21:03		19:55			18:42	19	08:07 (9)	16:34	20	08:13 (5)	15:55	23	09:16 (4)
6	04:51		05:35		06:29			07:21		07:49 (9)	07:20		07:54 (5)	08:11		08:53 (4)
	21:42		21:01		19:53			18:39	17	08:06 (9)	16:32	20	08:14 (5)	15:55	22	09:15 (4)
7	04:52		05:37		06:30			07:23		07:50 (9)	07:21		07:55 (5)	08:13		08:54 (4)
	21:42		20:59		19:50			18:37	14	08:04 (9)	16:30	19	08:14 (5)	15:54	22	09:16 (4)
8	04:53		05:38		06:32			07:25		07:53 (9)	07:23		07:55 (5)	08:14		08:54 (4)
	21:41		20:57		19:48			18:35	8	08:01 (9)	16:29	19	08:14 (5)	15:54	22	09:16 (4)
9	04:54		05:40		06:34			07:27			07:25		07:56 (5)	08:15		08:55 (4)
	21:40		20:55		19:45			18:32			16:27	18	08:14 (5)	15:54	21	09:16 (4)
10	04:55		05:42		06:36			07:29			07:27		07:58 (5)	08:16		08:55 (4)
	21:40		20:53		19:43			18:30			16:25	15	08:13 (5)	15:53	21	09:16 (4)
11	04:57		05:43		06:37			07:31		08:55 (8)	07:29		08:00 (5)	08:18		08:57 (4)
	21:39		20:51		19:40			18:28	11	09:06 (8)	16:23	12	08:12 (5)	15:53	20	09:17 (4)
12	04:58		05:45		06:39			07:32		08:51 (8)	07:31		08:02 (5)	08:19		08:57 (4)
	21:38		20:49		19:38			18:25	18	09:09 (8)	16:22	9	08:11 (5)	15:53	20	09:17 (4)
13	04:59		05:47		06:41			07:34		08:49 (8)	07:33		08:04 (5)	08:20		08:58 (4)
	21:37		20:47		19:36			18:23	22	09:11 (8)	16:20	5	08:09 (5)	15:53	19	09:17 (4)
14	05:00		05:49		06:43			07:36		08:48 (8)	07:35			08:21		08:58 (4)
	21:36		20:45		19:33			18:21	25	09:13 (8)	16:19			15:53	20	09:18 (4)
15	05:01		05:50		06:44			07:38		08:46 (8)	07:37			08:22		08:59 (4)
	21:35		20:43		19:31			18:18	28	09:14 (8)	16:17			15:53	19	09:18 (4)
16	05:03		05:52		06:46			07:40		08:45 (8)	07:38			08:23		09:00 (4)
	21:34		20:41		19:28			18:16	30	09:15 (8)	16:15			15:53	18	09:18 (4)
17	05:04		05:54		06:48			07:42		08:42 (7)	07:40		08:55 (4)	08:23		09:00 (4)
	21:32		20:39		19:26			18:14	33	09:15 (8)	16:14	6	09:01 (4)	15:53	19	09:19 (4)
18	05:05		05:56		06:50			07:43		08:40 (7)	07:42		08:53 (4)	08:24		09:00 (4)
	21:31		20:36		19:23			18:12	36	09:16 (8)	16:13	11	09:04 (4)	15:53	18	09:18 (4)
19	05:07		05:57		06:51			07:45		08:39 (7)	07:44		08:51 (4)	08:25		09:01 (4)
	21:30		20:34		19:21			18:09	37	09:16 (8)	16:11	15	09:06 (4)	15:54	18	09:19 (4)
20	05:08		05:59		06:53			07:47		08:38 (7)	07:46		08:50 (4)	08:26		09:02 (4)
	21:29		20:32		19:18			18:07	38	09:16 (8)	16:10	17	09:07 (4)	15:54	18	09:20 (4)
21	05:09		06:01		06:55			07:49		08:37 (7)	07:47		08:50 (4)	08:26		09:02 (4)
	21:27		20:30		19:16			18:05	39	09:16 (8)	16:08	18	09:08 (4)	15:54	18	09:20 (4)
22	05:11		06:03		06:57			07:51		08:36 (7)	07:49		08:50 (4)	08:27		09:03 (4)
	21:26		20:28		19:13			18:03	40	09:16 (8)	16:07	19	09:09 (4)	15:55	18	09:21 (4)
23	05:12		06:04		06:58			07:53		08:36 (7)	07:51		08:49 (4)	08:27		09:03 (4)
	21:25		20:25		19:11			18:00	40	09:16 (8)	16:06	21	09:10 (4)	15:55	18	09:21 (4)
24	05:14		06:06		07:00			07:55		08:35 (7)	07:53		08:49 (4)	08:28		09:03 (4)
	21:23		20:23		19:09			17:58	40	09:15 (8)	16:05	22	09:11 (4)	15:56	18	09:21 (4)
25	05:15		06:08		07:02		07:55 (9)	06:57		08:35 (7)	07:54		08:49 (4)	08:28		09:04 (4)
	21:22		20:21		19:06	11	08:06 (9)	16:56	40	08:15 (8)	16:04	23	09:12 (4)	15:57	18	09:22 (4)
26	05:17		06:10		07:04		07:53 (9)	06:58		07:35 (7)	07:56		08:50 (4)	08:28		09:04 (4)
	21:20		20:18		19:04	15	08:08 (9)	16:54	39	08:14 (8)	16:03	22	09:12 (4)	15:57	19	09:23 (4)
27	05:19		06:11		07:05		07:51 (9)	07:00		07:36 (7)	07:58		08:50 (4)	08:29		09:05 (4)
	21:19		20:16		19:01	17	08:08 (9)	16:52	37	08:13 (8)	16:02	23	09:13 (4)	15:58	18	09:23 (4)
28	05:20		06:13		07:07		07:49 (9)	07:02		07:36 (7)	07:59		08:49 (4)	08:29		09:05 (4)
	21:17		20:14		18:59	20	08:09 (9)	16:50	36	08:12 (8)	16:01	24	09:13 (4)	15:59	19	09:24 (4)
29	05:22		06:15		07:09		07:49 (9)	07:04		07:37 (7)	08:01		08:50 (4)	08:29		09:05 (4)
	21:15		20:12		18:56	21	08:10 (9)	16:48	34	08:11 (8)	16:00	24	09:14 (4)	16:00	19	09:24 (4)
30	05:23		06:16		07:11		07:48 (9)	07:06		07:38 (7)	08:03		08:51 (4)	08:29		09:06 (4)
	21:14		20:09		18:54	22	08:10 (9)	16:46	32	08:10 (8)	15:59	23	09:14 (4)	16:01	19	09:25 (4)
31	05:25		06:18					07:08		07:39 (7)				08:29		09:06 (4)
	21:12		20:07					16:44	32	08:11 (5)				16:02	20	09:26 (4)
Sonnenscheinstunden	510		459		382			329			260			235		
astr.max.mögl.Beschattung						106			832			499			617	
Red.Sonnenscheinwahrsch.						0.40			0.33			0.21			0.14	
Reduktion Betriebsdauer						0.91			0.91			0.91			0.91	
Reduktion Windrichtung						0.68			0.66			0.62			0.60	
Gesamte Reduktion						0.24			0.19			0.12			0.07	
Met.wahrsch.Beschattung						26			162			58			45	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IU - IO255

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar			Februar			März			April			Mai		Juni	
1	08:29		09:03 (4)	07:59		08:27 (5)	07:03		08:15 (8)	06:48		05:40		04:51	
	16:03	19	09:22 (4)	16:54	13	08:40 (5)	17:49	19	08:34 (8)	19:46		20:41		21:30	
2	08:29		09:04 (4)	07:58		08:25 (5)	07:00		08:17 (8)	06:46		05:38		04:50	
	16:04	19	09:23 (4)	16:56	16	08:41 (5)	17:51	15	08:32 (8)	19:48		20:43		21:31	
3	08:29		09:04 (4)	07:56		08:23 (5)	06:58		08:22 (8)	06:43		05:36		04:49	
	16:05	20	09:24 (4)	16:58	18	08:41 (5)	17:53	4	08:26 (8)	19:50		20:44		21:32	
4	08:28		09:04 (4)	07:54		08:22 (5)	06:56			06:41		05:34		04:49	
	16:07	20	09:24 (4)	17:00	20	08:42 (5)	17:54			19:52		20:46		21:34	
5	08:28		09:05 (4)	07:52		08:22 (5)	06:53		07:19 (9)	06:39		05:32		04:48	
	16:08	20	09:25 (4)	17:02	20	08:42 (5)	17:56	3	07:22 (9)	19:54		20:48		21:35	
6	08:28		09:04 (4)	07:51		08:22 (5)	06:51		07:15 (9)	06:36		05:30		04:47	
	16:09	21	09:25 (4)	17:04	20	08:42 (5)	17:58	12	07:27 (9)	19:55		20:50		21:36	
7	08:27		09:05 (4)	07:49		08:22 (5)	06:49		07:13 (9)	06:34		05:28		04:46	
	16:10	22	09:27 (4)	17:06	20	08:42 (5)	18:00	16	07:29 (9)	19:57		20:52		21:37	
8	08:27		09:05 (4)	07:47		08:23 (5)	06:46		07:11 (9)	06:31		05:26		04:46	
	16:12	22	09:27 (4)	17:07	19	08:42 (5)	18:02	18	07:29 (9)	19:59		20:53		21:38	
9	08:26		09:05 (4)	07:45		08:23 (5)	06:44		07:10 (9)	06:29		05:24		04:45	
	16:13	22	09:27 (4)	17:09	18	08:41 (5)	18:04	20	07:30 (9)	20:01		20:55		21:39	
10	08:25		09:05 (4)	07:43		08:10 (7)	06:41		07:09 (9)	06:27		05:22		04:45	
	16:15	23	09:28 (4)	17:11	30	08:40 (5)	18:06	21	07:30 (9)	20:03		20:57		21:39	
11	08:25		09:05 (4)	07:41		08:08 (7)	06:39		07:09 (9)	06:24		05:21		04:44	
	16:16	23	09:28 (4)	17:13	31	08:39 (5)	18:08	21	07:30 (9)	20:05		20:58		21:40	
12	08:24		09:07 (4)	07:39		08:07 (7)	06:37		07:08 (9)	06:22		05:19		04:44	
	16:18	23	09:30 (4)	17:15	31	08:38 (5)	18:10	22	07:30 (9)	20:06		21:00		21:41	
13	08:23		09:07 (4)	07:37		08:06 (7)	06:34		07:08 (9)	06:20		05:17		04:44	
	16:19	23	09:30 (4)	17:17	32	08:38 (8)	18:11	22	07:30 (9)	20:08		21:02		21:42	
14	08:22		09:06 (4)	07:35		08:05 (7)	06:32		07:09 (9)	06:17		05:15		04:43	
	16:21	23	09:29 (4)	17:19	34	08:39 (8)	18:13	20	07:29 (9)	20:10		21:04		21:42	
15	08:22		09:07 (4)	07:33		08:05 (7)	06:30		07:09 (9)	06:15		05:14		04:43	
	16:23	23	09:30 (4)	17:21	35	08:40 (8)	18:15	19	07:28 (9)	20:12		21:05		21:43	
16	08:21		09:07 (4)	07:31		08:05 (7)	06:27		07:10 (9)	06:13		05:12		04:43	
	16:24	23	09:30 (4)	17:23	36	08:41 (8)	18:17	17	07:27 (9)	20:14		21:07		21:43	
17	08:20		09:08 (4)	07:29		08:03 (7)	06:25		07:10 (9)	06:10		05:10		04:43	
	16:26	23	09:31 (4)	17:25	38	08:41 (8)	18:19	15	07:25 (9)	20:16		21:09		21:44	
18	08:19		09:09 (4)	07:27		08:04 (7)	06:22		07:13 (9)	06:08		05:09		04:43	
	16:28	22	09:31 (4)	17:27	38	08:42 (8)	18:21	10	07:23 (9)	20:17		21:10		21:44	
19	08:17		09:09 (4)	07:25		08:04 (7)	06:20			06:06		05:07		04:43	
	16:29	21	09:30 (4)	17:29	38	08:42 (8)	18:23			20:19		21:12		21:45	
20	08:16		09:10 (4)	07:23		08:04 (7)	06:17			06:04		05:06		04:43	
	16:31	20	09:30 (4)	17:31	38	08:42 (8)	18:24			20:21		21:13		21:45	
21	08:15		09:11 (4)	07:20		08:04 (7)	06:15			06:01		05:04		04:43	
	16:33	20	09:31 (4)	17:33	37	08:41 (8)	18:26			20:23		21:15		21:45	
22	08:14		09:12 (4)	07:18		08:05 (7)	06:13			05:59		05:03		04:43	
	16:35	18	09:30 (4)	17:35	36	08:41 (8)	18:28			20:25		21:16		21:45	
23	08:13		09:13 (4)	07:16		08:06 (7)	06:10			05:57		05:02		04:43	
	16:37	16	09:29 (4)	17:37	35	08:41 (8)	18:30			20:26		21:18		21:46	
24	08:11		09:14 (4)	07:14		08:08 (7)	06:08			05:55		05:00		04:44	
	16:38	14	09:28 (4)	17:39	33	08:41 (8)	18:32			20:28		21:19		21:46	
25	08:10		09:17 (4)	07:12		08:09 (7)	06:05			05:53		04:59		04:44	
	16:40	10	09:27 (4)	17:41	31	08:40 (8)	18:34			20:30		21:21		21:46	
26	08:09		09:20 (4)	07:09		08:11 (8)	06:03			05:50		04:58		04:45	
	16:42	3	09:23 (4)	17:43	28	08:39 (8)	18:35			20:32		21:22		21:46	
27	08:07			07:07		08:12 (8)	06:00			05:48		04:56		04:45	
	16:44			17:45	26	08:38 (8)	18:37			20:34		21:24		21:46	
28	08:06			07:05		08:13 (8)	05:58			05:46		04:55		04:45	
	16:46			17:47	23	08:36 (8)	18:39			20:35		21:25		21:46	
29	08:04		08:32 (5)				06:56			05:44		04:54		04:46	
	16:48	2	08:34 (5)				19:41			20:37		21:26		21:45	
30	08:03		08:30 (5)				06:53			05:42		04:53		04:47	
	16:50	6	08:36 (5)				19:43			20:39		21:28		21:45	
31	08:01		08:29 (5)				06:51					04:52			
	16:52	10	08:39 (5)				19:45					21:29			
Sonnenscheinstunden	251			274			367			419		492		508	
astr.max.mögl.Beschattung		531			794			274							
Red.Sonnenscheinwahrsch.		0.17			0.24			0.31							
Reduktion Betriebsdauer		0.91			0.91			0.91							
Reduktion Windrichtung		0.60			0.65			0.67							
Gesamte Reduktion		0.09			0.14			0.19							
Met.wahrsch.Beschattung		49			111			52							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IU - IO255

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September			Oktober			November			Dezember		
1	04:47		05:27		06:20			07:12		07:48 (9)	07:10		07:40 (7)	08:04		08:47 (4)
	21:45		21:10		20:04			18:52	22	08:10 (9)	16:42	30	08:10 (5)	15:58	23	09:10 (4)
2	04:48		05:28		06:22			07:14		07:47 (9)	07:12		07:53 (5)	08:06		08:48 (4)
	21:44		21:08		20:02			18:49	21	08:08 (9)	16:40	18	08:11 (5)	15:57	23	09:11 (4)
3	04:49		05:30		06:23			07:16		07:47 (9)	07:14		07:52 (5)	08:07		08:49 (4)
	21:44		21:07		20:00			18:47	21	08:08 (9)	16:38	19	08:11 (5)	15:57	23	09:12 (4)
4	04:50		05:32		06:25			07:18		07:47 (9)	07:16		07:52 (5)	08:09		08:49 (4)
	21:44		21:05		19:57			18:44	20	08:07 (9)	16:36	20	08:12 (5)	15:56	22	09:11 (4)
5	04:50		05:33		06:27			07:20		07:48 (9)	07:18		07:52 (5)	08:10		08:50 (4)
	21:43		21:03		19:55			18:42	19	08:07 (9)	16:34	20	08:12 (5)	15:55	22	09:12 (4)
6	04:51		05:35		06:29			07:21		07:49 (9)	07:20		07:53 (5)	08:11		08:50 (4)
	21:42		21:01		19:53			18:39	16	08:05 (9)	16:32	19	08:12 (5)	15:55	22	09:12 (4)
7	04:52		05:37		06:30			07:23		07:50 (9)	07:21		07:53 (5)	08:13		08:52 (4)
	21:42		20:59		19:50			18:37	14	08:04 (9)	16:30	19	08:12 (5)	15:54	20	09:12 (4)
8	04:53		05:38		06:32			07:25		07:52 (9)	07:23		07:54 (5)	08:14		08:52 (4)
	21:41		20:57		19:48			18:35	9	08:01 (9)	16:29	18	08:12 (5)	15:54	20	09:12 (4)
9	04:54		05:40		06:34			07:27			07:25		07:56 (5)	08:15		08:52 (4)
	21:40		20:55		19:45			18:32			16:27	15	08:11 (5)	15:54	20	09:12 (4)
10	04:55		05:42		06:36			07:29			07:27		07:58 (5)	08:16		08:53 (4)
	21:40		20:53		19:43			18:30			16:25	13	08:11 (5)	15:53	19	09:12 (4)
11	04:57		05:43		06:37			07:31		08:53 (8)	07:29		08:00 (5)	08:18		08:54 (4)
	21:39		20:51		19:40			18:28	10	09:03 (8)	16:23	9	08:09 (5)	15:53	19	09:13 (4)
12	04:58		05:45		06:39			07:32		08:49 (8)	07:31		08:02 (5)	08:19		08:55 (4)
	21:38		20:49		19:38			18:25	17	09:06 (8)	16:22	6	08:08 (5)	15:53	18	09:13 (4)
13	04:59		05:47		06:41			07:34		08:47 (8)	07:33		08:04 (5)	08:20		08:56 (4)
	21:37		20:47		19:36			18:23	21	09:08 (8)	16:20	2	08:06 (5)	15:53	17	09:13 (4)
14	05:00		05:49		06:43			07:36		08:45 (8)	07:35			08:21		08:56 (4)
	21:36		20:45		19:33			18:21	25	09:10 (8)	16:19			15:53	17	09:13 (4)
15	05:01		05:50		06:44			07:38		08:44 (8)	07:37			08:22		08:57 (4)
	21:35		20:43		19:31			18:18	27	09:11 (8)	16:17			15:53	17	09:14 (4)
16	05:03		05:52		06:46			07:40		08:43 (8)	07:38		08:53 (4)	08:23		08:58 (4)
	21:34		20:41		19:28			18:16	28	09:11 (8)	16:15	3	08:56 (4)	15:53	16	09:14 (4)
17	05:04		05:54		06:48			07:42		08:41 (7)	07:40		08:50 (4)	08:23		08:59 (4)
	21:32		20:39		19:26			18:14	31	09:12 (8)	16:14	10	09:00 (4)	15:53	15	09:14 (4)
18	05:05		05:56		06:50			07:43		08:39 (7)	07:42		08:48 (4)	08:24		08:59 (4)
	21:31		20:36		19:23			18:12	33	09:12 (8)	16:13	14	09:02 (4)	15:53	15	09:14 (4)
19	05:07		05:57		06:51			07:45		08:37 (7)	07:44		08:47 (4)	08:25		09:00 (4)
	21:30		20:34		19:21			18:09	36	09:13 (8)	16:11	16	09:03 (4)	15:54	15	09:15 (4)
20	05:08		05:59		06:53			07:47		08:36 (7)	07:46		08:47 (4)	08:26		09:01 (4)
	21:29		20:32		19:18			18:07	37	09:13 (8)	16:10	18	09:05 (4)	15:54	14	09:15 (4)
21	05:09		06:01		06:55			07:49		08:35 (7)	07:47		08:46 (4)	08:26		09:01 (4)
	21:27		20:30		19:16			18:05	38	09:13 (8)	16:08	20	09:06 (4)	15:54	14	09:15 (4)
22	05:11		06:03		06:57			07:51		08:35 (7)	07:49		08:46 (4)	08:27		09:02 (4)
	21:26		20:28		19:13			18:03	38	09:13 (8)	16:07	20	09:06 (4)	15:55	14	09:16 (4)
23	05:12		06:04		06:58			07:53		08:34 (7)	07:51		08:46 (4)	08:27		09:02 (4)
	21:25		20:25		19:11			18:00	38	09:12 (8)	16:06	21	09:07 (4)	15:55	14	09:16 (4)
24	05:14		06:06		07:00			07:55		08:34 (7)	07:53		08:46 (4)	08:28		09:02 (4)
	21:23		20:23		19:09			17:58	38	09:12 (8)	16:05	22	09:08 (4)	15:56	14	09:16 (4)
25	05:15		06:08		07:02		07:57 (9)	06:57		07:34 (7)	07:54		08:46 (4)	08:28		09:03 (4)
	21:22		20:21		19:06	7	08:04 (9)	16:56	37	08:11 (8)	16:04	23	09:09 (4)	15:57	15	09:18 (4)
26	05:17		06:10		07:04		07:54 (9)	06:58		07:34 (7)	07:56		08:46 (4)	08:28		09:03 (4)
	21:20		20:18		19:04	13	08:07 (9)	16:54	37	08:11 (8)	16:03	23	09:09 (4)	15:57	15	09:18 (4)
27	05:19		06:11		07:05		07:52 (9)	07:00		07:34 (7)	07:58		08:47 (4)	08:29		09:03 (4)
	21:19		20:16		19:01	16	08:08 (9)	16:52	36	08:10 (8)	16:02	23	09:10 (4)	15:58	16	09:19 (4)
28	05:20		06:13		07:07		07:50 (9)	07:02		07:35 (7)	07:59		08:46 (4)	08:29		09:03 (4)
	21:17		20:14		18:59	18	08:08 (9)	16:50	34	08:09 (8)	16:01	24	09:10 (4)	15:59	16	09:19 (4)
29	05:22		06:15		07:09		07:49 (9)	07:04		07:36 (7)	08:01		08:47 (4)	08:29		09:03 (4)
	21:15		20:12		18:56	20	08:09 (9)	16:48	31	08:07 (8)	16:00	23	09:10 (4)	16:00	17	09:20 (4)
30	05:23		06:16		07:11		07:48 (9)	07:06		07:37 (7)	08:03		08:48 (4)	08:29		09:03 (4)
	21:14		20:09		18:54	21	08:09 (9)	16:46	31	08:08 (5)	15:59	23	09:11 (4)	16:01	18	09:21 (4)
31	05:25		06:18					07:08		07:38 (7)				08:29		09:04 (4)
	21:12		20:07					16:44	31	08:09 (5)				16:02	18	09:22 (4)
Sonnenscheinstunden	510		459		382			329			260			235		
astr.max.mögl.Beschattung						95			796			491			548	
Red.Sonnenscheinwahrsch.						0.40			0.33			0.21			0.14	
Reduktion Betriebsdauer						0.91			0.91			0.91			0.91	
Reduktion Windrichtung						0.68			0.66			0.62			0.60	
Gesamte Reduktion						0.24			0.19			0.12			0.07	
Met.wahrsch.Beschattung						23			155			57			40	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IV - IO256

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Januar			Februar			März			April			Mai		Juni	
1	08:29			07:59			07:03			06:48			05:40		04:51
	16:03			16:54			17:49			19:46			20:41		21:30
2	08:29			07:58			07:00			06:46			05:38		04:50
	16:04			16:56			17:51			19:48			20:43		21:31
3	08:29			07:56			06:58			06:43			05:36		04:49
	16:05			16:58			17:53			19:50			20:44		21:32
4	08:28			07:54			06:56			06:41			05:34		04:49
	16:07			17:00			17:54			19:52			20:46		21:34
5	08:28			07:52			06:53			06:39			05:32		04:48
	16:08			17:02			17:56			19:54			20:48		21:35
6	08:28			07:51			06:51			06:36			05:30		04:47
	16:09			17:04			17:58			19:55			20:50		21:36
7	08:27			07:49			06:49			06:34			05:28		04:46
	16:10			17:06			18:00			19:57			20:52		21:37
8	08:27		08:59 (4)	07:47			06:46			06:31			05:26		04:46
	16:12	2	09:01 (4)	17:07			18:02			19:59			20:53		21:38
9	08:26		08:58 (4)	07:45			06:44			06:29			05:24		04:45
	16:13	6	09:04 (4)	17:09			18:04			20:01			20:55		21:39
10	08:25		08:57 (4)	07:43			06:42			06:27			05:22		04:45
	16:15	9	09:06 (4)	17:11			18:06			20:03			20:57		21:39
11	08:25		08:56 (4)	07:41			06:39			06:24			05:21		04:44
	16:16	11	09:07 (4)	17:13			18:08			20:05			20:59		21:40
12	08:24		08:56 (4)	07:39			06:37			06:22			05:19		04:44
	16:18	13	09:09 (4)	17:15			18:10			20:06			21:00		21:41
13	08:23		08:55 (4)	07:37			06:34			06:20			05:17		04:44
	16:19	15	09:10 (4)	17:17			18:11			20:08			21:02		21:42
14	08:22		08:53 (4)	07:35		08:03 (7)	06:32			06:17			05:15		04:43
	16:21	17	09:10 (4)	17:19	4	08:07 (7)	18:13			20:10			21:04		21:42
15	08:22		08:53 (4)	07:33		07:59 (7)	06:30			06:15			05:14		04:43
	16:23	18	09:11 (4)	17:21	12	08:11 (7)	18:15			20:12			21:05		21:43
16	08:21		08:53 (4)	07:31		07:58 (7)	06:27			06:13			05:12		04:43
	16:24	19	09:12 (4)	17:23	19	08:17 (8)	18:17			20:14			21:07		21:43
17	08:20		08:53 (4)	07:29		07:56 (7)	06:25			06:10			05:10		04:43
	16:26	20	09:13 (4)	17:25	22	08:18 (8)	18:19			20:16			21:09		21:44
18	08:19		08:54 (4)	07:27		07:55 (7)	06:22			06:08			05:09		04:43
	16:28	20	09:14 (4)	17:27	25	08:20 (8)	18:21			20:17			21:10		21:44
19	08:18		08:53 (4)	07:25		07:54 (7)	06:20			06:06			05:07		04:43
	16:29	21	09:14 (4)	17:29	28	08:22 (8)	18:23			20:19			21:12		21:45
20	08:16		08:54 (4)	07:23		07:54 (7)	06:17			06:04			05:06		04:43
	16:31	21	09:15 (4)	17:31	29	08:23 (8)	18:24			20:21			21:13		21:45
21	08:15		08:54 (4)	07:20		07:53 (7)	06:15			06:01			05:04		04:43
	16:33	22	09:16 (4)	17:33	30	08:23 (8)	18:26			20:23			21:15		21:45
22	08:14		08:54 (4)	07:18		07:53 (7)	06:13			05:59			05:03		04:43
	16:35	21	09:15 (4)	17:35	31	08:24 (8)	18:28			20:25			21:16		21:46
23	08:13		08:55 (4)	07:16		07:54 (7)	06:10			05:57			05:02		04:43
	16:37	21	09:16 (4)	17:37	30	08:24 (8)	18:30			20:26			21:18		21:46
24	08:11		08:55 (4)	07:14		07:54 (7)	06:08			05:55			05:00		04:44
	16:38	21	09:16 (4)	17:39	31	08:25 (8)	18:32			20:28			21:19		21:46
25	08:10		08:56 (4)	07:12		07:54 (7)	06:05			05:53			04:59		04:44
	16:40	20	09:16 (4)	17:41	30	08:24 (8)	18:34			20:30			21:21		21:46
26	08:09		08:56 (4)	07:09		07:55 (7)	06:03			05:50			04:58		04:45
	16:42	20	09:16 (4)	17:43	29	08:24 (8)	18:35			20:32			21:22		21:46
27	08:07		08:57 (4)	07:07		07:56 (8)	06:00			05:48			04:56		04:45
	16:44	19	09:16 (4)	17:45	28	08:24 (8)	18:37			20:34			21:24		21:46
28	08:06		08:58 (4)	07:05		07:55 (8)	05:58			05:46			04:55		04:45
	16:46	17	09:15 (4)	17:47	27	08:22 (8)	18:39			20:35			21:25		21:46
29	08:04		08:59 (4)				06:56			05:44			04:54		04:46
	16:48	15	09:14 (4)				19:41			20:37			21:26		21:45
30	08:03		09:00 (4)				06:53			05:42			04:53		04:47
	16:50	13	09:13 (4)				19:43			20:39			21:28		21:45
31	08:01		09:03 (4)				06:51						04:52		
	16:52	8	09:11 (4)				19:45						21:29		
Sonnenscheinstunden	251			274			367			419			492		508
astr.max.mögl.Beschattung		389			375			304							
Red.Sonnenscheinwahrsch.		0.17			0.24			0.31							
Reduktion Betriebsdauer		0.91			0.91			0.91							
Reduktion Windrichtung		0.61			0.66			0.67							
Gesamte Reduktion		0.09			0.14			0.19							
Met.wahrsch.Beschattung		37			53			58							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IV - IO256

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September			Oktober			November			Dezember		
1	04:47	05:27		06:20			07:12		07:43 (9)	07:10			08:04		08:38 (4)
	21:45	21:10		20:04			18:52	20	08:03 (9)	16:42			15:58	11	08:49 (4)
2	04:48	05:28		06:22			07:14		07:42 (9)	07:12			08:06		08:40 (4)
	21:44	21:08		20:02			18:49	19	08:01 (9)	16:40			15:57	9	08:49 (4)
3	04:49	05:30		06:23			07:16		07:43 (9)	07:14			08:07		08:42 (4)
	21:44	21:07		20:00			18:47	18	08:01 (9)	16:38			15:57	6	08:48 (4)
4	04:50	05:32		06:25			07:18		07:44 (9)	07:16			08:09		08:43 (4)
	21:44	21:05		19:57			18:44	15	07:59 (9)	16:36			15:56	3	08:46 (4)
5	04:50	05:33		06:27			07:20		07:46 (9)	07:18			08:10		
	21:43	21:03		19:55			18:42	12	07:58 (9)	16:34			15:55		
6	04:51	05:35		06:29			07:21		07:48 (9)	07:20			08:11		
	21:42	21:01		19:53			18:39	7	07:55 (9)	16:32			15:55		
7	04:52	05:37		06:30			07:23			07:21			08:13		
	21:42	20:59		19:50			18:37			16:30			15:54		
8	04:53	05:38		06:32			07:25		08:38 (8)	07:23			08:14		
	21:41	20:57		19:48			18:35	11	08:49 (8)	16:29			15:54		
9	04:54	05:40		06:34			07:27		08:34 (8)	07:25			08:15		
	21:40	20:55		19:45			18:32	17	08:51 (8)	16:27			15:54		
10	04:55	05:42		06:36			07:29		08:32 (8)	07:27			08:16		
	21:40	20:53		19:43			18:30	21	08:53 (8)	16:25			15:53		
11	04:57	05:43		06:37			07:31		08:31 (8)	07:29		08:34 (4)	08:18		
	21:39	20:51		19:40			18:28	23	08:54 (8)	16:23	8	08:42 (4)	15:53		
12	04:58	05:45		06:39			07:32		08:30 (8)	07:31		08:32 (4)	08:19		
	21:38	20:49		19:38			18:25	25	08:55 (8)	16:22	13	08:45 (4)	15:53		
13	04:59	05:47		06:41			07:34		08:29 (8)	07:33		08:31 (4)	08:20		
	21:37	20:47		19:36			18:23	26	08:55 (8)	16:20	15	08:46 (4)	15:53		
14	05:00	05:49		06:43			07:36		08:28 (8)	07:35		08:30 (4)	08:21		
	21:36	20:45		19:33			18:21	28	08:56 (8)	16:19	17	08:47 (4)	15:53		
15	05:01	05:50		06:44			07:38		08:28 (8)	07:37		08:29 (4)	08:22		
	21:35	20:43		19:31			18:18	28	08:56 (8)	16:17	19	08:48 (4)	15:53		
16	05:03	05:52		06:46			07:40		08:27 (7)	07:38		08:29 (4)	08:23		
	21:34	20:41		19:28			18:16	29	08:56 (8)	16:15	20	08:49 (4)	15:53		
17	05:04	05:54		06:48			07:42		08:26 (7)	07:40		08:29 (4)	08:23		
	21:32	20:39		19:26			18:14	30	08:56 (8)	16:14	20	08:49 (4)	15:53		
18	05:05	05:56		06:50			07:43		08:25 (7)	07:42		08:29 (4)	08:24		
	21:31	20:36		19:23			18:12	31	08:56 (8)	16:13	21	08:50 (4)	15:53		
19	05:07	05:57		06:51			07:45		08:25 (7)	07:44		08:29 (4)	08:25		
	21:30	20:34		19:21			18:09	30	08:55 (8)	16:11	21	08:50 (4)	15:54		
20	05:08	05:59		06:53			07:47		08:25 (7)	07:46		08:29 (4)	08:26		
	21:29	20:32		19:18			18:07	30	08:55 (8)	16:10	21	08:50 (4)	15:54		
21	05:09	06:01		06:55			07:49		08:25 (7)	07:48		08:29 (4)	08:26		
	21:27	20:30		19:16			18:05	29	08:54 (8)	16:09	22	08:51 (4)	15:54		
22	05:11	06:03		06:57			07:51		08:25 (7)	07:49		08:30 (4)	08:27		
	21:26	20:28		19:13			18:03	28	08:53 (8)	16:07	21	08:51 (4)	15:55		
23	05:12	06:04		06:58			07:53		08:25 (7)	07:51		08:30 (4)	08:27		
	21:25	20:25		19:11			18:00	27	08:52 (8)	16:06	21	08:51 (4)	15:55		
24	05:14	06:06		07:00		07:51 (9)	07:55		08:25 (7)	07:53		08:31 (4)	08:28		
	21:23	20:23		19:09	7	07:58 (9)	17:58	25	08:50 (8)	16:05	20	08:51 (4)	15:56		
25	05:15	06:08		07:02		07:49 (9)	06:57		07:26 (7)	07:54		08:31 (4)	08:28		
	21:22	20:21		19:06	12	08:01 (9)	16:56	22	07:48 (8)	16:04	20	08:51 (4)	15:57		
26	05:17	06:10		07:04		07:47 (9)	06:58		07:27 (7)	07:56		08:32 (4)	08:28		
	21:20	20:18		19:04	15	08:02 (9)	16:54	18	07:45 (8)	16:03	19	08:51 (4)	15:57		
27	05:19	06:11		07:05		07:46 (9)	07:00		07:29 (7)	07:58		08:33 (4)	08:29		
	21:19	20:16		19:01	17	08:03 (9)	16:52	11	07:40 (7)	16:02	18	08:51 (4)	15:58		
28	05:20	06:13		07:07		07:44 (9)	07:02			07:59		08:33 (4)	08:29		
	21:17	20:14		18:59	19	08:03 (9)	16:50			16:01	17	08:50 (4)	15:59		
29	05:22	06:15		07:09		07:43 (9)	07:04			08:01		08:35 (4)	08:29		
	21:15	20:12		18:56	20	08:03 (9)	16:48			16:00	15	08:50 (4)	16:00		
30	05:23	06:17		07:11		07:43 (9)	07:06			08:03		08:37 (4)	08:29		
	21:14	20:09		18:54	20	08:03 (9)	16:46			15:59	13	08:50 (4)	16:01		
31	05:25	06:18					07:08						08:29		
	21:12	20:07					16:44						16:02		
Sonnenscheinstunden	510	459		382			329			260			235		
astr.max.mögl.Beschattung					110			580			361			29	
Red.Sonnenscheinwahrsch.					0.40			0.33			0.21			0.14	
Reduktion Betriebsdauer					0.91			0.91			0.91			0.91	
Reduktion Windrichtung					0.68			0.67			0.61			0.61	
Gesamte Reduktion					0.25			0.20			0.11			0.08	
Met.wahrsch.Beschattung					27			114			41			2	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IW - IO257

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar			Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:29		10:01 (10)	07:59	07:02	06:48	05:48	04:51	04:47	05:26	06:20	07:12	07:10	08:04		
	16:03	8	10:09 (10)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58		
2	08:29		10:03 (10)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:06		
	16:04	6	10:09 (10)	16:56	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40	15:57		
3	08:29			07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07		
	16:05			16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38	15:57		
4	08:28			07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16	08:09		
	16:06			16:59	17:54	19:52	20:46	21:34	21:44	21:05	19:57	18:44	16:36	15:56		
5	08:28			07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18	08:10		
	16:08			17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34	15:55		
6	08:28			07:51	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11		
	16:09			17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32	15:55		
7	08:27			07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21	08:13		
	16:10			17:05	18:00	19:57	20:52	21:37	21:42	20:59	19:50	18:37	16:30	15:54		
8	08:27			07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14		
	16:12			17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28	15:54		
9	08:26			07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15		
	16:13			17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54		
10	08:25			07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27	08:16		09:52 (10)
	16:15			17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25	15:53	5	09:57 (10)
11	08:25			07:41	06:39	06:24	05:20	04:44	04:58	05:43	06:37	07:30	07:29	08:18		09:52 (10)
	16:16			17:13	18:08	20:05	20:58	21:40	21:39	20:51	19:40	18:28	16:23	15:53	8	10:00 (10)
12	08:24			07:39	06:37	06:22	05:18	04:44	04:58	05:45	06:39	07:32	07:31	08:19		09:51 (10)
	16:18			17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22	15:53	10	10:01 (10)
13	08:23			07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33	08:20		09:51 (10)
	16:19			17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20	15:53	11	10:02 (10)
14	08:22			07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35	08:21		09:51 (10)
	16:21			17:19	18:13	20:10	21:04	21:42	21:36	20:45	19:33	18:21	16:18	15:53	12	10:03 (10)
15	08:22			07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:37	08:22		09:51 (10)
	16:22			17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17	15:53	13	10:04 (10)
16	08:21			07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38	08:22		09:51 (10)
	16:24			17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15	15:53	14	10:05 (10)
17	08:20			07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40	08:23		09:52 (10)
	16:26			17:25	18:19	20:15	21:08	21:44	21:32	20:39	19:26	18:14	16:14	15:53	14	10:06 (10)
18	08:19			07:27	06:22	06:08	05:08	04:43	05:05	05:55	06:50	07:43	07:42	08:24		09:51 (10)
	16:27			17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53	15	10:06 (10)
19	08:17			07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44	08:25		09:52 (10)
	16:29			17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11	15:54	15	10:07 (10)
20	08:16			07:23	06:17	06:04	05:06	04:43	05:08	05:59	06:53	07:47	07:46	08:25		09:53 (10)
	16:31			17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10	15:54	15	10:08 (10)
21	08:15			07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47	08:26		09:52 (10)
	16:33			17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08	15:54	16	10:08 (10)
22	08:14			07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:57	07:51	07:49	08:27		09:53 (10)
	16:35			17:35	18:28	20:25	21:18	21:45	21:26	20:28	19:13	18:03	16:07	15:55	16	10:09 (10)
23	08:13			07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51	08:27		09:53 (10)
	16:38			17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06	15:55	16	10:09 (10)
24	08:11			07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53	08:28		09:54 (10)
	16:38			17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:09	17:58	16:05	15:56	15	10:09 (10)
25	08:10			07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:57	07:54	08:28		09:55 (10)
	16:40			17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	15:57	15	10:10 (10)
26	08:08			07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	08:28		09:55 (10)
	16:42			17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	15:57	15	10:10 (10)
27	08:07			07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:29		09:56 (10)
	16:44			17:45	18:37	20:34	21:24	21:46	21:19	20:16	19:01	16:52	16:02	15:58	14	10:10 (10)
28	08:06			07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:29		09:57 (10)
	16:46			17:47	18:39	20:35	21:25	21:46	21:17	20:14	18:59	16:50	16:01	15:59	13	10:10 (10)
29	08:04				06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29		09:58 (10)
	16:48				19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00	12	10:10 (10)
30	08:02				06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03	08:29		09:59 (10)
	16:50				19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	16:01	11	10:10 (10)
31	08:01				06:51		04:52		05:25	06:18		07:08		08:29		10:00 (10)
	16:52				19:44		21:29		21:12	20:07		16:44		16:02	10	10:10 (10)
Sonnenscheinstunden	251			279	367	419	492	508	510	459	382	329	260	235		
astr.max.mögl.Beschattung		14													285	
Red.Sonnenscheinwahrsch.		0.17													0.14	
Reduktion Betriebsdauer		0.91													0.91	
Reduktion Windrichtung		0.59													0.59	
Gesamte Reduktion		0.09													0.07	
Met.wahrsch.Beschattung		1													21	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IX - IO258

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar			Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:29		10:02 (10)	07:59	07:02	06:48	05:48	04:51	04:47	05:26	06:20	07:12	07:10	08:04		
	16:03	8	10:10 (10)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58		
2	08:29		10:04 (10)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:06		
	16:04	6	10:10 (10)	16:56	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40	15:57		
3	08:29			07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07		
	16:05			16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38	15:57		
4	08:28			07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16	08:09		
	16:06			16:59	17:54	19:52	20:46	21:34	21:44	21:05	19:57	18:44	16:36	15:56		
5	08:28			07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18	08:10		
	16:08			17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34	15:55		
6	08:28			07:51	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11		
	16:09			17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32	15:55		
7	08:27			07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21	08:13		
	16:10			17:05	18:00	19:57	20:52	21:37	21:42	20:59	19:50	18:37	16:30	15:54		
8	08:27			07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14		
	16:12			17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28	15:54		
9	08:26			07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15		
	16:13			17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54		
10	08:25			07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27	08:16		09:53 (10)
	16:15			17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25	15:53	5	09:58 (10)
11	08:25			07:41	06:39	06:24	05:20	04:44	04:58	05:43	06:37	07:30	07:29	08:18		09:53 (10)
	16:16			17:13	18:08	20:05	20:58	21:40	21:39	20:51	19:40	18:28	16:23	15:53	8	10:01 (10)
12	08:24			07:39	06:37	06:22	05:18	04:44	04:58	05:45	06:39	07:32	07:31	08:19		09:53 (10)
	16:18			17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22	15:53	9	10:02 (10)
13	08:23			07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33	08:20		09:52 (10)
	16:19			17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20	15:53	11	10:03 (10)
14	08:22			07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35	08:21		09:52 (10)
	16:21			17:19	18:13	20:10	21:04	21:42	21:36	20:45	19:33	18:21	16:18	15:53	12	10:04 (10)
15	08:22			07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:37	08:22		09:52 (10)
	16:22			17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17	15:53	13	10:05 (10)
16	08:21			07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38	08:22		09:52 (10)
	16:24			17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15	15:53	14	10:06 (10)
17	08:20			07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40	08:23		09:53 (10)
	16:26			17:25	18:19	20:15	21:08	21:44	21:32	20:39	19:26	18:14	16:14	15:53	14	10:07 (10)
18	08:19			07:27	06:22	06:08	05:08	04:43	05:05	05:55	06:50	07:43	07:42	08:24		09:52 (10)
	16:27			17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53	15	10:07 (10)
19	08:17			07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44	08:25		09:53 (10)
	16:29			17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11	15:54	15	10:08 (10)
20	08:16			07:23	06:17	06:04	05:06	04:43	05:08	05:59	06:53	07:47	07:46	08:25		09:54 (10)
	16:31			17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10	15:54	15	10:09 (10)
21	08:15			07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47	08:26		09:53 (10)
	16:33			17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08	15:54	16	10:09 (10)
22	08:14			07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:57	07:51	07:49	08:27		09:54 (10)
	16:35			17:35	18:28	20:25	21:18	21:45	21:26	20:28	19:13	18:03	16:07	15:55	16	10:10 (10)
23	08:13			07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51	08:27		09:55 (10)
	16:38			17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06	15:55	15	10:10 (10)
24	08:11			07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53	08:28		09:55 (10)
	16:38			17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:09	17:58	16:05	15:56	15	10:10 (10)
25	08:10			07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:57	07:54	08:28		09:56 (10)
	16:40			17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	15:57	15	10:11 (10)
26	08:08			07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	08:28		09:57 (10)
	16:42			17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	15:57	14	10:11 (10)
27	08:07			07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:29		09:57 (10)
	16:44			17:45	18:37	20:34	21:24	21:46	21:19	20:16	19:01	16:52	16:02	15:58	14	10:11 (10)
28	08:06			07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:29		09:58 (10)
	16:46			17:47	18:39	20:35	21:25	21:46	21:17	20:14	18:59	16:50	16:01	15:59	13	10:11 (10)
29	08:04				06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29		09:59 (10)
	16:48				19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00	12	10:11 (10)
30	08:02				06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03	08:29		10:00 (10)
	16:50				19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	16:01	11	10:11 (10)
31	08:01				06:51		04:52		05:25	06:18		07:08		08:29		10:01 (10)
	16:52				19:44		21:29		21:12	20:07		16:44		16:02	10	10:11 (10)
Sonnenscheinstunden	251			279	367	419	492	508	510	459	382	329	260	235		
astr.max.mögl.Beschattung		14													282	
Red.Sonnenscheinwahrsch.		0.17													0.14	
Reduktion Betriebsdauer		0.91													0.91	
Reduktion Windrichtung		0.59													0.59	
Gesamte Reduktion		0.09													0.07	
Met.wahrsch.Beschattung		1													21	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IY - IO259

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar			Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:29		10:03 (10)	07:59	07:02	06:48	05:48	04:51	04:47	05:26	06:20	07:12	07:10	08:04		
	16:03	8	10:11 (10)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58		
2	08:29		10:05 (10)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:06		
	16:04	6	10:11 (10)	16:56	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40	15:57		
3	08:29			07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07		
	16:05			16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38	15:57		
4	08:28			07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16	08:08		
	16:06			16:59	17:54	19:52	20:46	21:34	21:44	21:05	19:57	18:44	16:36	15:56		
5	08:28			07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18	08:10		
	16:08			17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34	15:55		
6	08:28			07:51	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11		
	16:09			17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32	15:55		
7	08:27			07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21	08:13		
	16:10			17:05	18:00	19:57	20:52	21:37	21:42	20:59	19:50	18:37	16:30	15:54		
8	08:27			07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14		
	16:12			17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28	15:54		
9	08:26			07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15		
	16:13			17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54		
10	08:25			07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27	08:16		09:54 (10)
	16:15			17:11	18:06	20:03	20:57	21:39	21:38	20:53	19:43	18:30	16:25	15:53	6	10:00 (10)
11	08:25			07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29	08:18		09:54 (10)
	16:16			17:13	18:08	20:05	20:58	21:40	21:38	20:51	19:40	18:28	16:23	15:53	8	10:02 (10)
12	08:24			07:39	06:37	06:22	05:18	04:44	04:58	05:45	06:39	07:32	07:31	08:19		09:53 (10)
	16:18			17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22	15:53	11	10:04 (10)
13	08:23			07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33	08:20		09:53 (10)
	16:19			17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20	15:53	12	10:05 (10)
14	08:22			07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35	08:21		09:53 (10)
	16:21			17:19	18:13	20:10	21:04	21:42	21:36	20:45	19:33	18:21	16:18	15:53	13	10:06 (10)
15	08:22			07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:37	08:22		09:53 (10)
	16:22			17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17	15:53	13	10:06 (10)
16	08:21			07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38	08:22		09:53 (10)
	16:24			17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15	15:53	14	10:07 (10)
17	08:20			07:29	06:25	06:10	05:10	04:43	05:04	05:54	06:48	07:41	07:40	08:23		09:54 (10)
	16:26			17:25	18:19	20:15	21:08	21:44	21:32	20:39	19:26	18:14	16:14	15:53	14	10:08 (10)
18	08:19			07:27	06:22	06:08	05:08	04:43	05:05	05:55	06:50	07:43	07:42	08:24		09:53 (10)
	16:27			17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53	15	10:08 (10)
19	08:17			07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44	08:25		09:54 (10)
	16:29			17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11	15:54	15	10:09 (10)
20	08:16			07:23	06:17	06:04	05:06	04:43	05:08	05:59	06:53	07:47	07:46	08:25		09:54 (10)
	16:31			17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10	15:54	16	10:10 (10)
21	08:15			07:20	06:15	06:01	05:04	04:43	05:09	06:01	06:55	07:49	07:47	08:26		09:54 (10)
	16:33			17:33	18:26	20:23	21:15	21:45	21:27	20:30	19:16	18:05	16:08	15:54	16	10:10 (10)
22	08:14			07:18	06:12	05:59	05:03	04:43	05:11	06:02	06:57	07:51	07:49	08:27		09:55 (10)
	16:35			17:35	18:28	20:25	21:18	21:45	21:26	20:28	19:13	18:03	16:07	15:55	16	10:11 (10)
23	08:13			07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51	08:27		09:55 (10)
	16:38			17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06	15:55	16	10:11 (10)
24	08:11			07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53	08:28		09:56 (10)
	16:38			17:39	18:32	20:28	21:19	21:46	21:23	20:23	19:09	17:58	16:05	15:56	15	10:11 (10)
25	08:10			07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:57	07:54	08:28		09:57 (10)
	16:40			17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	15:57	15	10:12 (10)
26	08:08			07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	08:28		09:57 (10)
	16:42			17:43	18:35	20:32	21:22	21:46	21:20	20:18	19:04	16:54	16:03	15:57	15	10:12 (10)
27	08:07			07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:29		09:58 (10)
	16:44			17:45	18:37	20:34	21:24	21:46	21:19	20:16	19:01	16:52	16:02	15:58	14	10:12 (10)
28	08:06			07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:29		09:59 (10)
	16:46			17:47	18:39	20:35	21:25	21:46	21:17	20:14	18:59	16:50	16:01	15:59	13	10:12 (10)
29	08:04				06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29		10:00 (10)
	16:48				19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00	13	10:13 (10)
30	08:02				06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03	08:29		10:01 (10)
	16:50				19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	16:01	12	10:13 (10)
31	08:01				06:51		04:52		05:25	06:18		07:08		08:29		10:02 (10)
	16:52				19:44		21:29		21:12	20:07		16:44		16:02	11	10:13 (10)
Sonnenscheinstunden	251			279	367	419	492	508	510	459	382	329	260	235		
astr.max.mögl.Beschattung		14													293	
Red.Sonnenscheinwahrsch.		0.17													0.14	
Reduktion Betriebsdauer		0.91													0.91	
Reduktion Windrichtung		0.59													0.59	
Gesamte Reduktion		0.09													0.07	
Met.wahrsch.Beschattung		1													22	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender

Berechnung: GB_Werder/Lübz**Schattenrezeptor:** IZ - IO260

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar			Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:29		10:04 (10)	07:59	07:02	06:48	05:48	04:51	04:47	05:26	06:20	07:12	07:10	08:04		
	16:03	9	10:13 (10)	16:54	17:49	19:46	20:41	21:30	21:45	21:10	20:04	18:51	16:42	15:58		
2	08:29		10:06 (10)	07:58	07:00	06:46	05:38	04:50	04:48	05:28	06:22	07:14	07:12	08:06		
	16:04	6	10:12 (10)	16:56	17:50	19:48	20:43	21:31	21:44	21:08	20:02	18:49	16:40	15:57		
3	08:29			07:56	06:58	06:43	05:36	04:49	04:49	05:30	06:23	07:16	07:14	08:07		
	16:05			16:57	17:52	19:50	20:44	21:32	21:44	21:07	20:00	18:47	16:38	15:57		
4	08:28			07:54	06:56	06:41	05:34	04:48	04:49	05:31	06:25	07:18	07:16	08:08		
	16:06			16:59	17:54	19:52	20:46	21:34	21:44	21:05	19:57	18:44	16:36	15:56		
5	08:28			07:52	06:53	06:39	05:32	04:48	04:50	05:33	06:27	07:20	07:18	08:10		
	16:08			17:01	17:56	19:54	20:48	21:35	21:43	21:03	19:55	18:42	16:34	15:55		
6	08:28			07:51	06:51	06:36	05:30	04:47	04:51	05:35	06:29	07:21	07:19	08:11		
	16:09			17:03	17:58	19:55	20:50	21:36	21:42	21:01	19:52	18:39	16:32	15:55		
7	08:27			07:49	06:49	06:34	05:28	04:46	04:52	05:36	06:30	07:23	07:21	08:13		
	16:10			17:05	18:00	19:57	20:52	21:37	21:42	20:59	19:50	18:37	16:30	15:54		
8	08:27			07:47	06:46	06:31	05:26	04:46	04:53	05:38	06:32	07:25	07:23	08:14		
	16:12			17:07	18:02	19:59	20:53	21:38	21:41	20:57	19:48	18:35	16:28	15:54		
9	08:26			07:45	06:44	06:29	05:24	04:45	04:54	05:40	06:34	07:27	07:25	08:15		
	16:13			17:09	18:04	20:01	20:55	21:38	21:40	20:55	19:45	18:32	16:27	15:54		
10	08:25			07:43	06:41	06:27	05:22	04:45	04:55	05:42	06:36	07:29	07:27	08:16		09:55 (10)
	16:15			17:11	18:06	20:03	20:57	21:39	21:39	20:53	19:43	18:30	16:25	15:53	6	10:01 (10)
11	08:25			07:41	06:39	06:24	05:20	04:44	04:56	05:43	06:37	07:30	07:29	08:18		09:55 (10)
	16:16			17:13	18:08	20:05	20:58	21:40	21:39	20:51	19:40	18:28	16:23	15:53	9	10:04 (10)
12	08:24			07:39	06:37	06:22	05:18	04:44	04:58	05:45	06:39	07:32	07:31	08:19		09:55 (10)
	16:18			17:15	18:09	20:06	21:00	21:41	21:38	20:49	19:38	18:25	16:22	15:53	10	10:05 (10)
13	08:23			07:37	06:34	06:20	05:17	04:43	04:59	05:47	06:41	07:34	07:33	08:20		09:54 (10)
	16:19			17:17	18:11	20:08	21:02	21:42	21:37	20:47	19:35	18:23	16:20	15:53	12	10:06 (10)
14	08:22			07:35	06:32	06:17	05:15	04:43	05:00	05:48	06:43	07:36	07:35	08:21		09:54 (10)
	16:21			17:19	18:13	20:10	21:04	21:42	21:36	20:45	19:33	18:21	16:18	15:53	13	10:07 (10)
15	08:22			07:33	06:29	06:15	05:14	04:43	05:01	05:50	06:44	07:38	07:36	08:22		09:54 (10)
	16:22			17:21	18:15	20:12	21:05	21:43	21:35	20:43	19:31	18:18	16:17	15:53	14	10:08 (10)
16	08:21			07:31	06:27	06:13	05:12	04:43	05:02	05:52	06:46	07:40	07:38	08:22		09:55 (10)
	16:24			17:23	18:17	20:14	21:07	21:43	21:34	20:41	19:28	18:16	16:15	15:53	14	10:09 (10)
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	16:26			17:25	18:19	20:15	21:08	21:44	21:32	20:39	19:26	18:14	16:14	15:53	15	10:10 (10)
18	08:19			07:27	06:22	06:08	05:08	04:43	05:05	05:55	06:50	07:43	07:42	08:24		09:54 (10)
	16:27			17:27	18:21	20:17	21:10	21:44	21:31	20:36	19:23	18:11	16:12	15:53	16	10:10 (10)
19	08:17			07:25	06:20	06:06	05:07	04:43	05:07	05:57	06:51	07:45	07:44	08:25		09:55 (10)
	16:29			17:29	18:22	20:19	21:12	21:45	21:30	20:34	19:21	18:09	16:11	15:54	16	10:11 (10)
20	08:16			07:23	06:17	06:04	05:06	04:43	05:08	05:59	06:53	07:47	07:46	08:25		09:56 (10)
	16:31			17:31	18:24	20:21	21:13	21:45	21:29	20:32	19:18	18:07	16:10	15:54	16	10:12 (10)
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	16:35			17:35	18:28	20:25	21:18	21:45	21:26	20:28	19:13	18:03	16:07	15:55	16	10:13 (10)
23	08:13			07:16	06:10	05:57	05:01	04:43	05:12	06:04	06:58	07:53	07:51	08:27		09:57 (10)
	16:38			17:37	18:30	20:26	21:18	21:46	21:25	20:25	19:11	18:00	16:06	15:55	16	10:13 (10)
24	08:11			07:14	06:08	05:55	05:00	04:44	05:14	06:06	07:00	07:55	07:53	08:28		09:57 (10)
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25	08:10			07:12	06:05	05:52	04:59	04:44	05:15	06:08	07:02	06:56	07:54	08:28		09:58 (10)
	16:40			17:41	18:33	20:30	21:21	21:46	21:22	20:21	19:06	16:56	16:04	15:57	16	10:14 (10)
26	08:08			07:09	06:03	05:50	04:58	04:44	05:17	06:09	07:04	06:58	07:56	08:28		09:59 (10)
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27	08:07			07:07	06:00	05:48	04:56	04:45	05:18	06:11	07:05	07:00	07:58	08:29		09:59 (10)
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28	08:06			07:05	05:58	05:46	04:55	04:45	05:20	06:13	07:07	07:02	07:59	08:29		10:00 (10)
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29	08:04				06:55	05:44	04:54	04:46	05:22	06:15	07:09	07:04	08:01	08:29		10:01 (10)
	16:48				19:41	20:37	21:26	21:45	21:15	20:11	18:56	16:48	16:00	16:00	13	10:14 (10)
30	08:02				06:53	05:42	04:53	04:47	05:23	06:16	07:11	07:06	08:03	08:29		10:02 (10)
	16:50				19:43	20:39	21:28	21:45	21:14	20:09	18:54	16:46	15:59	16:01	12	10:14 (10)
31	08:01				06:51		04:52		05:25	06:18		07:08		08:29		10:03 (10)
	16:52				19:44		21:29		21:12	20:07		16:44		16:02	11	10:14 (10)
Sonnenscheinstunden	251			279	367	419	492	508	510	459	382	329	260	235		
astr.max.mögl.Beschattung		15													301	
Red.Sonnenscheinwahrsch.		0.17													0.14	
Reduktion Betriebsdauer		0.91													0.91	
Reduktion Windrichtung		0.59													0.59	
Gesamte Reduktion		0.09													0.07	
Met.wahrsch.Beschattung		1													22	

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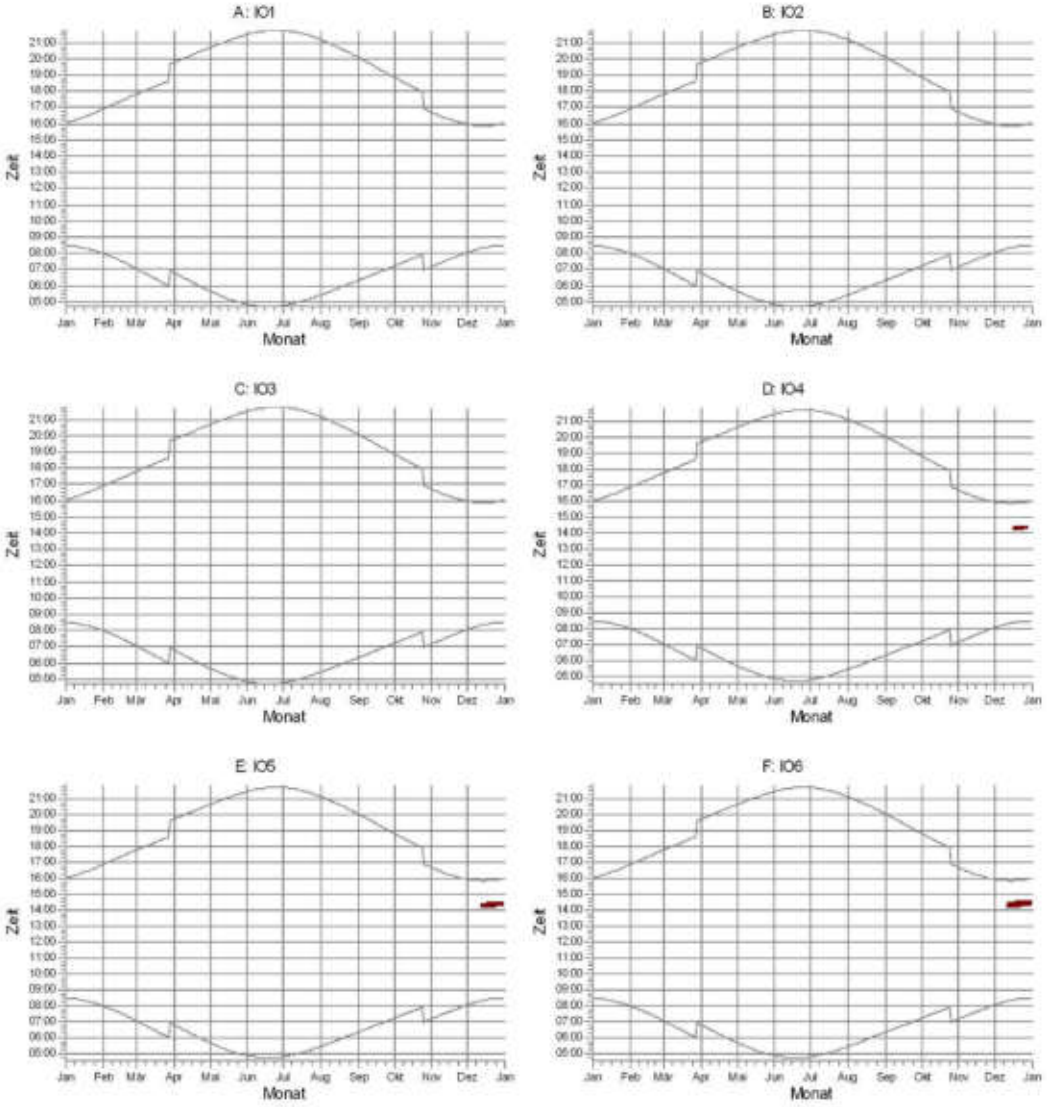
Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Grafischer Kalender

Berechnung: GB_Werder/Lübz



WEA

8: W7

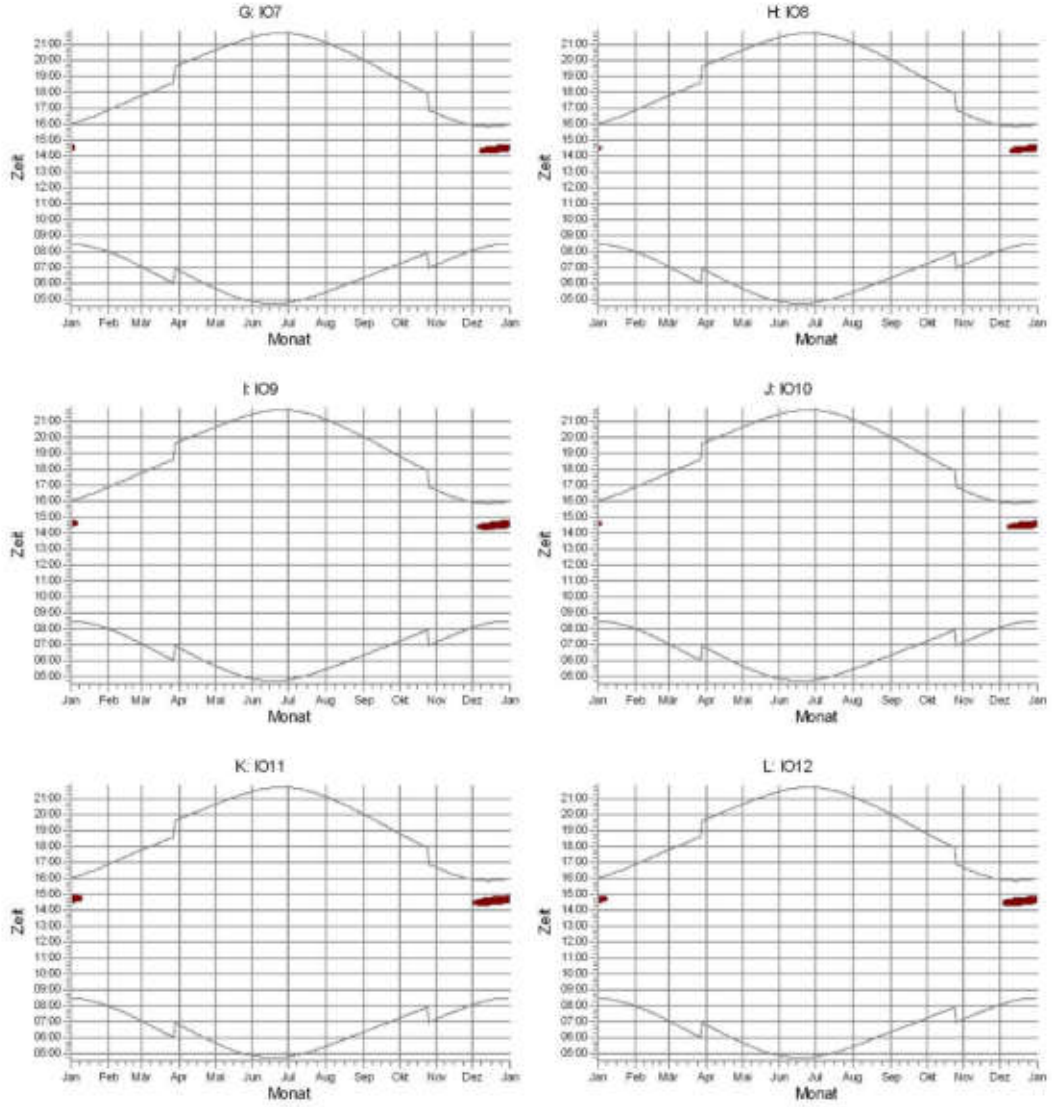
Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

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SHADOW - Grafischer Kalender

Berechnung: GB_Werder/Lübz



Projekt:
180926_Werder-Lübz_II

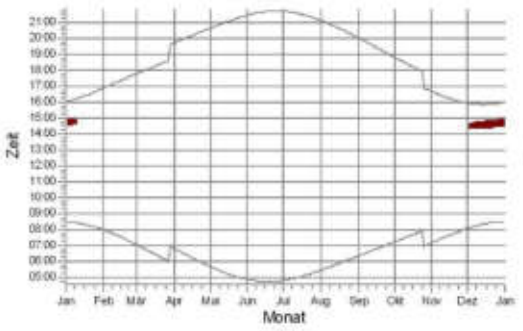
Beschreibung:
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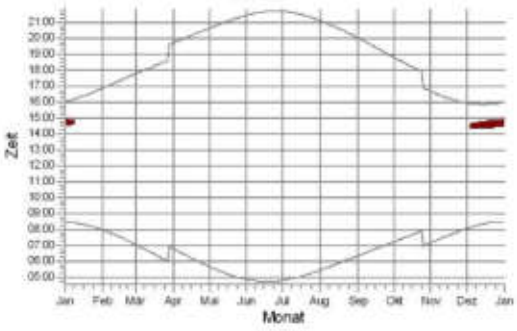
SHADOW - Grafischer Kalender

Berechnung: GB_Werder/Lübz

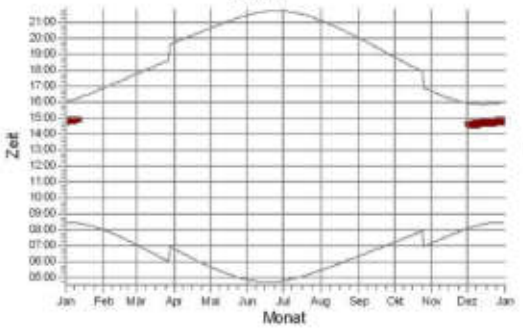
M: IO13



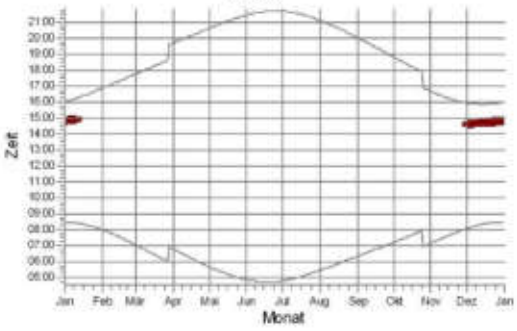
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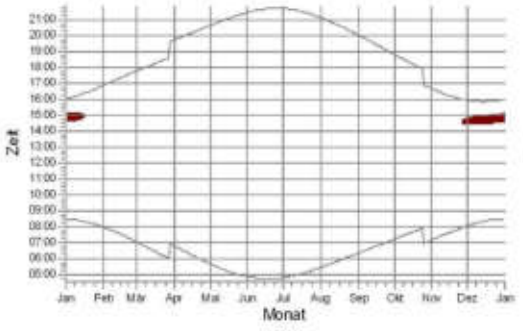
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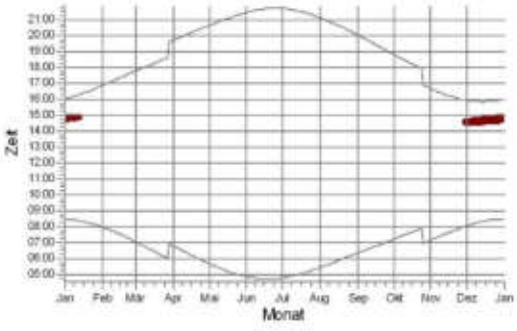
P: IO16



Q: IO17



R: IO18



WEA

8: W7

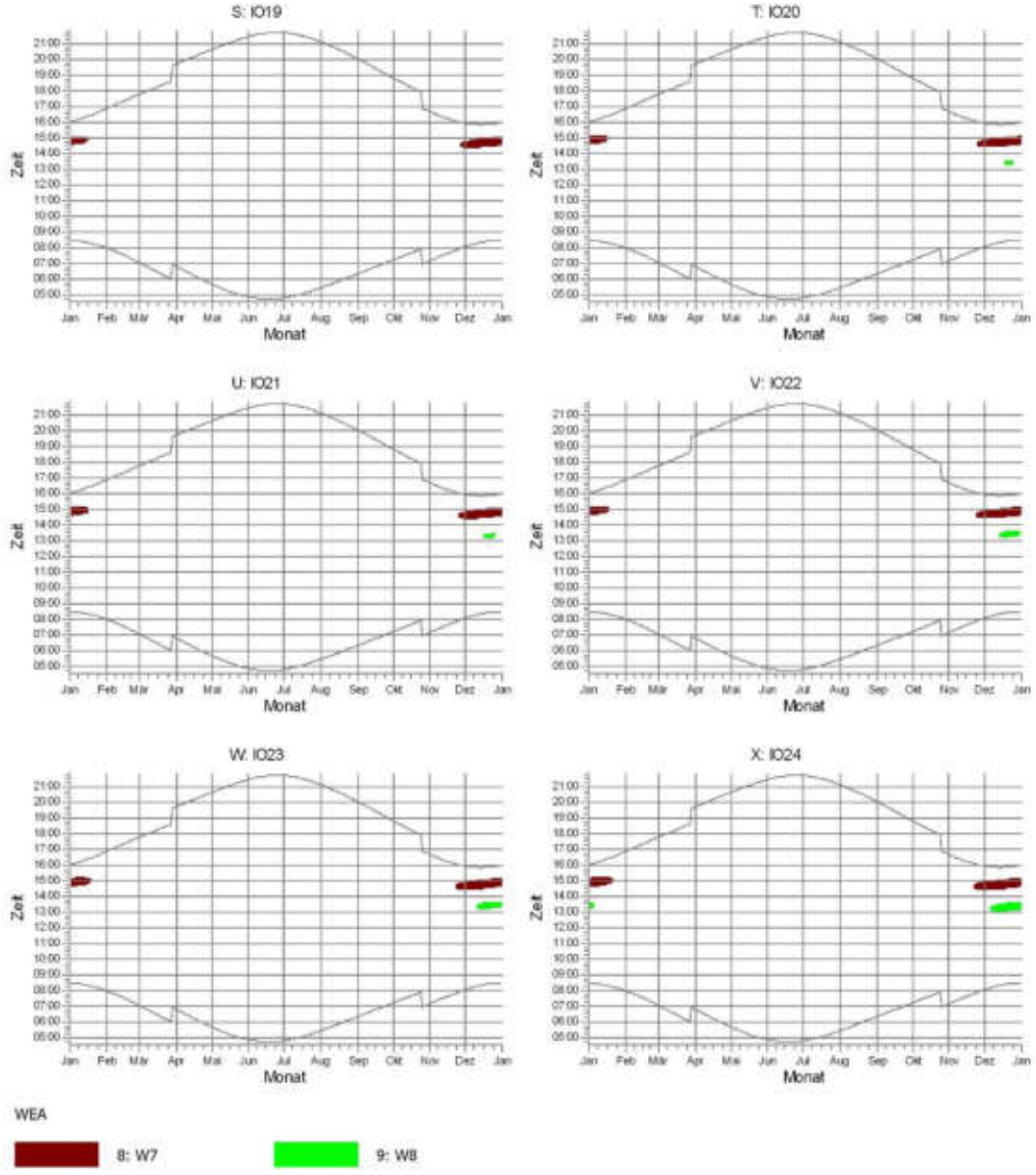
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SHADOW - Grafischer Kalender

Berechnung: GB_Werder/Lübz



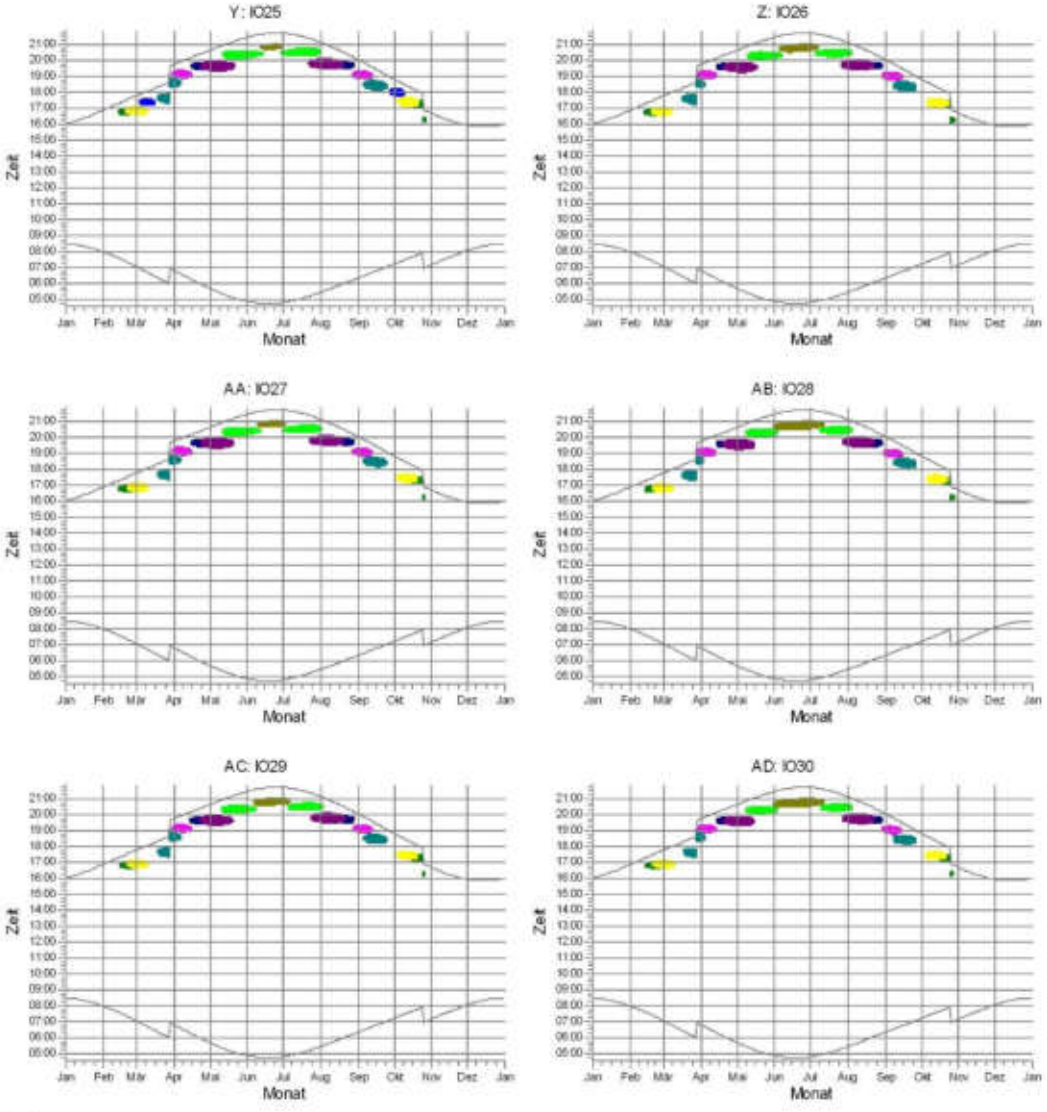
Projekt:
180926_Werder-Lübz_II

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SHADOW - Grafischer Kalender

Berechnung: GB_Werder/Lübz



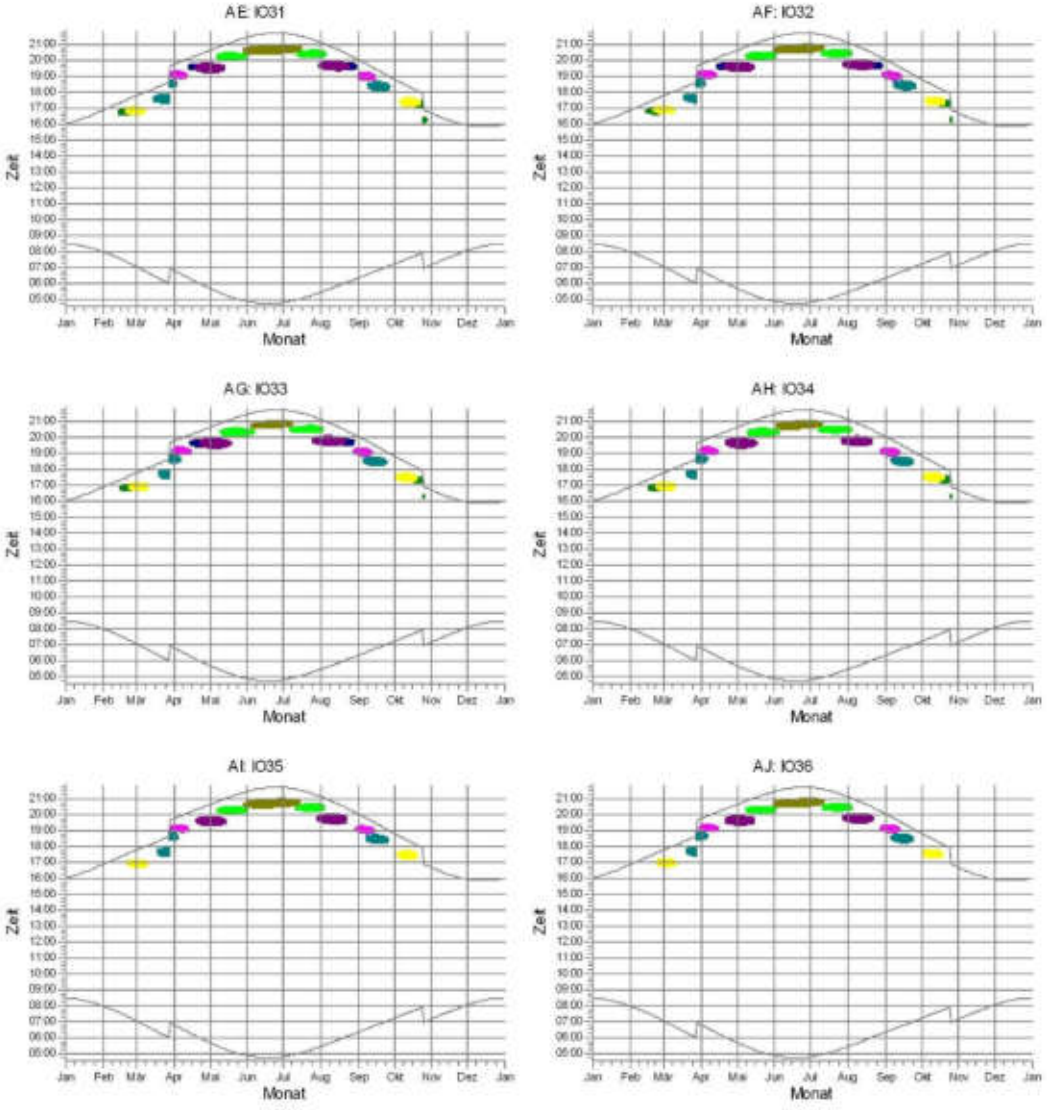
Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Grafischer Kalender

Berechnung: GB_Werder/Lübz



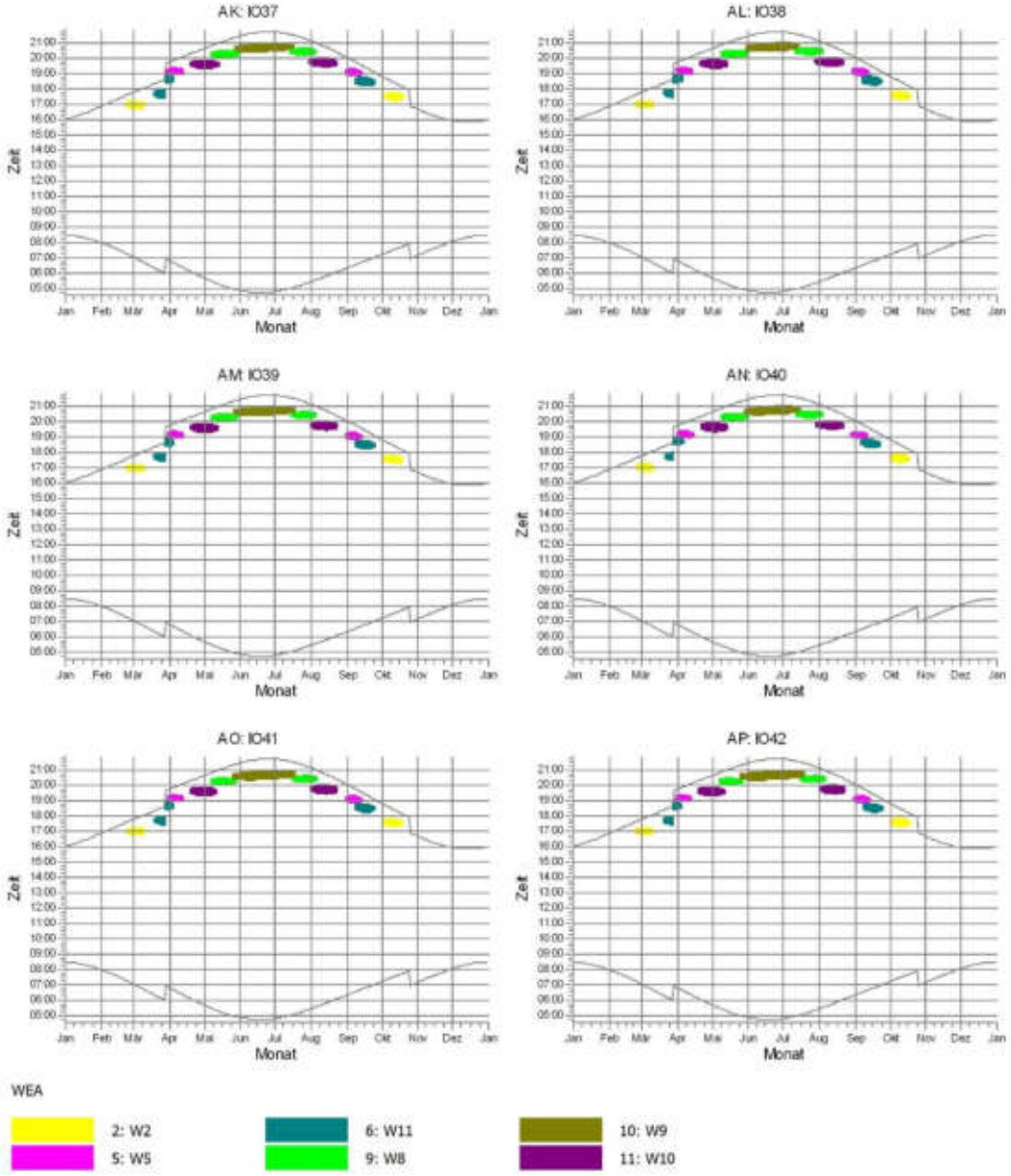
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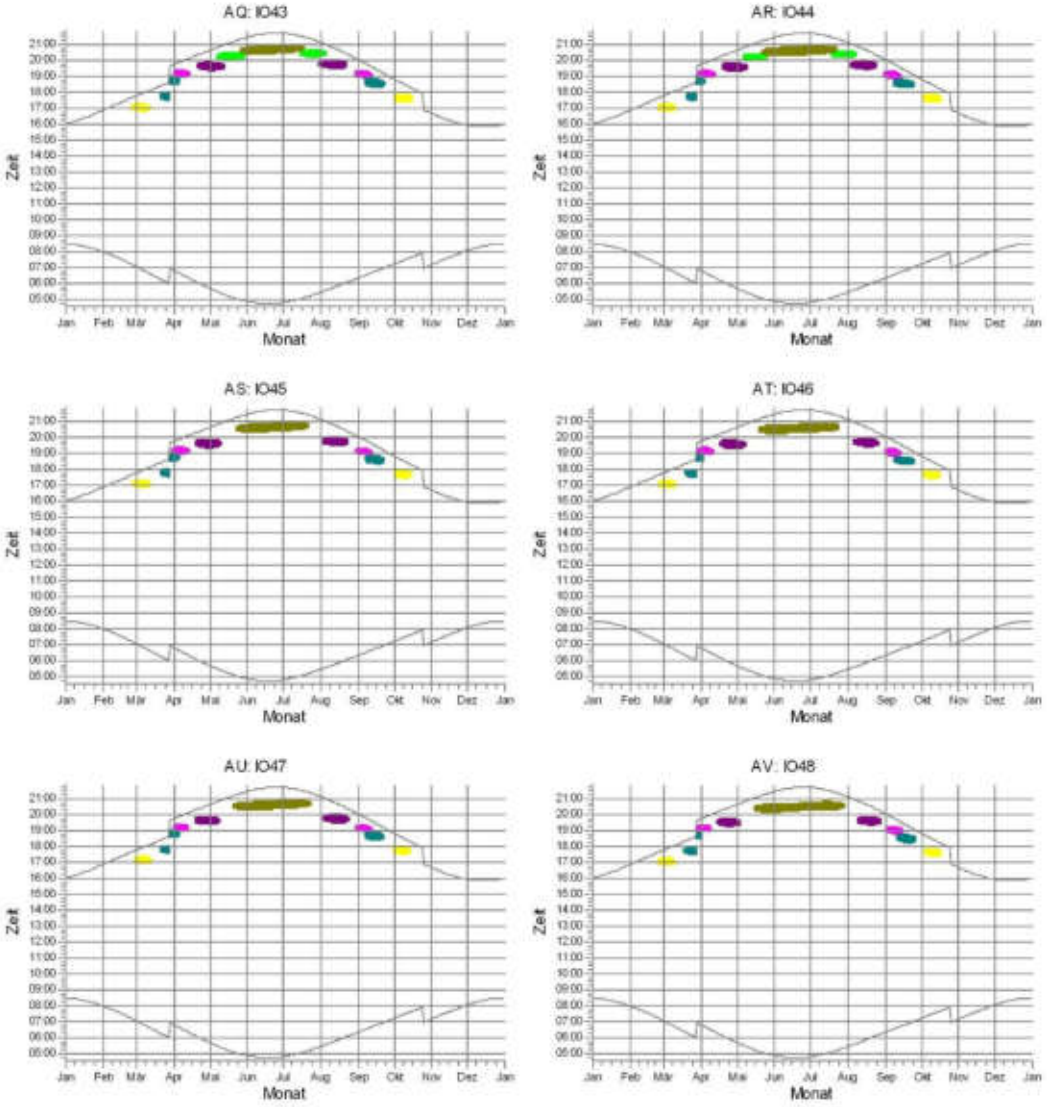
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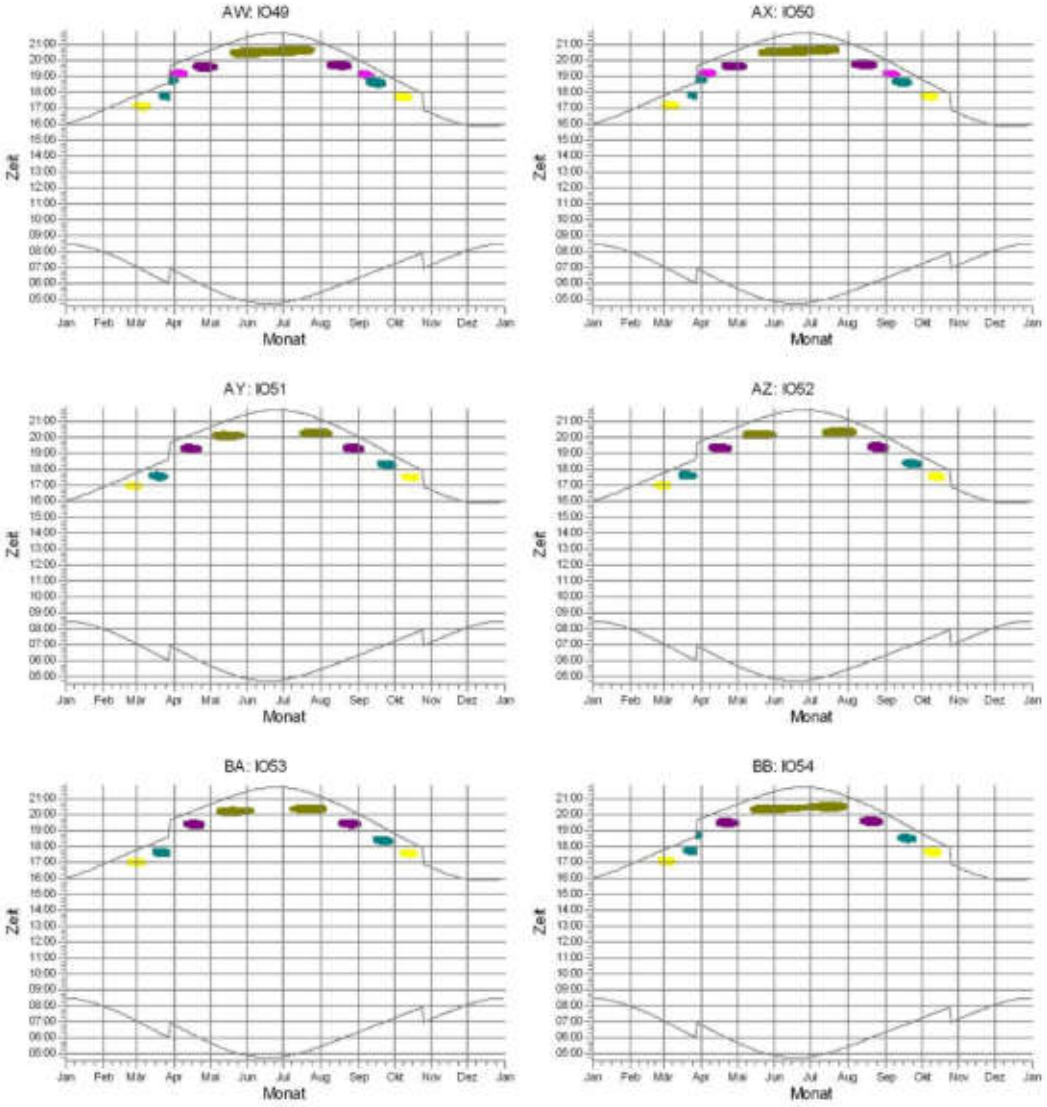
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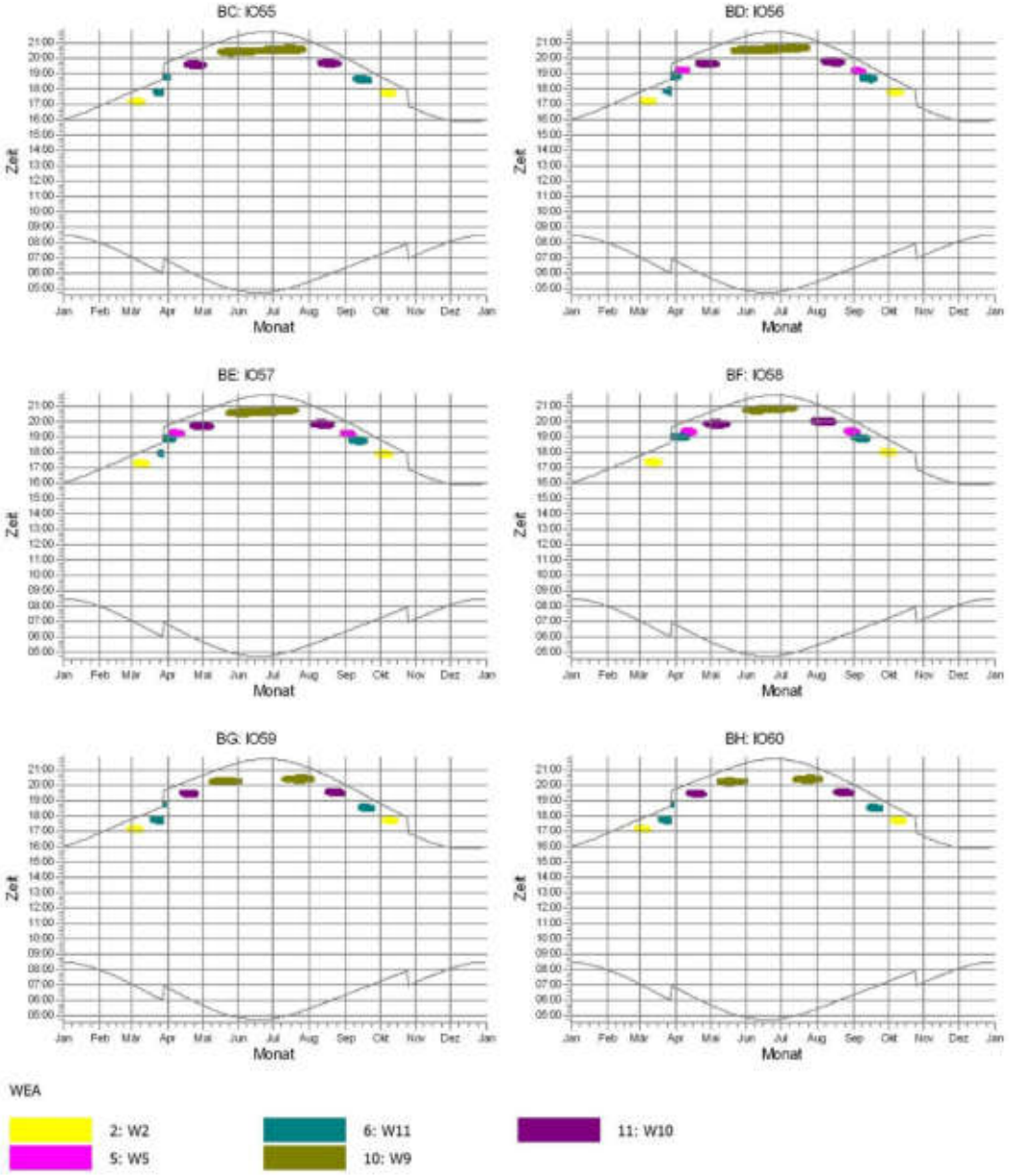
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SHADOW - Grafischer Kalender

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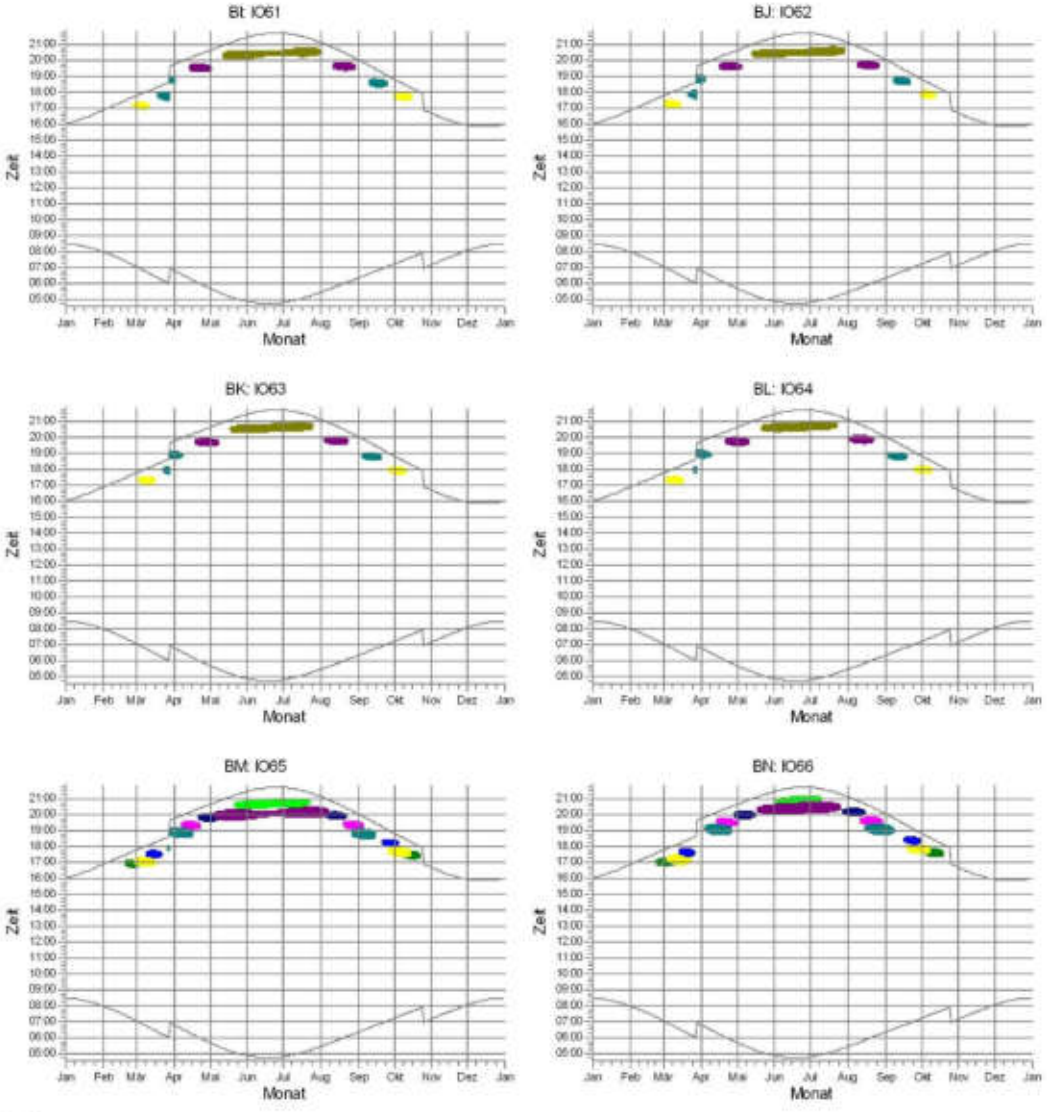
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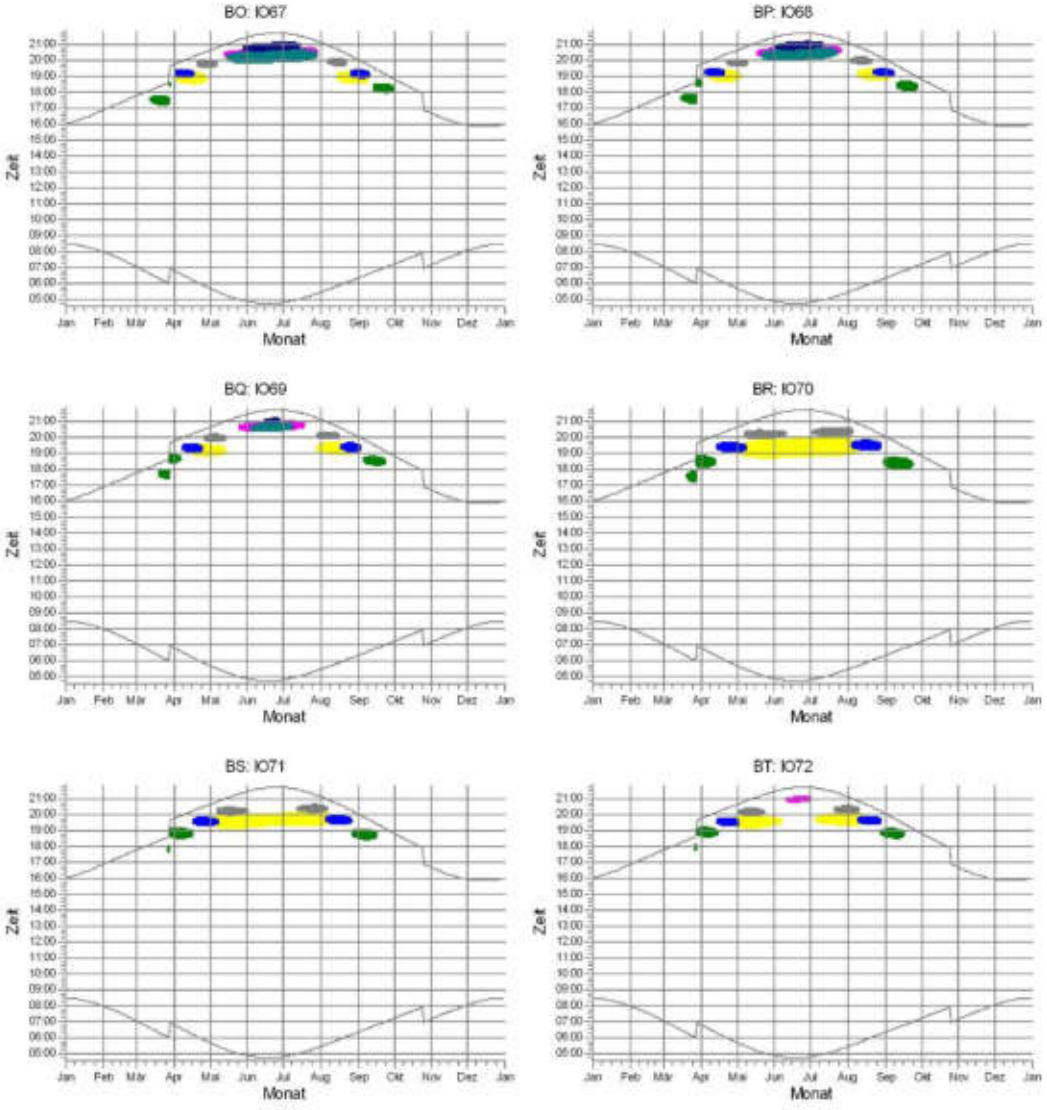
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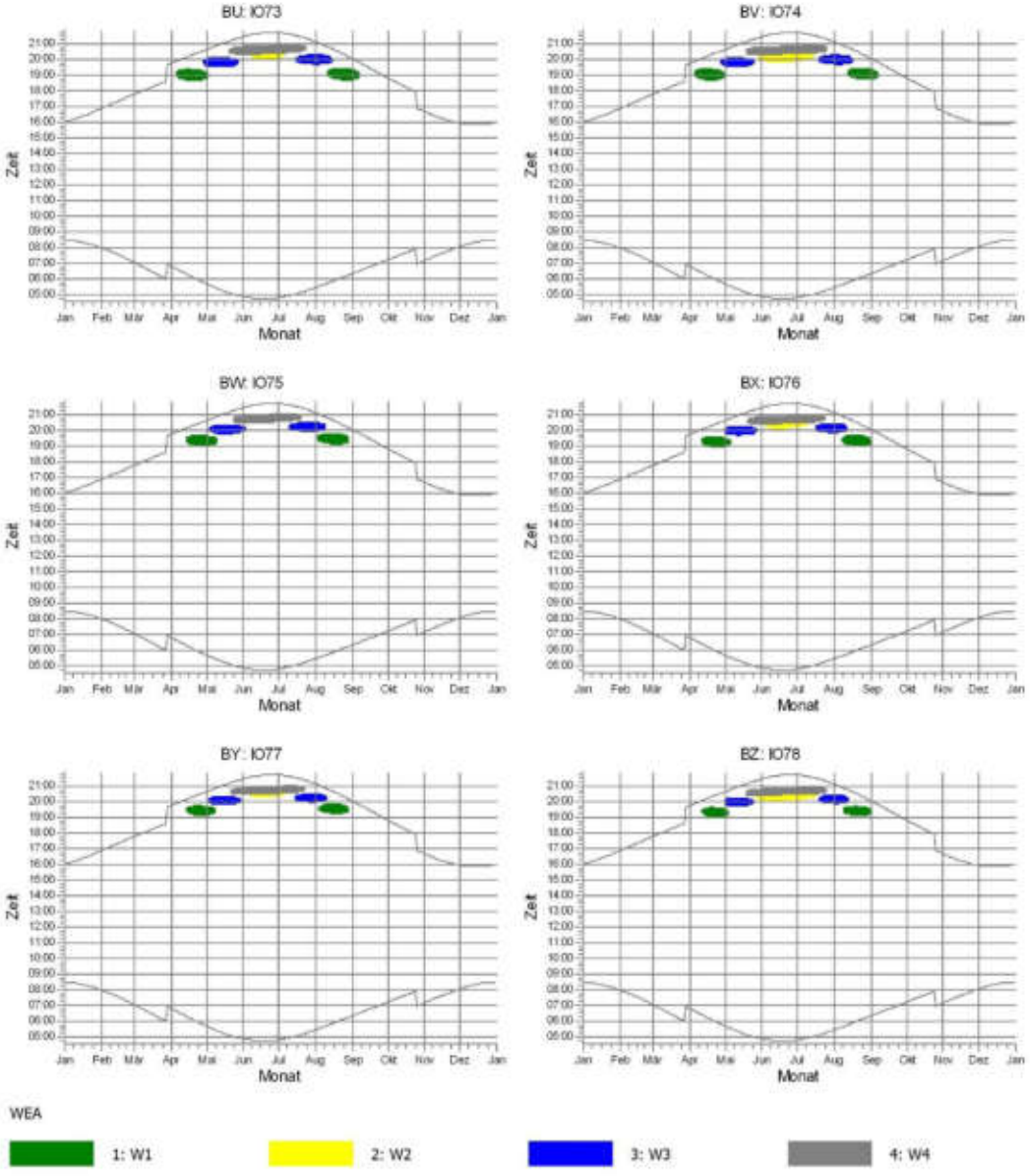
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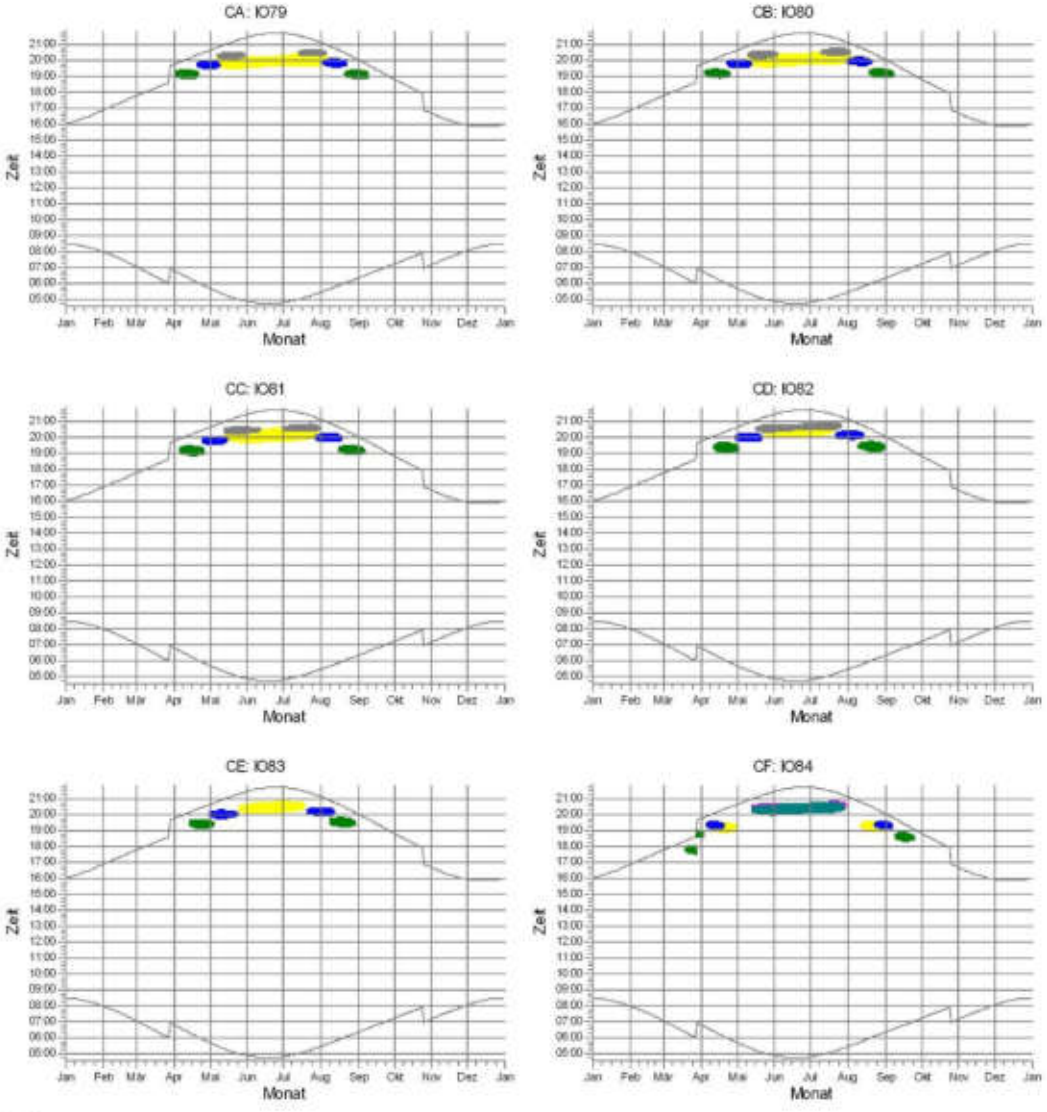
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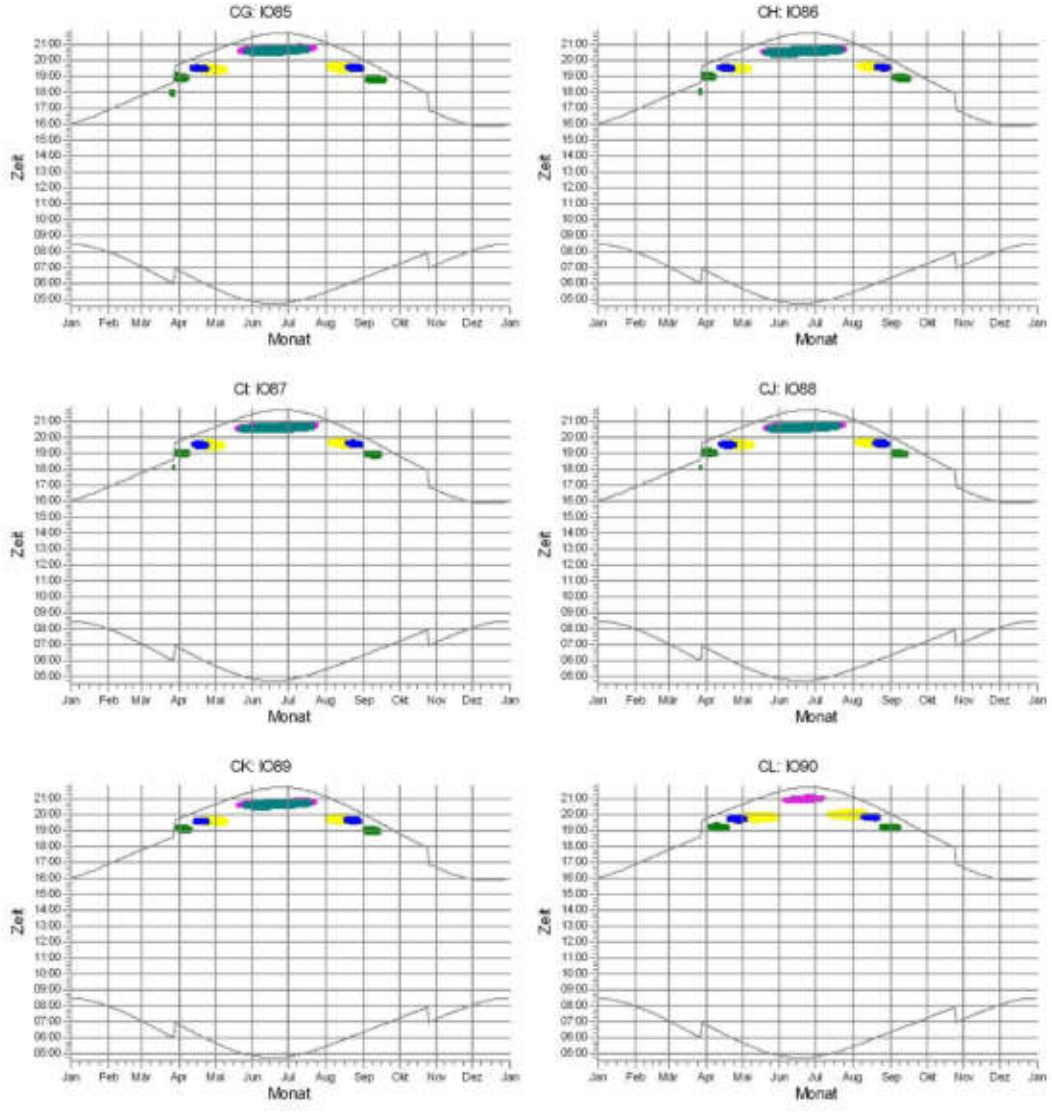
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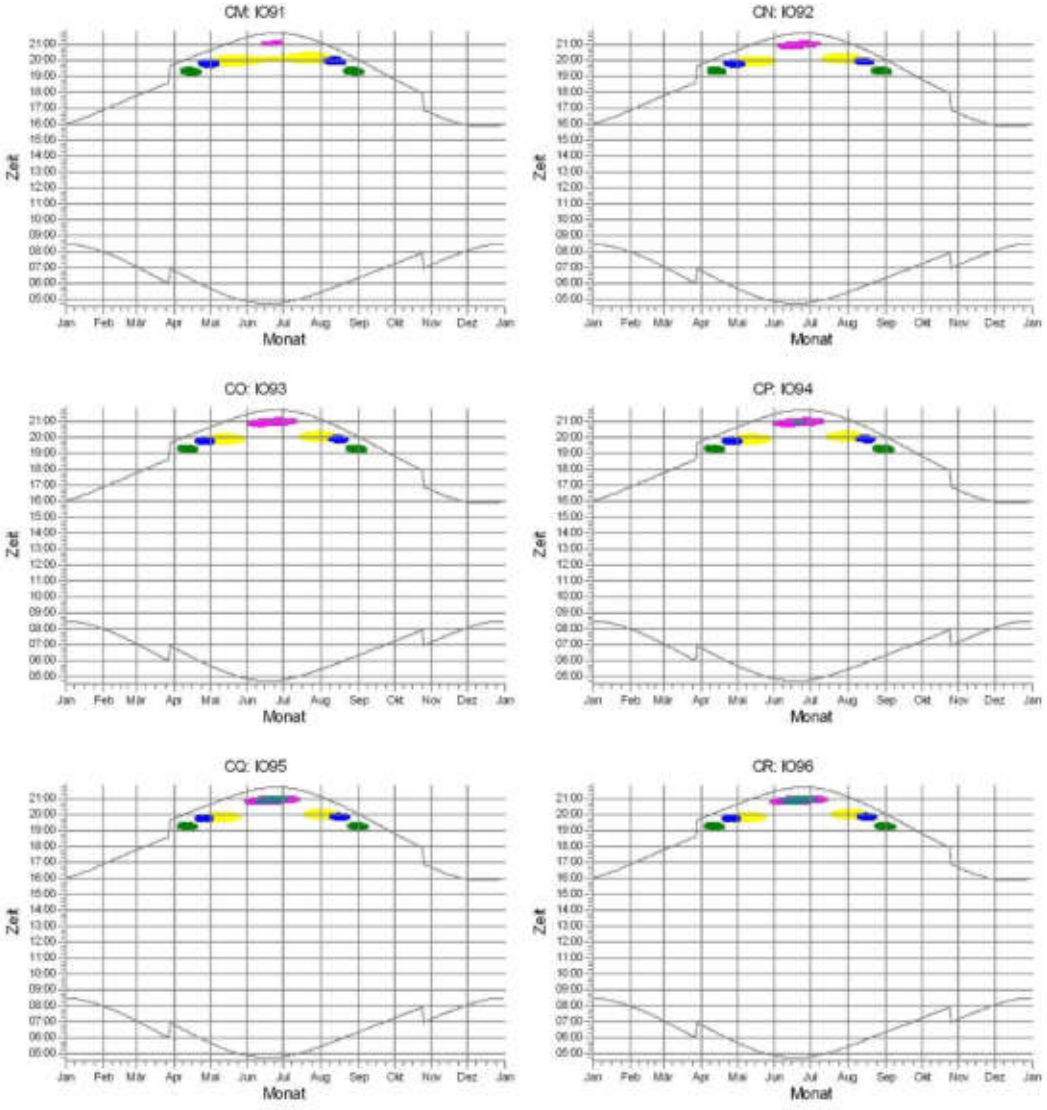
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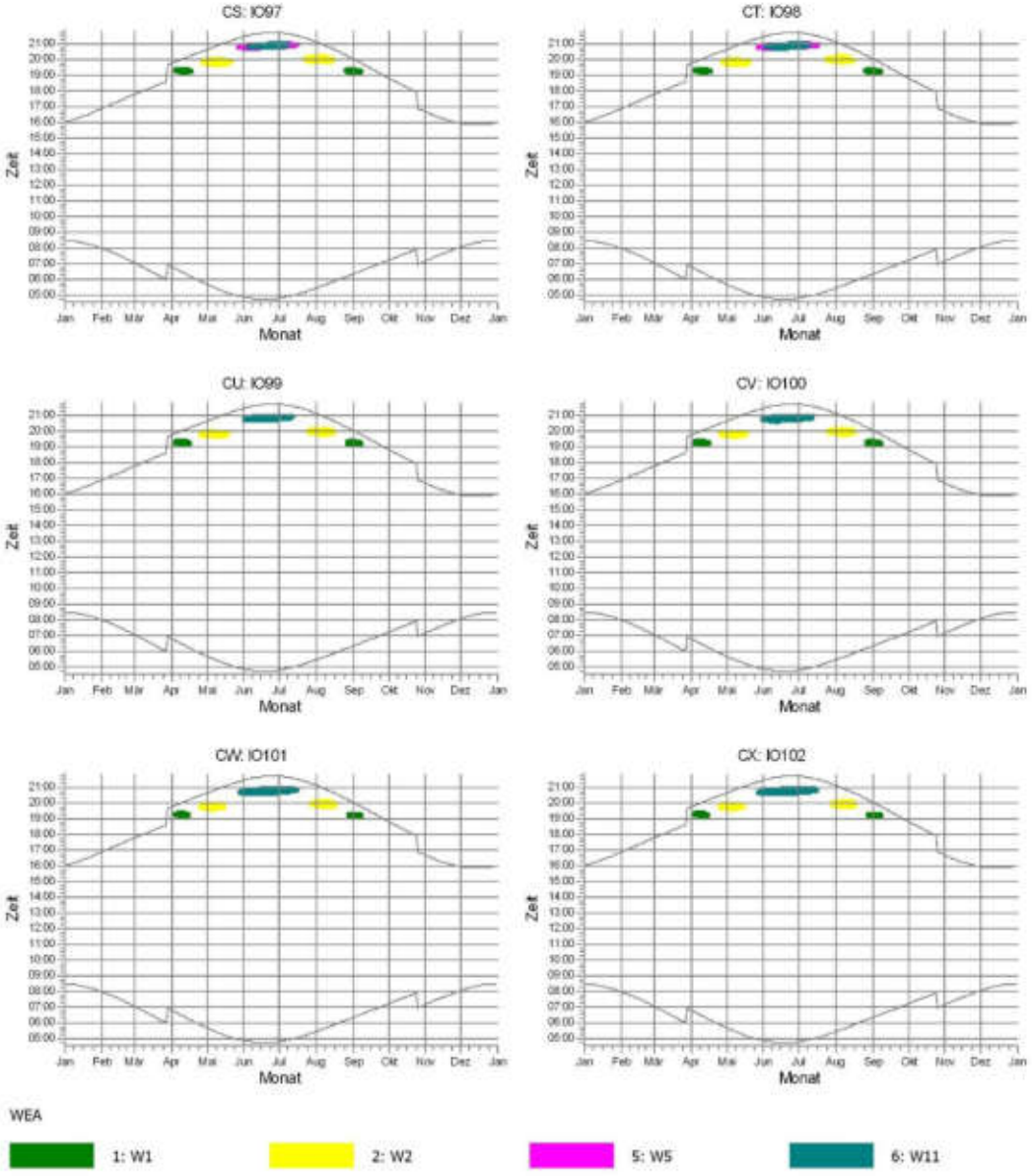
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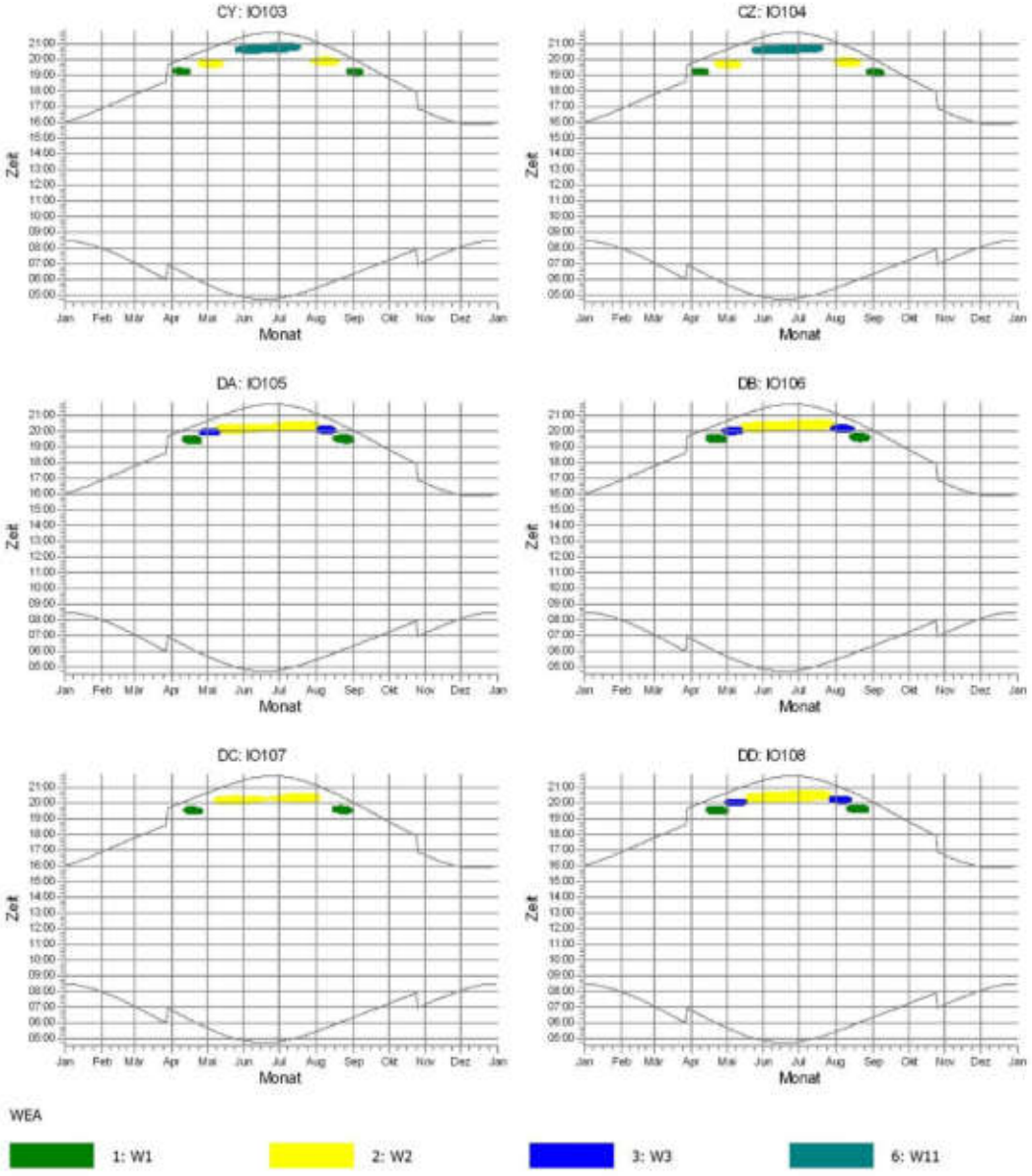
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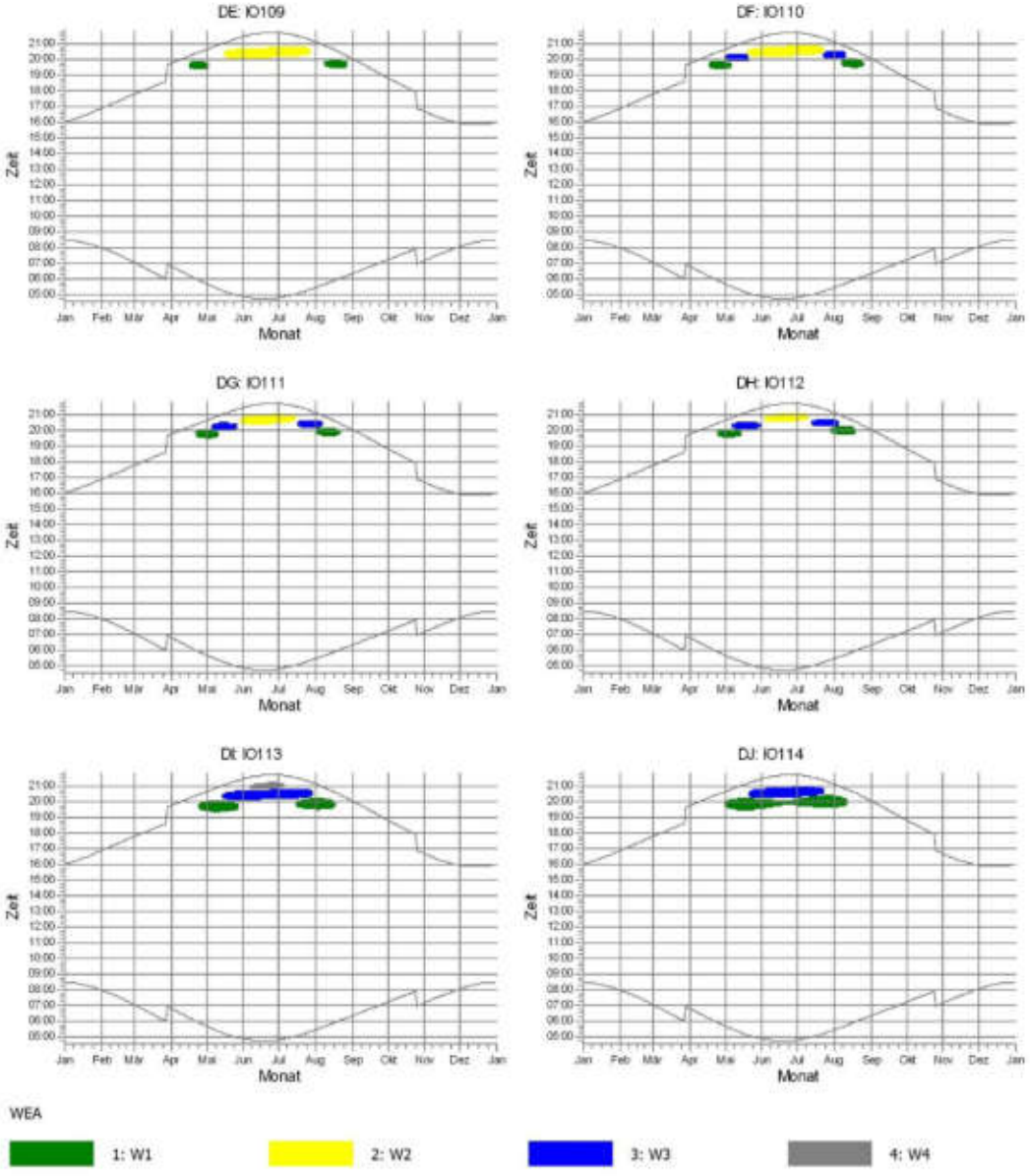
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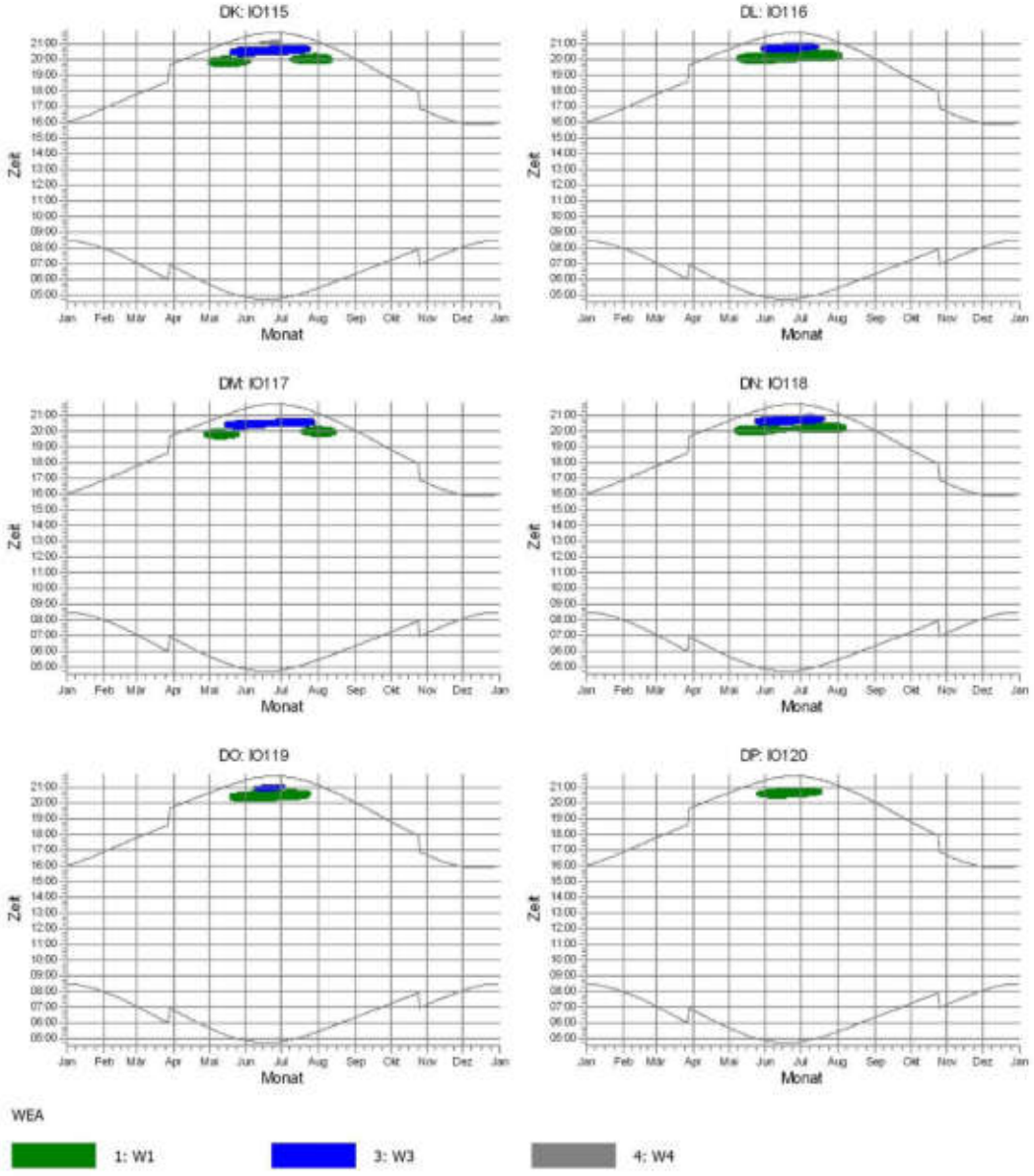
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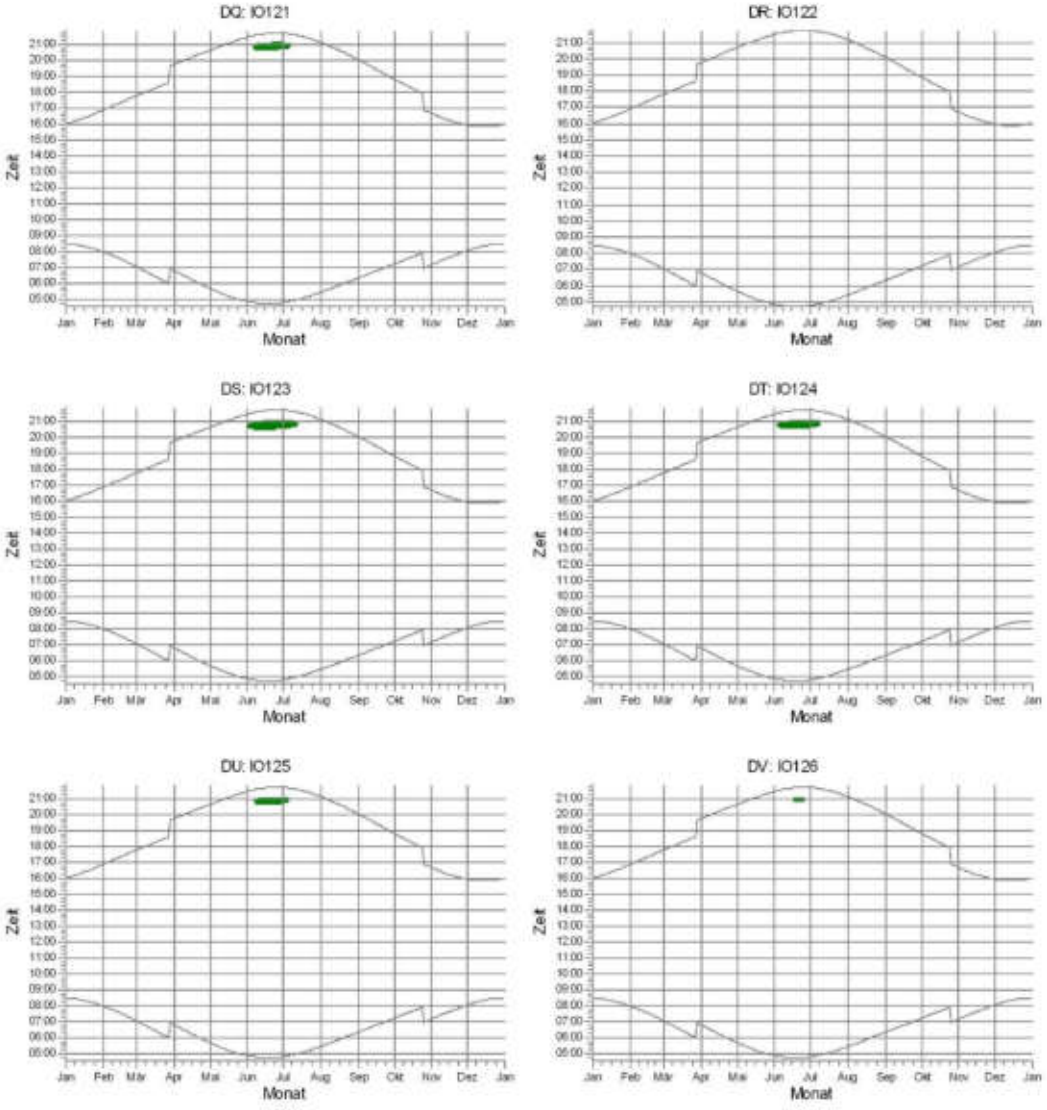
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Berechnung: GB_Werder/Lübz



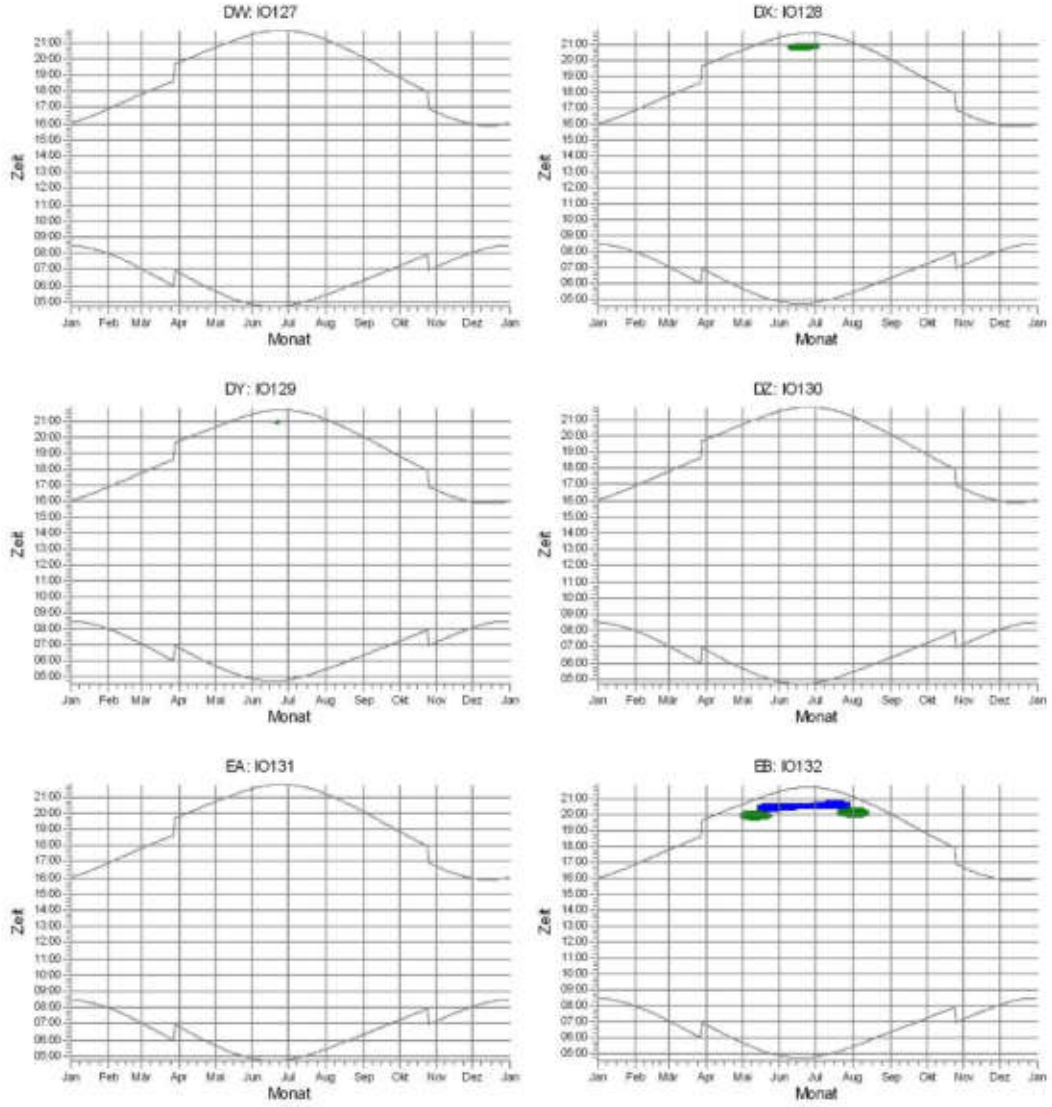
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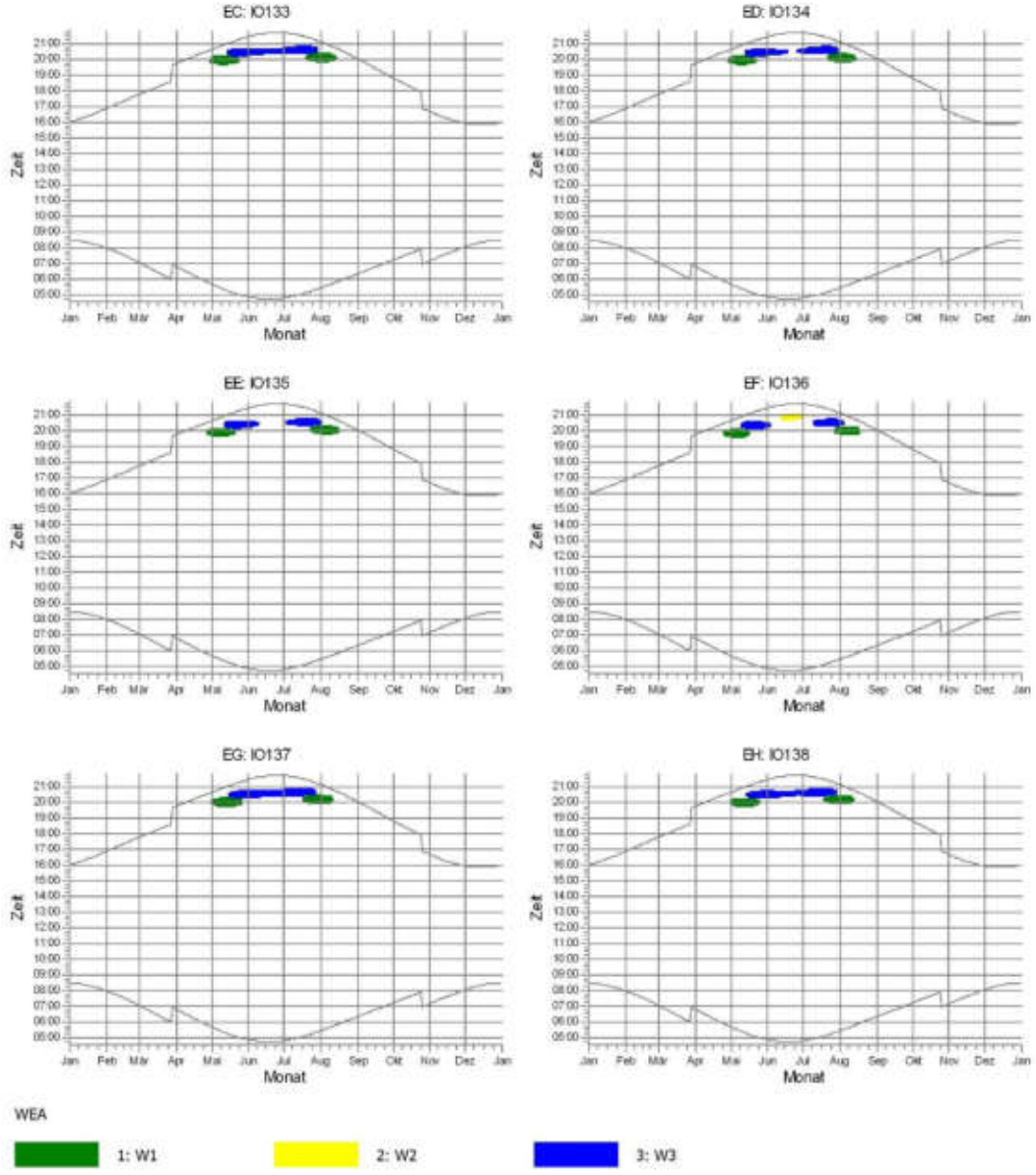
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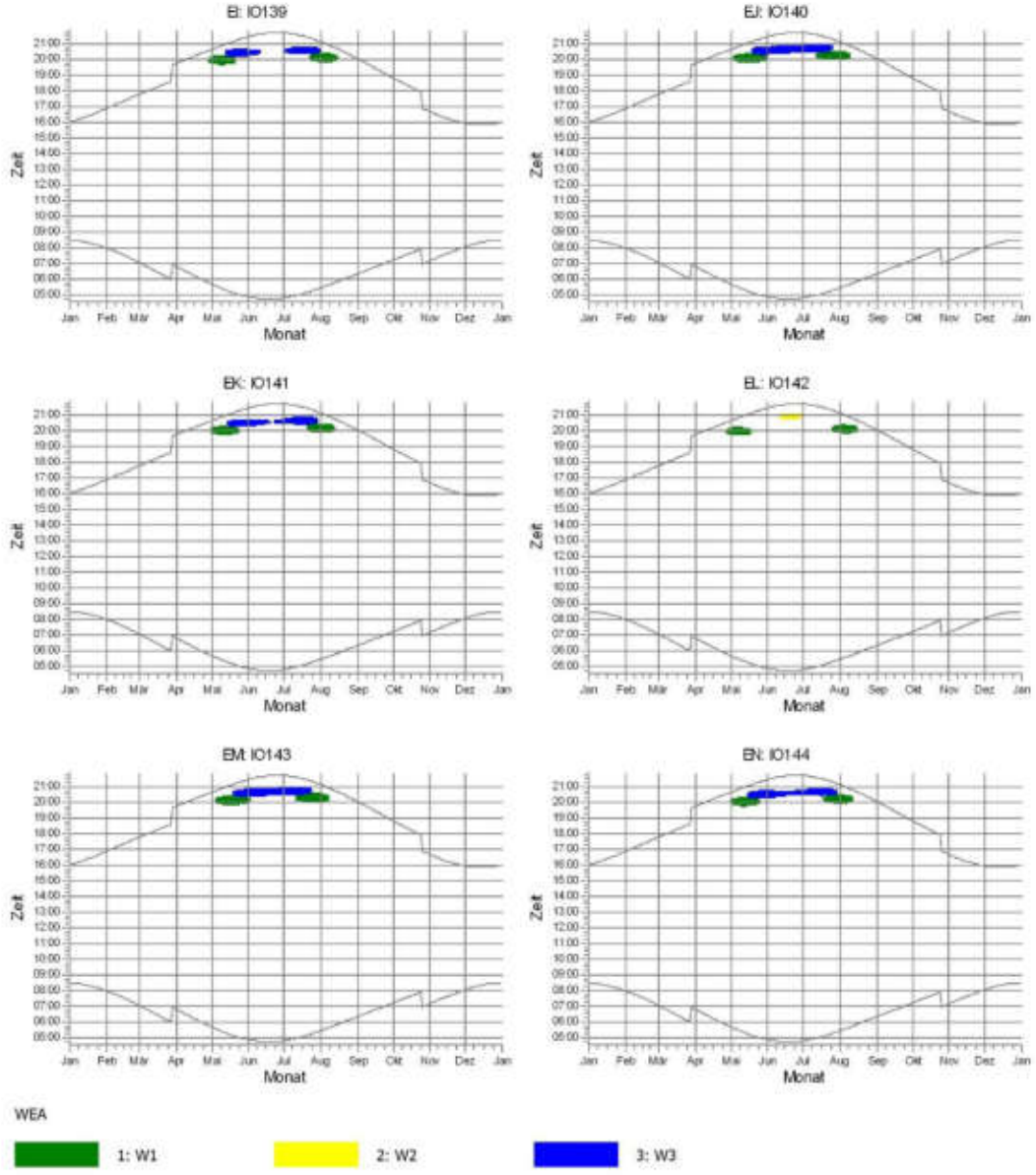
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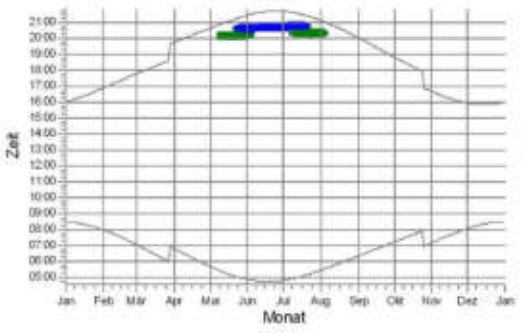
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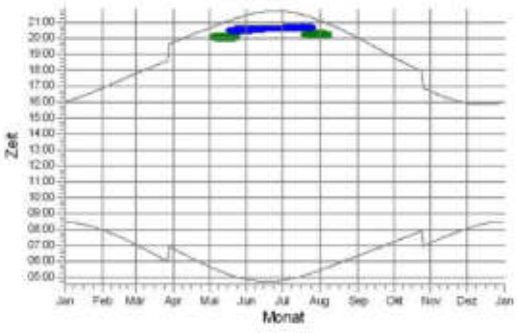
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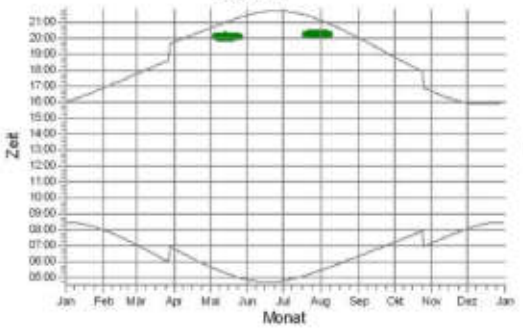
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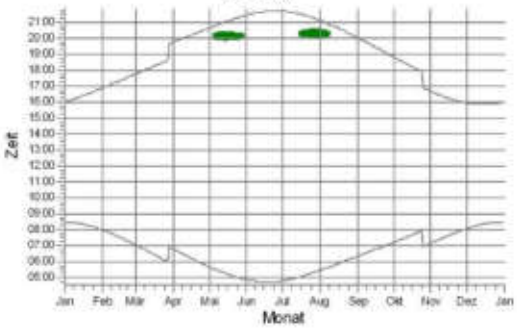
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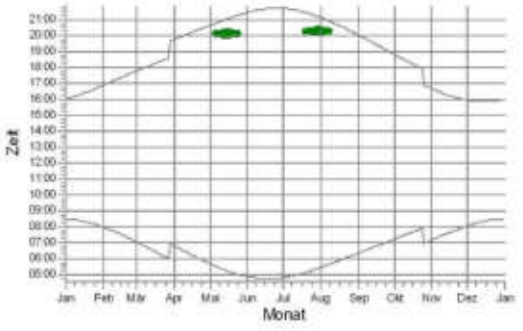
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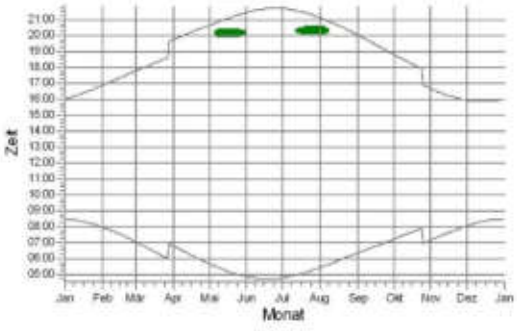
ER: IO148



ES: IO149



ET: IO150



WEA

1: W1 3: W3

Projekt:
180926_Werder-Lübz_II

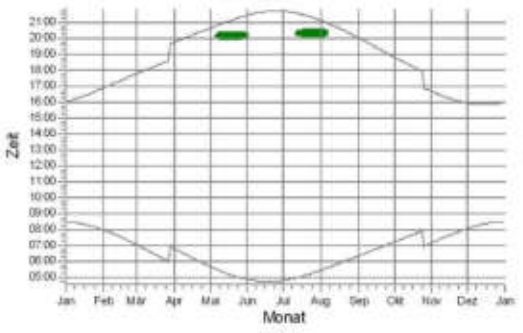
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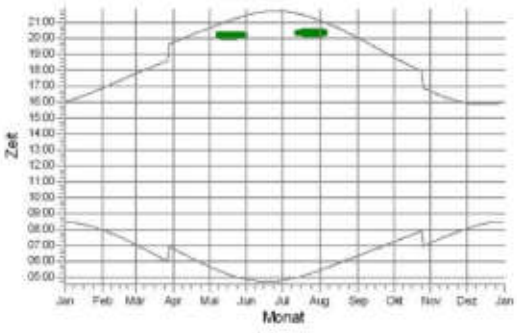
SHADOW - Grafischer Kalender

Berechnung: GB_Werder/Lübz

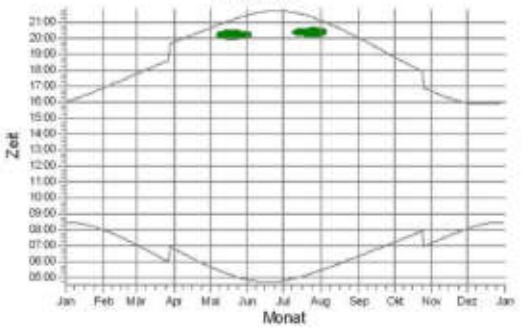
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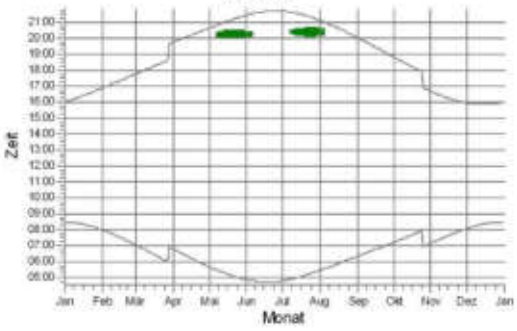
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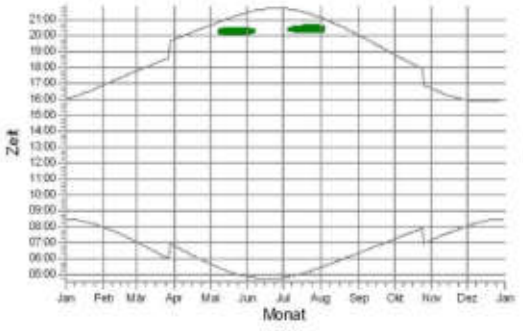
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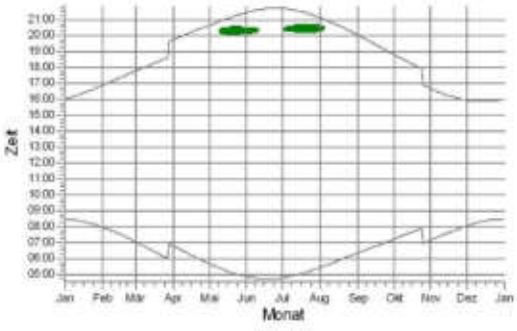
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EY: IO155



EZ: IO156



WEA

1: W1

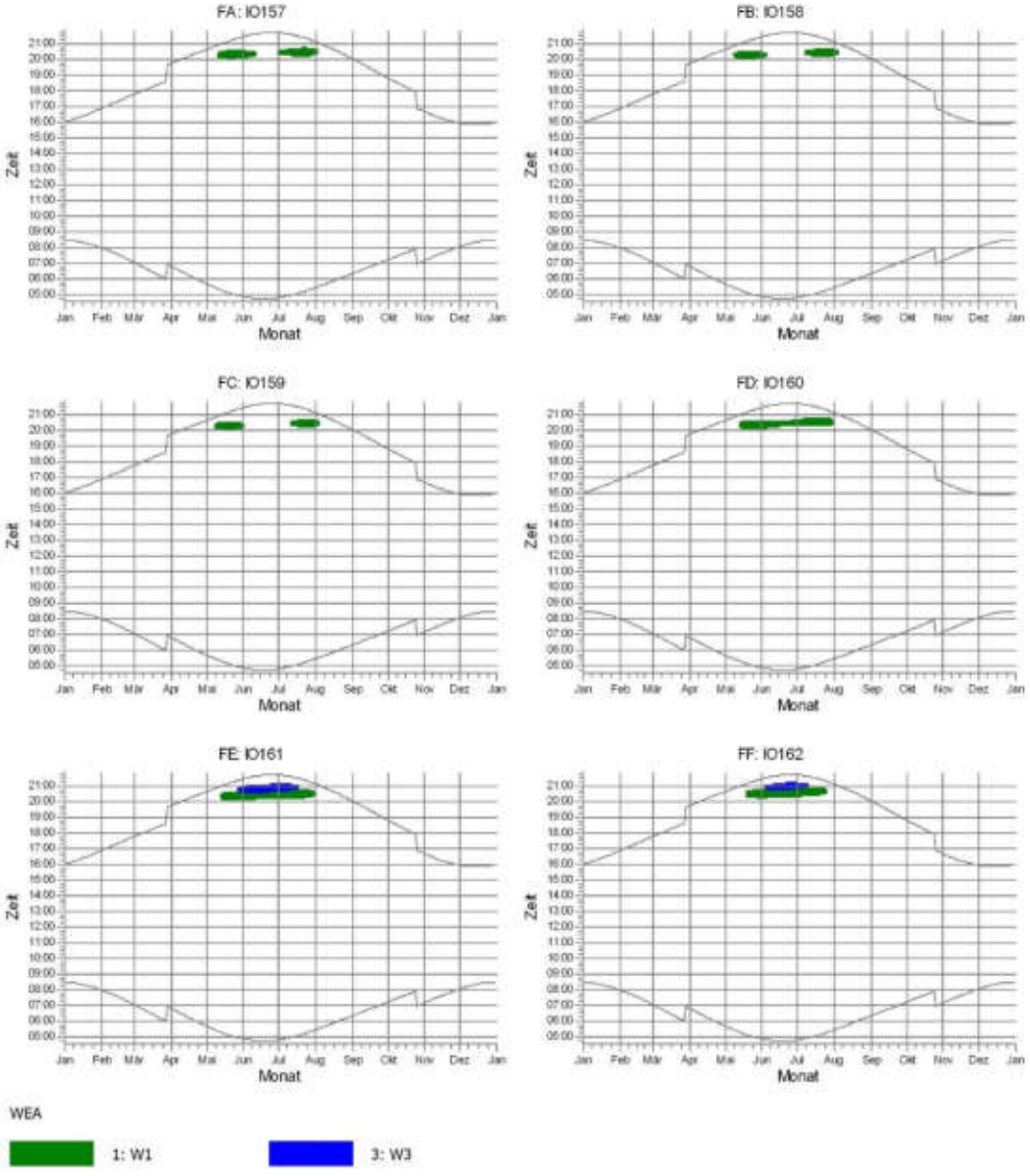
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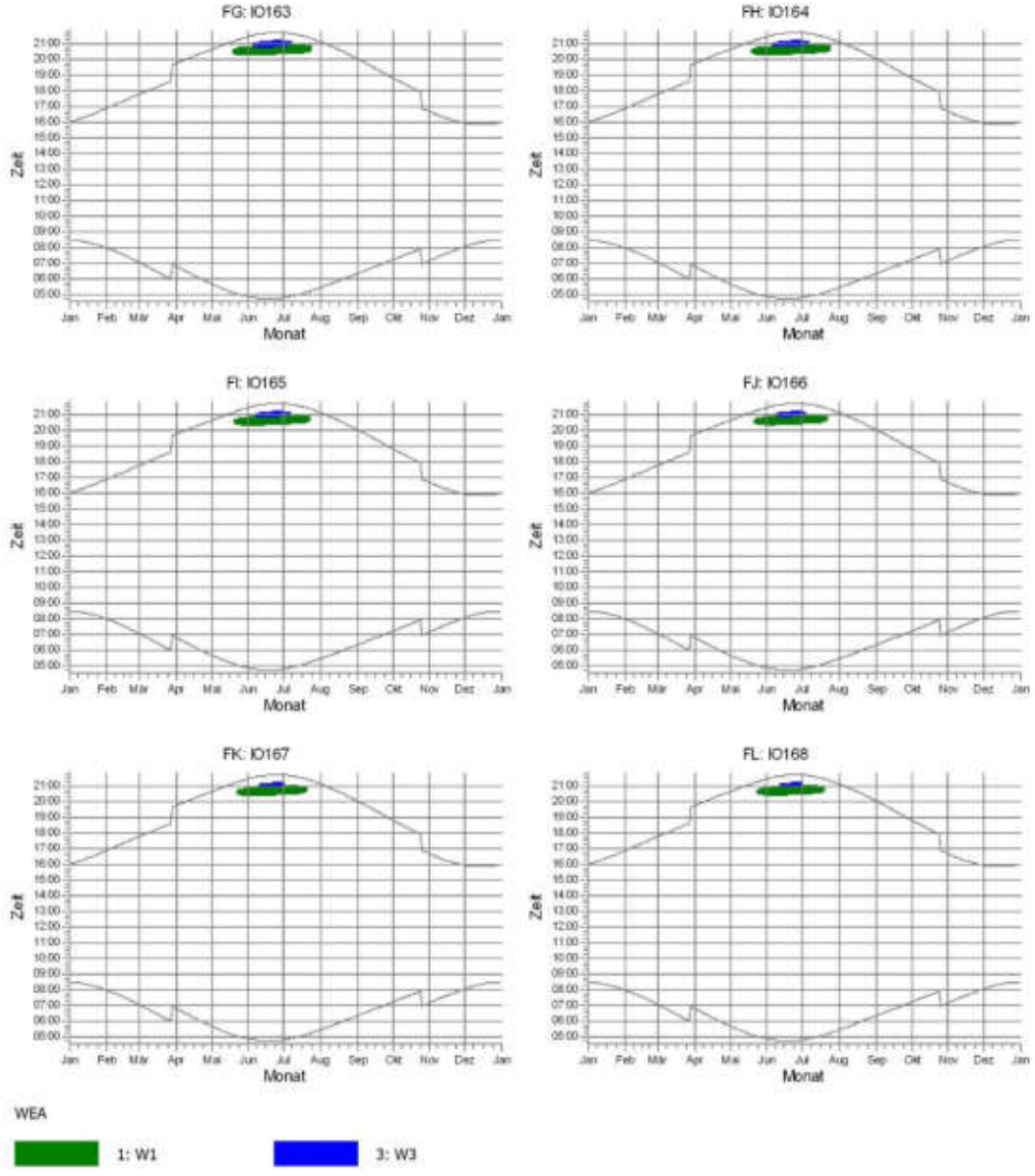
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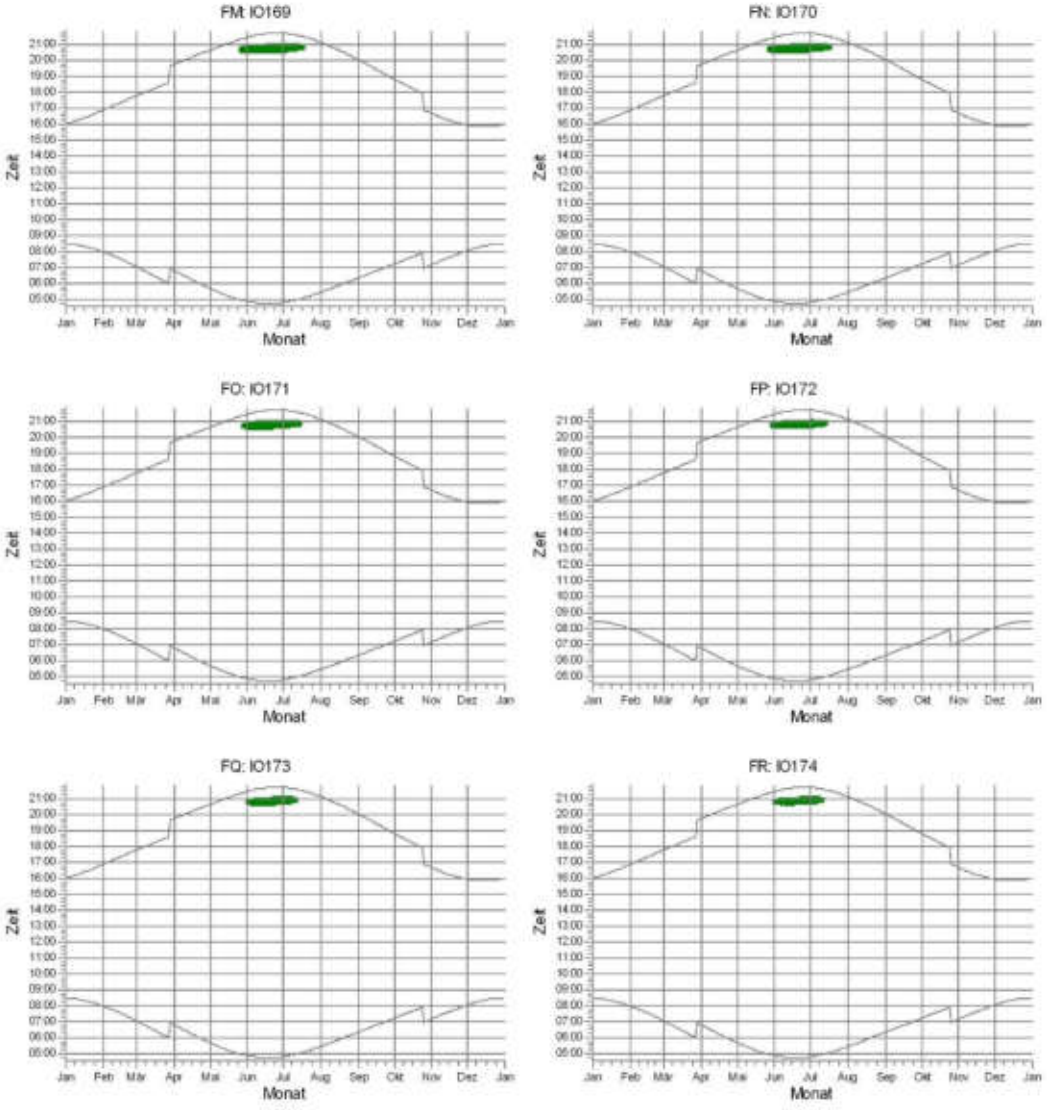
Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Grafischer Kalender

Berechnung: GB_Werder/Lübz



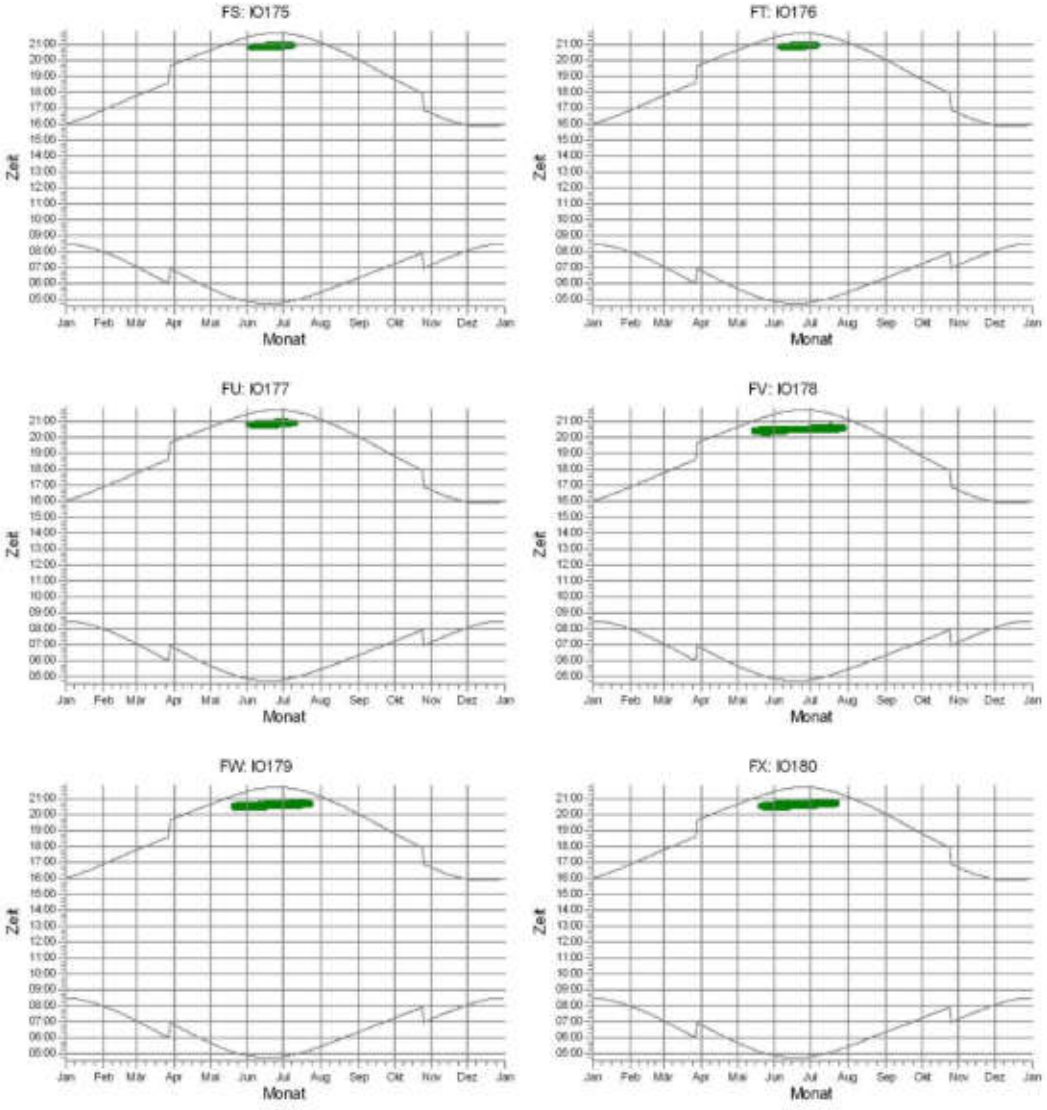
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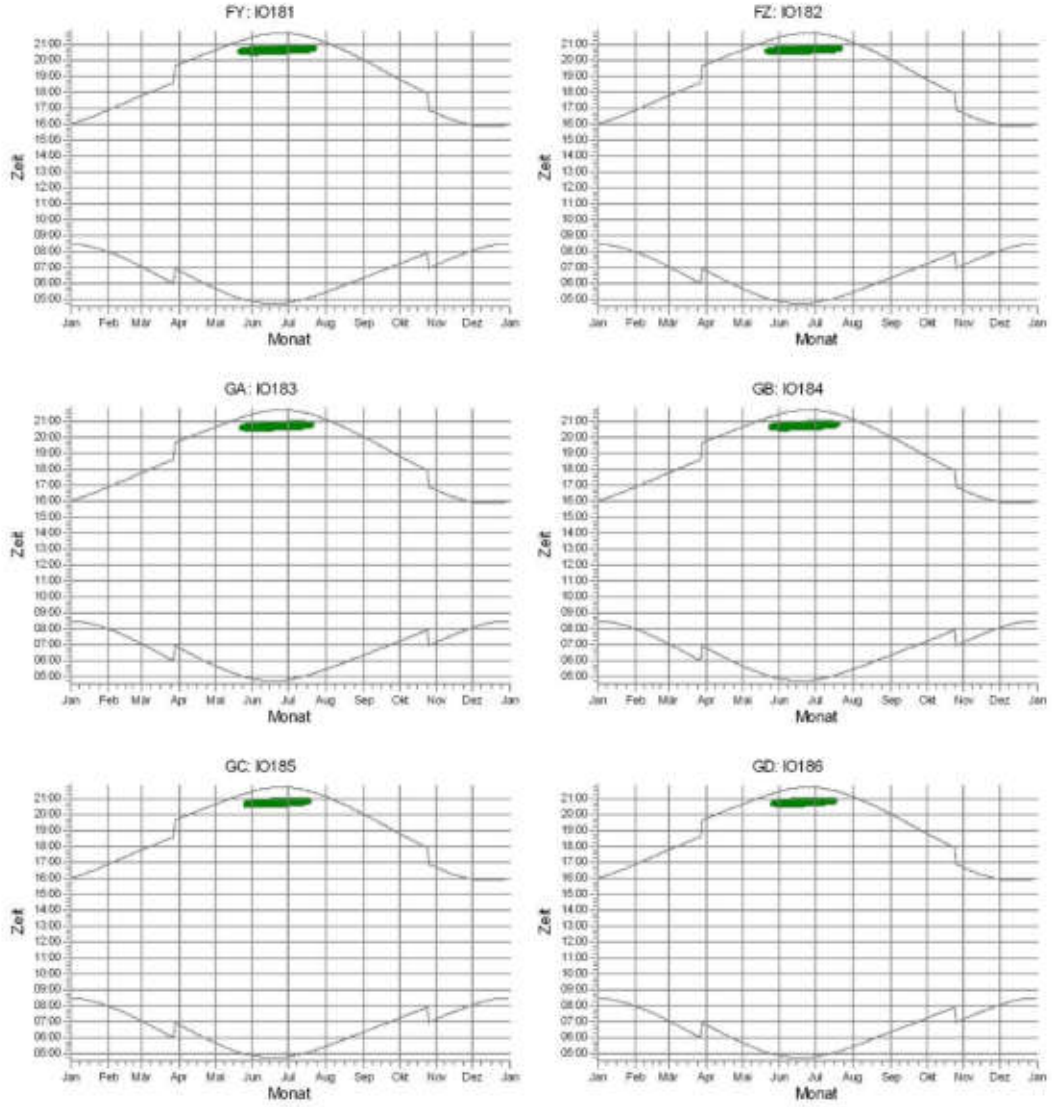
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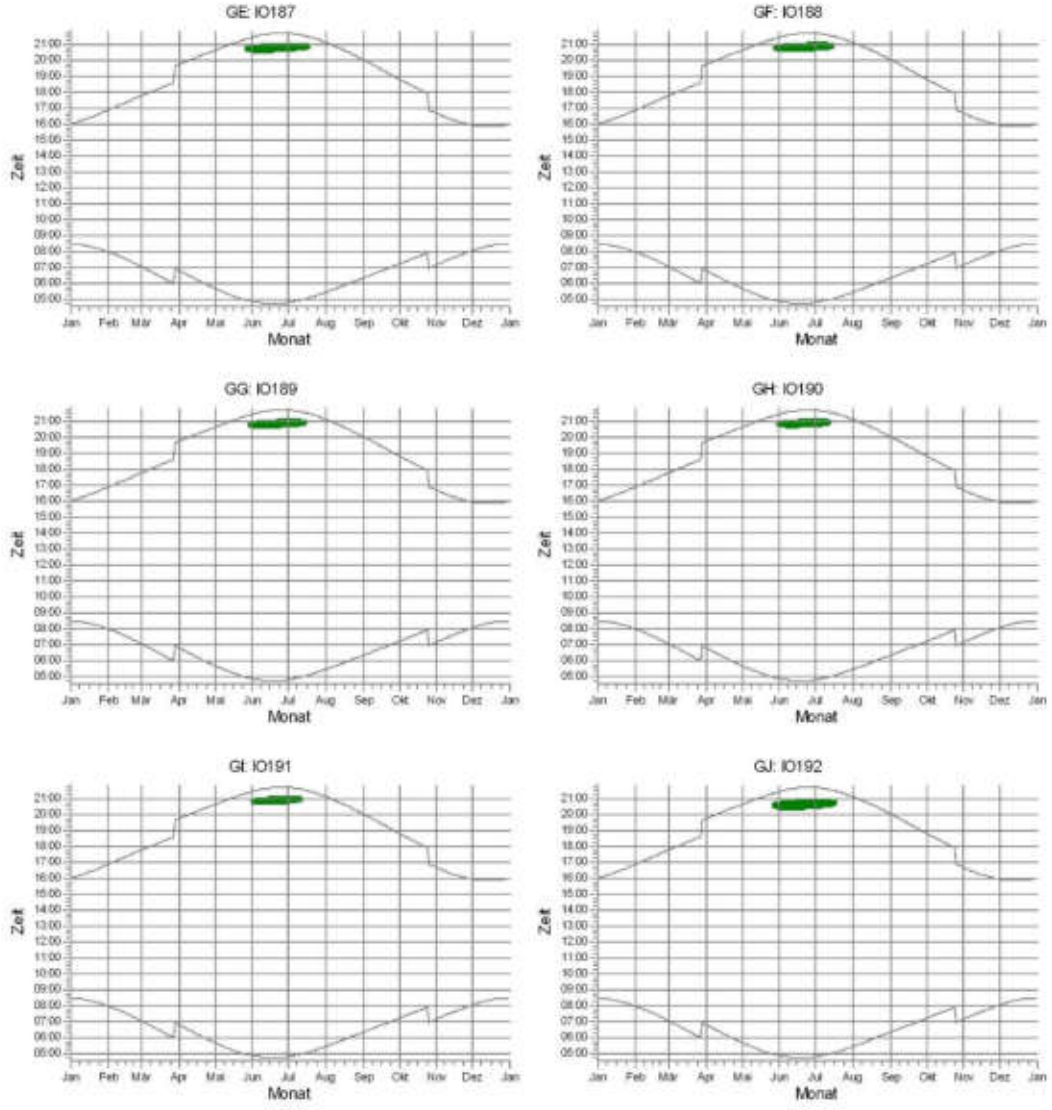
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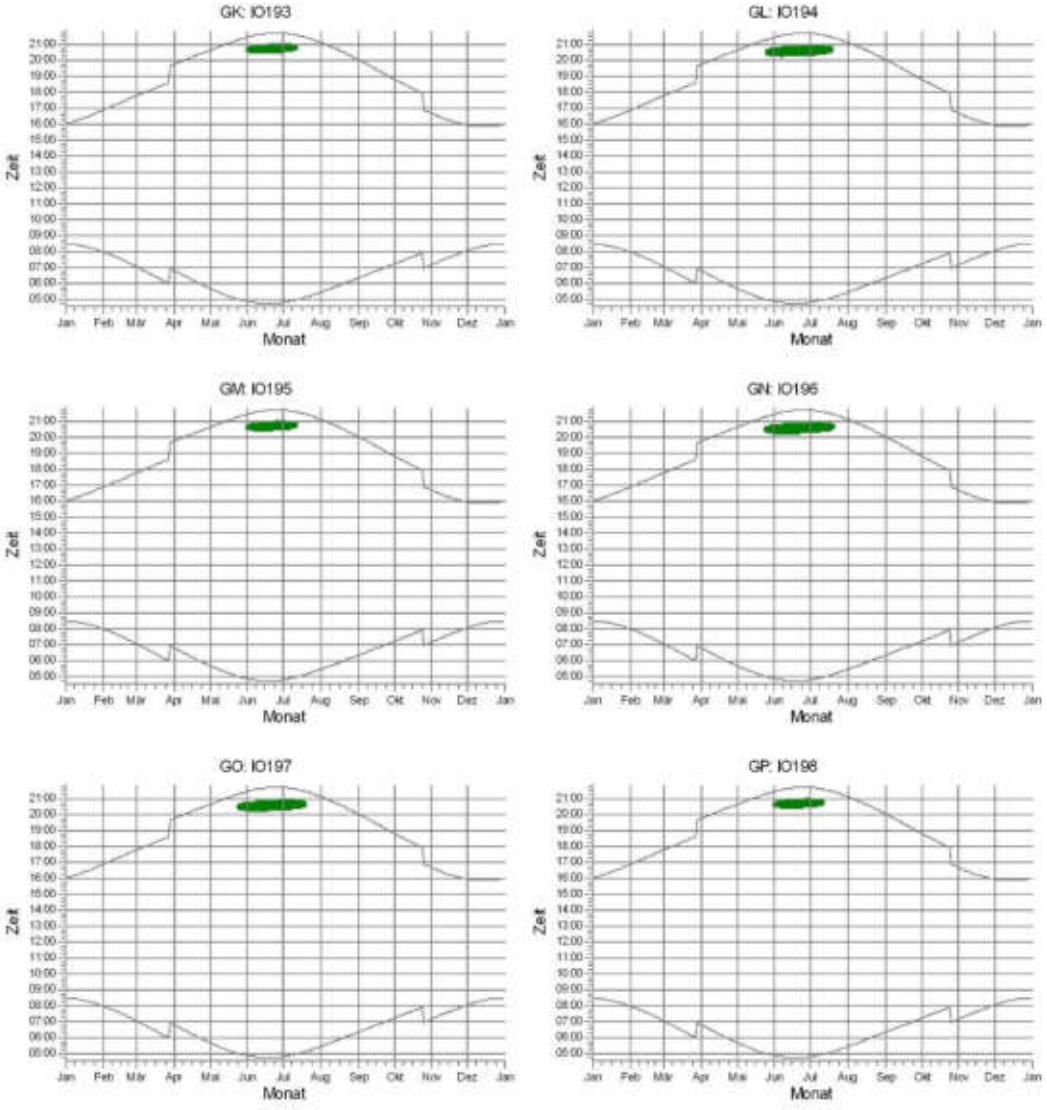
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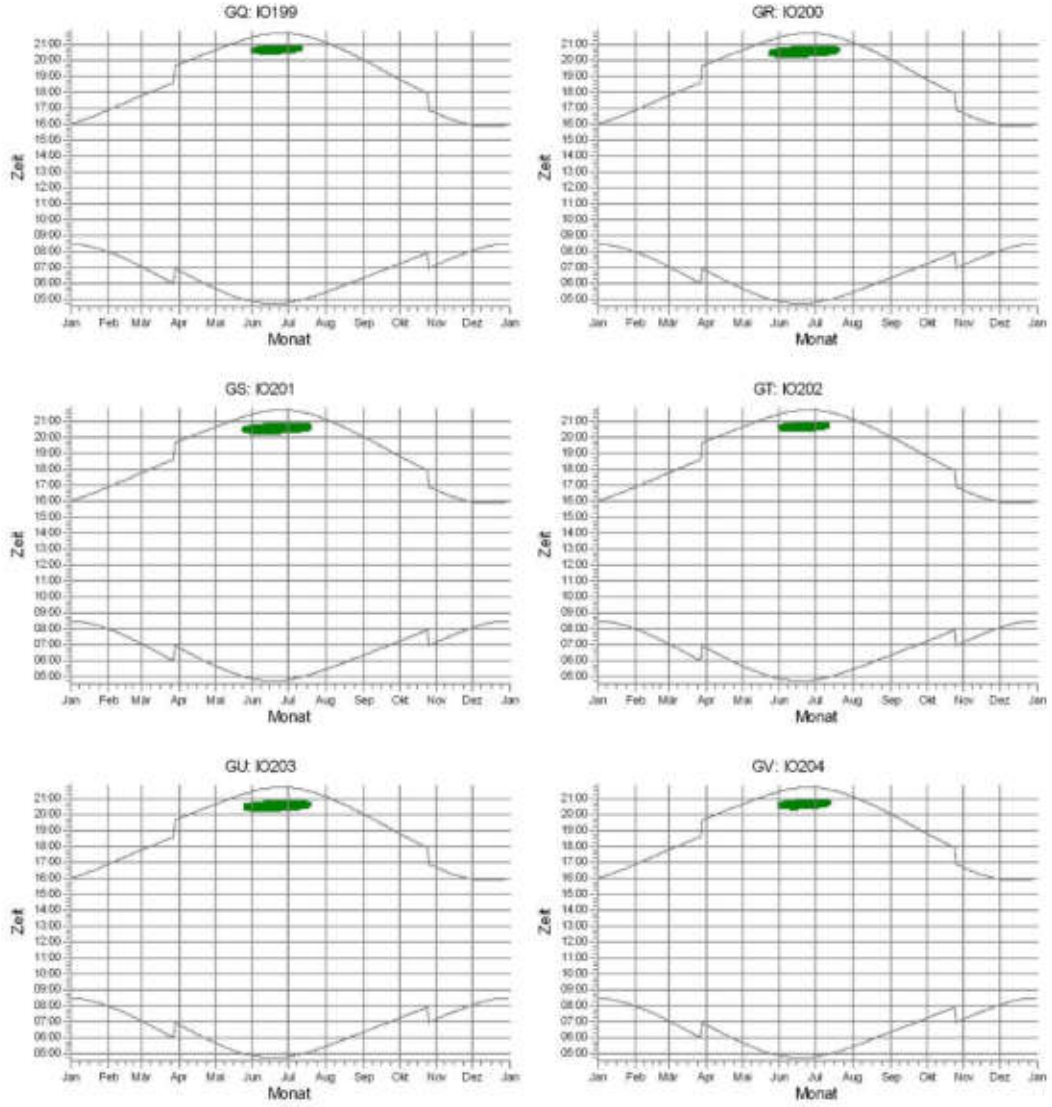
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SHADOW - Grafischer Kalender

Berechnung: GB_Werder/Lübz



Projekt:
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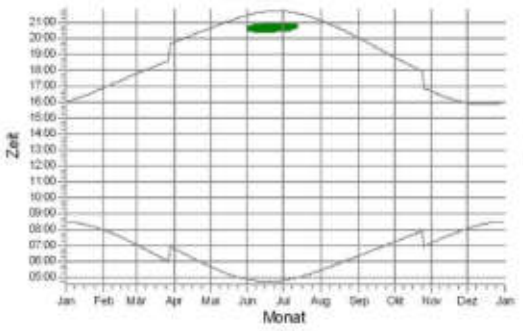
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Berechnet:
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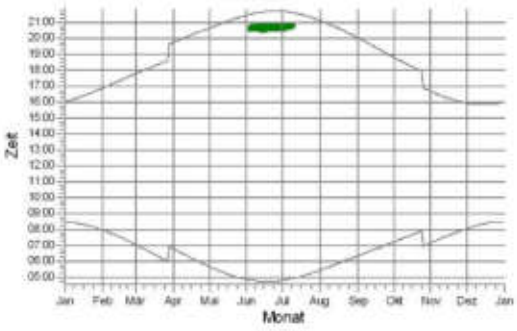
SHADOW - Grafischer Kalender

Berechnung: GB_Werder/Lübz

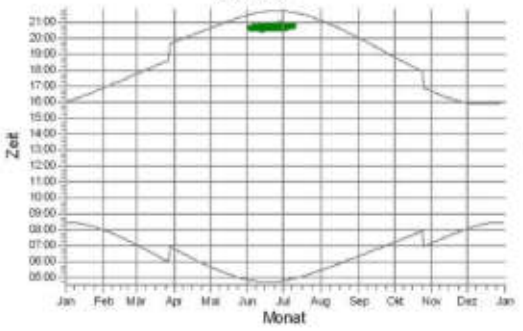
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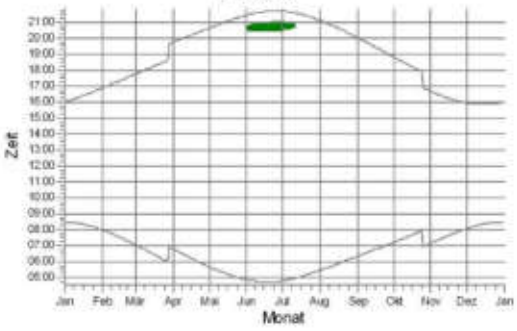
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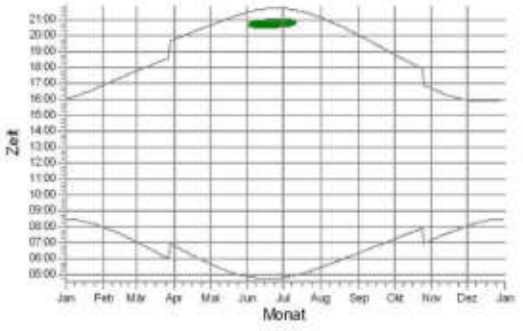
GY: IO207



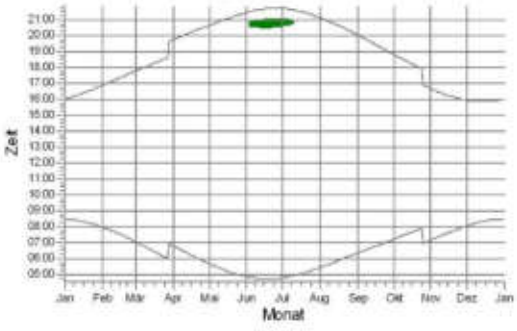
GZ: IO208



HA: IO209



HB: IO210



WEA

1: W1

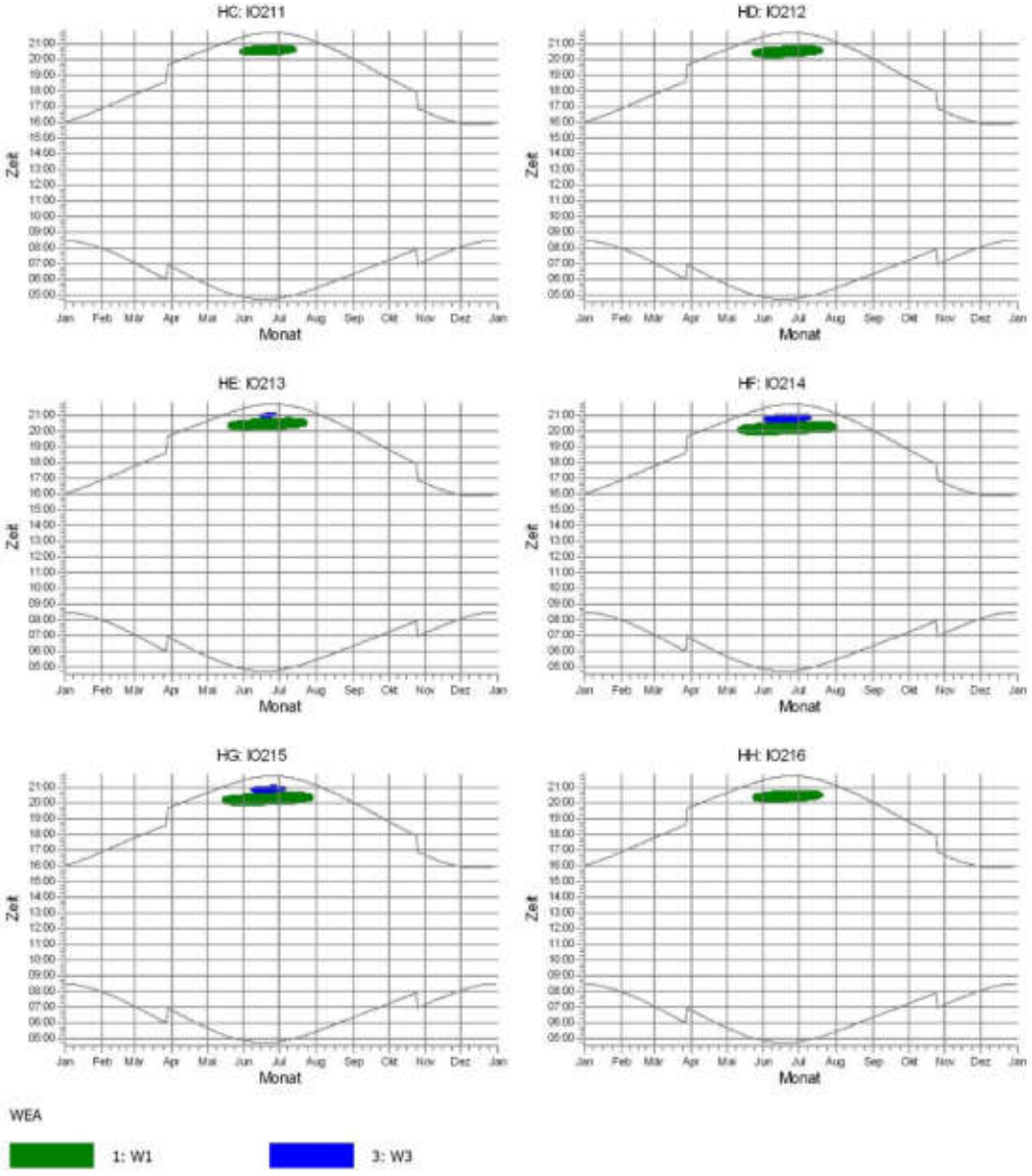
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SHADOW - Grafischer Kalender

Berechnung: GB_Werder/Lübz



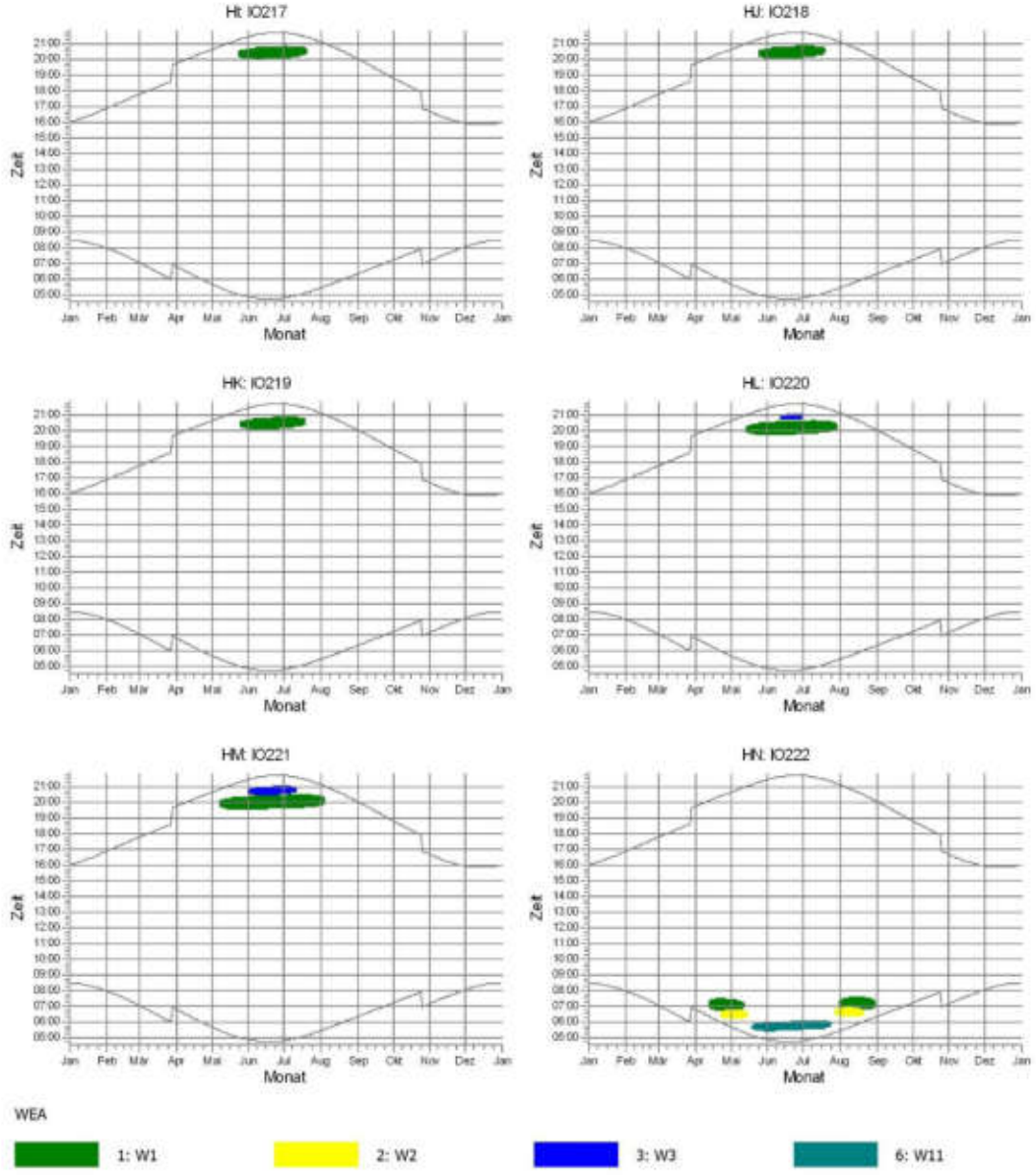
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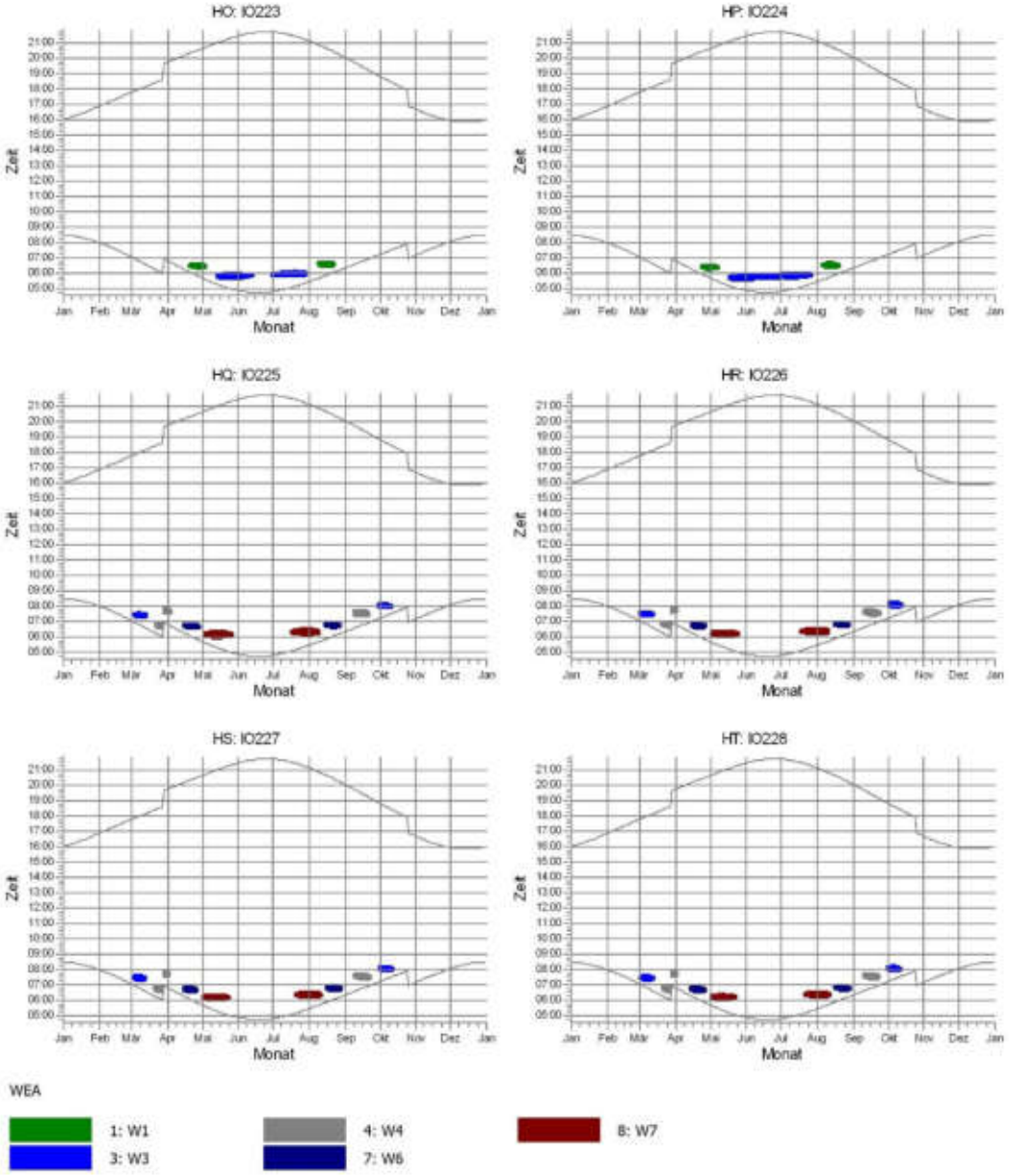
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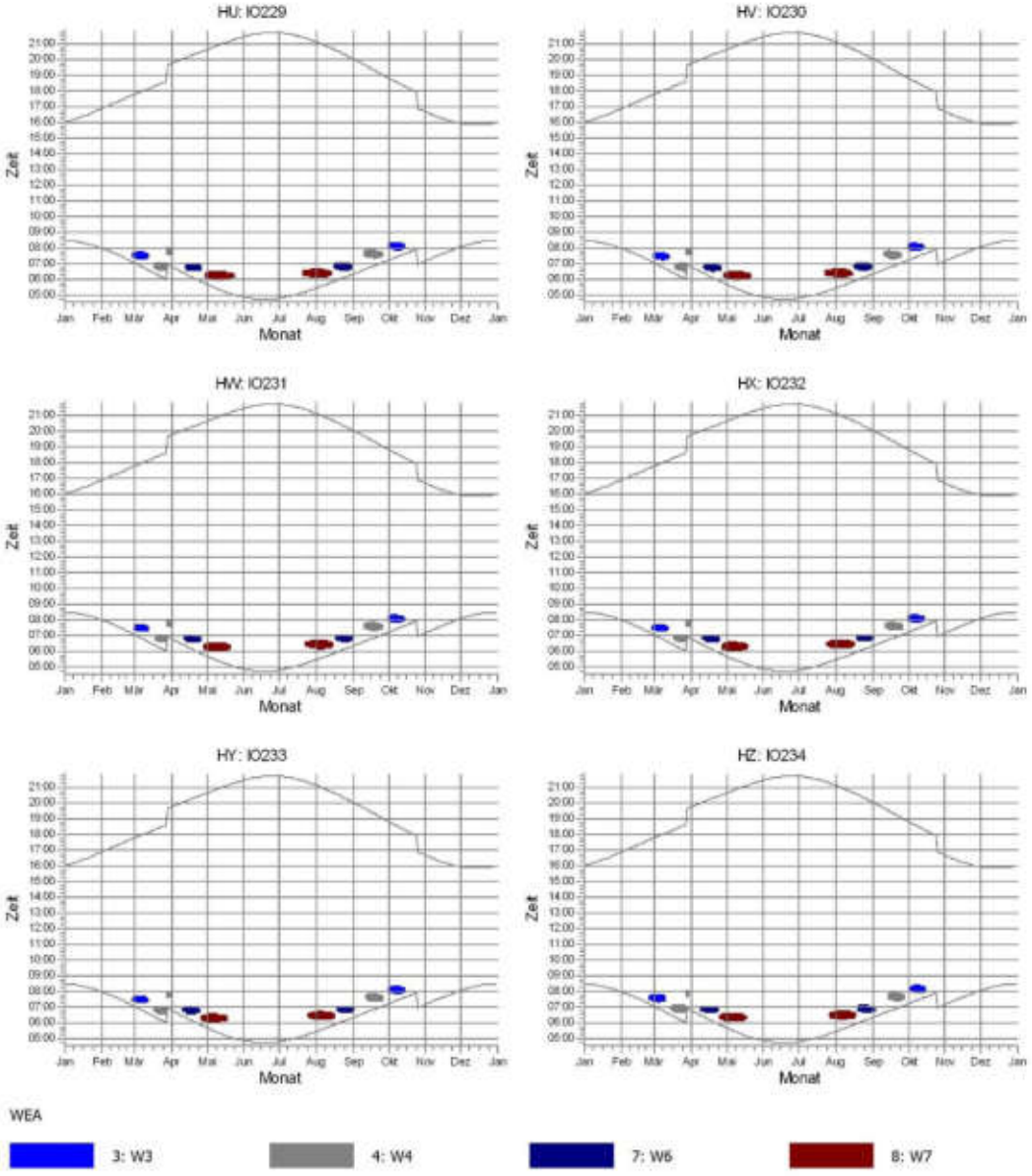
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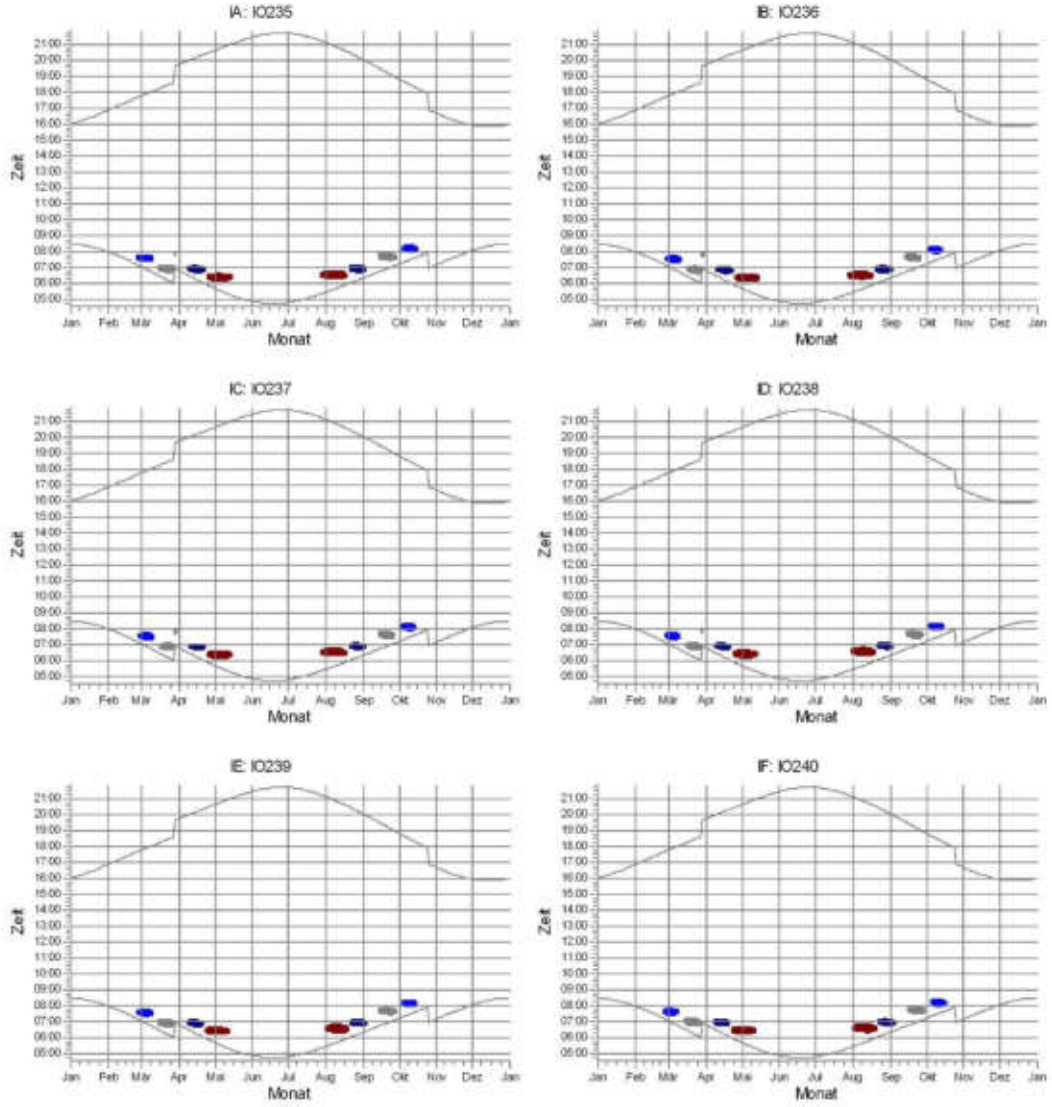
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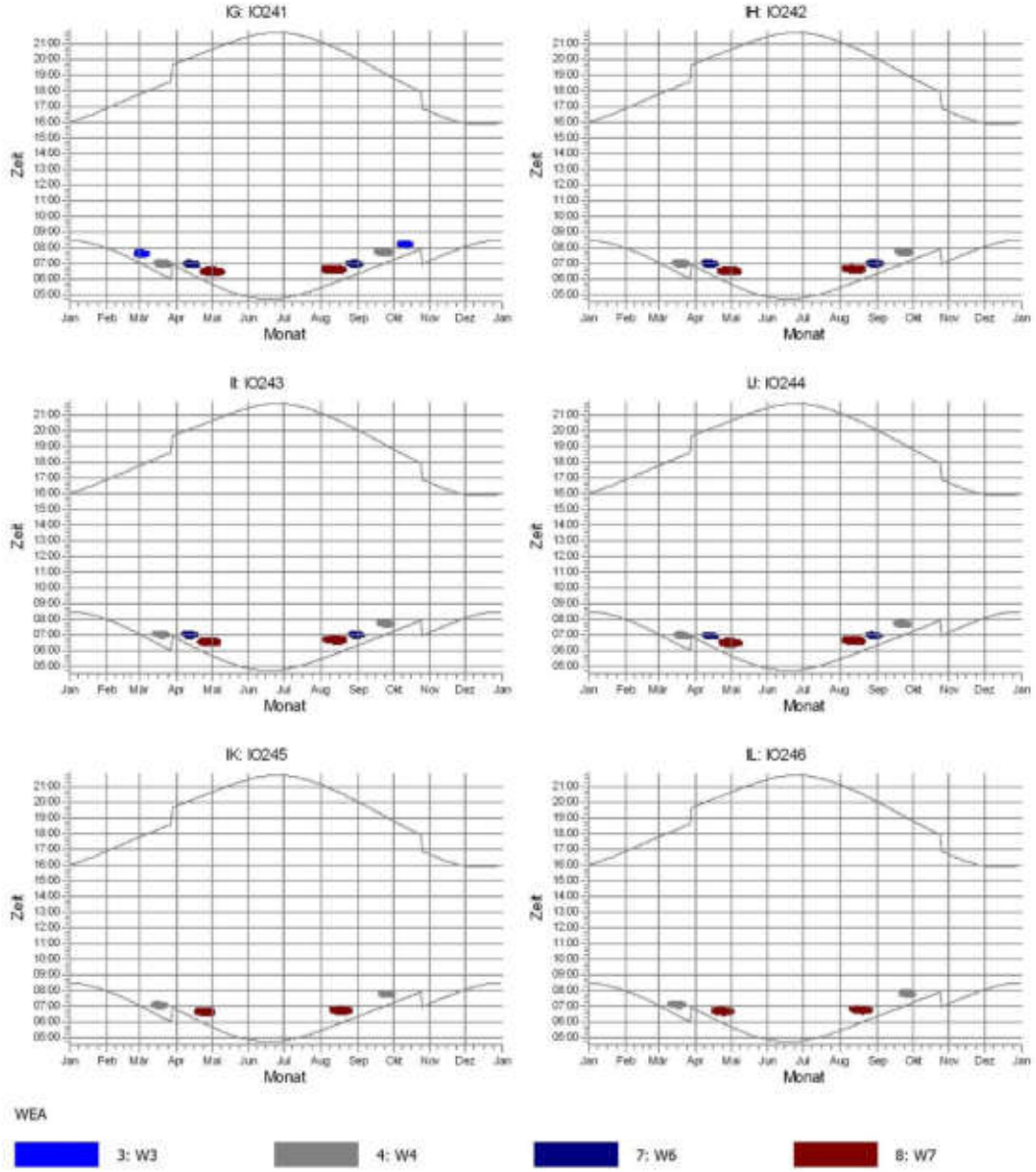
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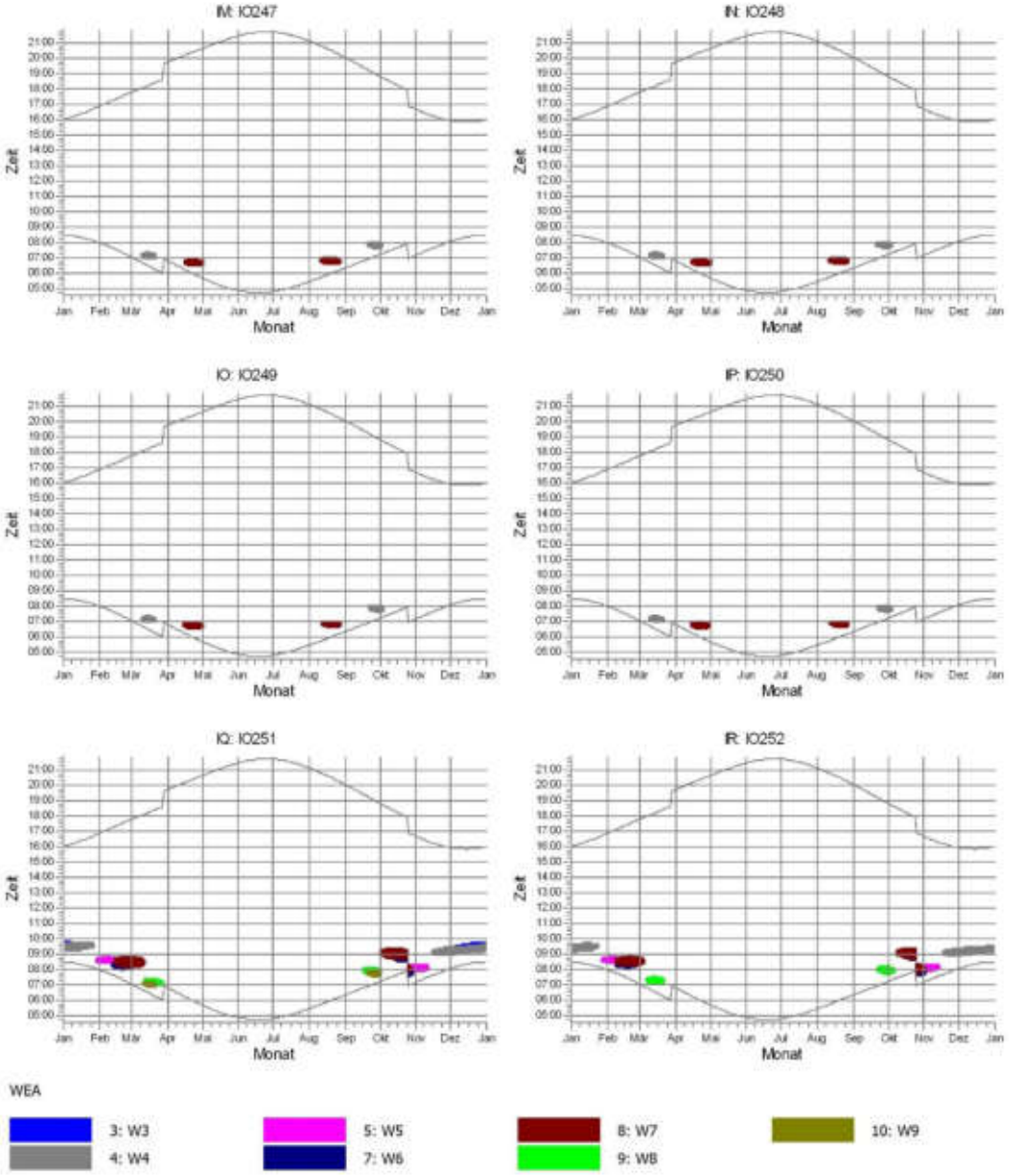
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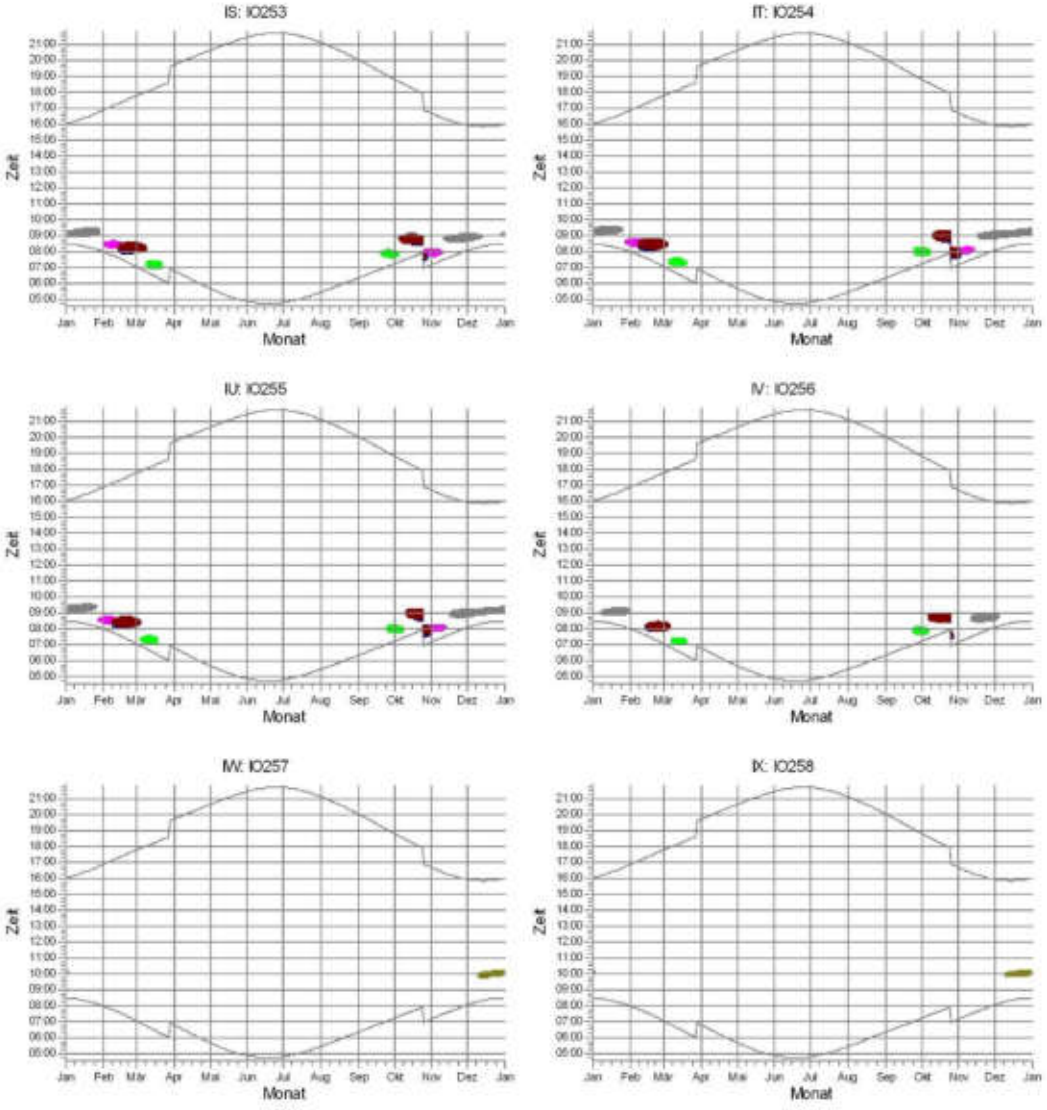
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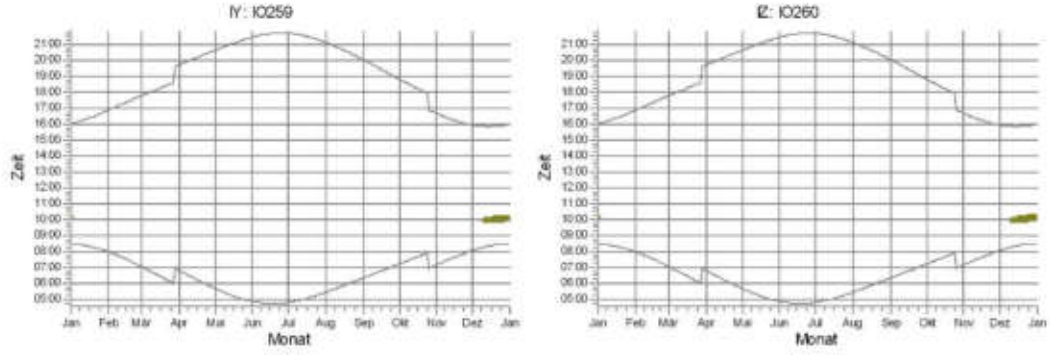
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SHADOW - Grafischer Kalender

Berechnung: GB_Werder/Lübz



WEA

10: W9

Projekt:
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SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 1 - W1

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:29 - 16:03	07:59 - 16:54	07:02 - 07:49 16:48-17:15/27	06:48 - 19:46 18:14-19:17/63	05:46 - 20:41 06:13-06:36/23 19:06-20:09/63	04:51 - 21:30 19:38-20:55/77
2	08:29 - 16:04	07:57 - 16:56	07:00 - 07:51 16:48-17:14/26	06:46 - 19:48 18:13-18:21/68	05:38 - 20:43 06:13-06:35/22 19:07-20:10/63	04:50 - 21:31 19:39-20:57/78
3	08:28 - 16:05	07:56 - 16:58	06:58 - 07:52 16:49-17:14/25	06:43 - 19:50 18:13-19:23/70	05:36 - 20:44 06:14-06:34/20 19:08-20:12/64	04:49 - 21:32 19:39-20:58/79
4	08:28 - 16:07	07:54 - 17:00	06:56 - 07:54 16:51-17:14/23	06:41 - 19:52 18:13-19:25/72	05:34 - 20:46 06:14-06:32/18 19:11-20:14/63	04:49 - 21:33 19:39-20:59/80
5	08:28 - 16:08	07:52 - 17:02	06:53 - 07:56 16:53-17:13/20	06:39 - 19:54 18:13-19:27/74	05:32 - 20:48 06:15-06:30/15 19:11-20:17/64	04:48 - 21:34 19:40-21:00/80
6	08:27 - 16:09	07:50 - 17:03	06:51 - 07:58 16:54-17:12/18	06:36 - 19:55 18:14-19:28/74	05:30 - 20:50 06:16-06:28/12 19:12-20:18/64	04:47 - 21:36 19:40-21:01/81
7	08:27 - 16:10	07:49 - 17:05	06:48 - 08:00 16:54-17:10/16	06:34 - 19:57 18:14-19:29/75	05:28 - 20:51 06:18-06:26/8 19:14-20:19/65	04:46 - 21:36 19:39-21:01/82
8	08:26 - 16:12	07:47 - 17:07	06:46 - 08:02 16:56-17:08/13	06:31 - 19:59 18:15-19:31/76	05:26 - 20:53 06:53-07:15/24 19:15-20:21/66	04:46 - 21:37 19:40-21:02/82
9	08:26 - 16:13	07:45 - 17:09	06:44 - 08:04 17:09-17:05/5	06:29 - 20:01 18:17-19:32/75	05:24 - 20:55 06:53-07:14/21 19:19-20:24/65	04:45 - 21:38 19:41-21:03/82
10	08:25 - 16:15	07:43 - 17:11	06:41 - 08:06	06:27 - 20:03 18:17-19:33/75	05:22 - 20:57 06:55-07:12/17 19:27-20:26/59	04:45 - 21:39 19:40-21:03/83
11	08:25 - 16:16	07:41 - 17:13	06:39 - 08:08	06:24 - 20:04 18:19-19:35/76	05:21 - 20:58 06:57-07:08/11 19:26-20:27/61	04:44 - 21:40 19:41-21:04/83
12	08:24 - 16:18	07:39 - 17:15	06:37 - 08:09	06:22 - 20:06 18:38-19:37/59 18:22-18:36/14	05:19 - 21:00 19:27-20:28/61	04:44 - 21:41 19:42-21:04/82
13	08:23 - 16:19	07:37 16:45-16:48/3 - 17:17	06:34 - 08:11 17:32-17:38/6	06:20 - 20:08 07:01-07:15/14 18:38-19:40/62	05:17 - 21:02 19:27-20:29/62	04:44 - 21:41 19:41-21:04/83
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15	08:21 - 16:23	07:33 16:39-16:52/13 - 17:21	06:29 - 08:15 17:25-17:43/18	06:15 - 20:12 06:58-07:20/24 18:42-19:43/61	05:14 - 21:05 19:28-20:32/64	04:43 - 21:43 19:42-21:05/83
16	08:20 - 16:24	07:31 16:38-16:54/16 - 17:23	06:27 - 08:17 17:23-17:44/21	06:13 - 20:14 06:54-07:22/28 18:45-19:44/59	05:12 - 21:07 19:29-20:34/65	04:43 - 21:43 19:42-21:05/83
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18	08:18 - 16:28	07:27 - 17:27	06:22 - 08:21 17:22-17:49/27	06:08 - 20:17 06:51-07:23/32 18:43-19:47/64	05:09 - 21:10 19:30-20:36/66	04:43 - 21:44 19:43-21:06/83
19	08:17 - 16:29	07:25 16:36-17:01/25 - 17:29	06:20 - 08:22 17:20-17:53/33	06:06 - 20:19 06:50-07:24/34 18:44-19:49/63	05:07 - 21:12 19:30-20:38/68	04:43 - 21:45 19:43-21:06/83
20	08:16 - 16:31	07:22 16:36-17:02/26 - 17:31	06:17 - 08:24 17:20-17:57/37	06:04 06:26-06:33/5 18:44-19:50/66 - 20:21 06:49-07:25/36	05:06 - 21:13 19:31-20:40/69	04:43 - 21:45 19:43-21:06/83
21	08:15 - 16:33	07:20 16:36-17:04/28 - 17:33	06:15 - 08:26 17:19-17:58/39	06:01 06:26-06:36/10 18:44-19:51/67 - 20:23 06:49-07:25/36	05:04 - 21:15 19:32-20:42/70	04:43 - 21:45 19:43-21:06/83
22	08:14 - 16:35	07:18 16:36-17:06/30 - 17:35	06:12 - 08:28 17:19-18:00/41	05:59 06:24-06:37/13 18:43-19:51/68 - 20:24 06:48-07:25/37	05:03 - 21:16 19:32-20:42/70	04:43 - 21:45 19:44-21:07/83
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24	08:11 - 16:38	07:14 16:37-17:09/32 - 17:39	06:08 - 08:32 17:19-18:01/42	05:55 06:19-06:38/19 18:44-19:56/72 - 20:28 06:46-07:25/39	05:00 - 21:19 19:35-20:45/70	04:44 - 21:46 19:44-21:07/83
25	08:10 - 16:40	07:11 16:39-17:12/33 - 17:41	06:05 - 08:33 17:18-18:05/47	05:53 06:17-06:38/21 18:45-19:58/73 - 20:30 06:46-07:25/39	04:59 - 21:21 19:36-20:47/71	04:44 - 21:46 19:45-21:08/83
26	08:08 - 16:42	07:09 16:41-17:13/32 - 17:43	06:03 - 08:35 17:17-18:07/50	05:50 06:15-06:38/23 18:46-20:00/74 - 20:32 06:46-07:25/39	04:58 - 21:22 19:37-20:48/71	04:45 - 21:46 19:44-21:07/83
27	08:07 - 16:44	07:07 16:42-17:13/31 - 17:45	06:00 - 08:37 17:17-18:11/54	05:48 06:14-06:38/24 18:47-20:02/75 - 20:34 06:46-07:24/38	04:56 - 21:23 19:38-20:50/72	04:45 - 21:45 19:45-21:08/83
28	08:05 - 16:46	07:05 16:46-17:14/28 - 17:47	05:58 - 08:39 17:15-18:12/57	05:46 06:13-06:38/25 18:48-20:03/75 - 20:35 06:46-07:24/38	04:55 - 21:25 19:38-20:51/73	04:46 - 21:45 19:45-21:08/83
29	08:04 - 16:48		06:55 - 19:41 18:15-19:14/59	05:44 06:13-06:37/24 18:50-20:06/76 - 20:37 06:46-07:24/38	04:54 - 21:26 19:38-20:52/74	04:46 - 21:45 19:45-21:08/83
30	08:03 - 16:50		06:53 - 19:43 18:14-19:16/62	05:42 06:13-06:37/24 18:52-20:08/76 - 20:39 06:46-07:23/37	04:53 - 21:27 19:38-20:54/76	04:47 - 21:45 19:45-21:07/82
31	08:01 - 16:52		06:51 - 19:44 18:14-19:17/63		04:52 - 21:29 19:38-20:54/76	
Sonnenscheinstunden	252	274	367	419	492	508
Anzahl Minuten mit Schatten	0	379	908	2898	2506	2460

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten
	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 1 - W1

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November	Dezember
1	04:47	19:45-21:08/83	05:27	07:11-07:16/5	06:20	18:18-19:33/75	07:12		07:10	08:04
	21:45		21:10	19:37-20:38/61	20:04		18:51		16:42	15:58
2	04:48	19:46-21:08/82	05:28	07:06-07:20/14	06:22	18:16-19:31/75	07:14		07:12	08:06
	21:44		21:08	19:37-20:37/60	20:02		18:49		16:40	15:57
3	04:49	19:45-21:07/82	05:30	07:05-07:23/18	06:23	18:14-19:29/75	07:16		07:14	08:07
	21:44		21:06	19:37-20:36/59	20:00		18:47		16:38	15:57
4	04:50	19:45-21:07/82	05:31	07:02-07:24/22	06:25	18:12-19:28/76	07:18		07:16	08:08
	21:43		21:05	19:27-20:33/66	19:57		18:44		16:36	15:56
5	04:50	19:46-21:07/81	05:33	06:30-06:34/4 19:25-20:31/66	06:27	18:11-19:26/75	07:20	17:34-17:44/10	07:17	08:10
	21:43		21:03	07:01-07:26/25	19:55		18:42		16:34	15:55
6	04:51	19:46-21:07/81	05:35	06:27-06:37/10 19:22-20:28/66	06:29	18:09-19:24/75	07:21	17:32-17:46/14	07:19	08:11
	21:42		21:01	07:00-07:28/28	19:52		18:39		16:32	15:55
7	04:52	19:46-21:07/81	05:37	06:25-06:38/13 19:21-20:27/66	06:30	18:09-19:22/73	07:23	17:29-17:47/18	07:21	08:13
	21:42		20:59	06:59-07:28/29	19:50		18:37		16:30	15:54
8	04:53	19:46-21:06/80	05:38	06:24-06:40/16 19:20-20:25/65	06:32	18:08-19:20/72	07:25	17:28-17:47/19	07:23	08:14
	21:41		20:57	06:58-07:29/31	19:48		18:35		16:29	15:54
9	04:54	19:46-21:06/80	05:40	06:23-06:41/18 19:19-20:22/63	06:34	18:06-19:17/71	07:27	17:27-17:48/21	07:25	08:15
	21:40		20:55	06:56-07:29/33	19:45		18:32		16:27	15:54
10	04:55	19:47-21:05/78	05:42	06:22-06:43/21 19:17-20:20/63	06:36	18:06-19:14/68	07:29	17:24-17:48/24	07:27	08:16
	21:39		20:53	06:56-07:30/34	19:43		18:30		16:25	15:53
11	04:57	19:47-21:04/77	05:43	06:22-06:45/23 19:15-20:18/63	06:37	18:06-19:10/64	07:30	17:23-17:48/25	07:29	08:17
	21:38		20:51	06:56-07:31/35	19:40		18:28		16:23	15:53
12	04:58	19:47-21:03/76	05:45	06:21-06:45/24 19:02-20:17/75	06:39	18:05-19:08/63	07:32	17:21-17:48/27	07:31	08:18
	21:38		20:49	06:55-07:31/36	19:38		18:25		16:22	15:53
13	04:59	19:47-21:02/75	05:47	06:21-06:45/24 18:59-20:16/77	06:41	18:05-19:07/62	07:34	17:21-17:48/27	07:33	08:20
	21:37		20:47	06:54-07:32/38	19:35		18:23		16:20	15:53
14	05:00	19:47-21:01/74	05:49	06:22-06:46/24 18:57-20:13/76	06:43	18:05-19:05/60	07:36	17:17-17:47/30	07:35	08:21
	21:36		20:45	06:53-07:31/38	19:33		18:21		16:18	15:53
15	05:01	19:47-21:00/73	05:50	06:21-06:46/25 18:55-20:10/75	06:44	18:05-19:03/58	07:38	17:14-17:46/32	07:36	08:21
	21:35		20:43	06:53-07:32/39	19:31		18:18		16:17	15:53
16	05:03	19:47-20:59/72	05:52	06:22-06:46/24 18:54-20:09/75	06:46	18:05-19:00/55	07:40	17:13-17:45/32	07:38	08:22
	21:33		20:41	06:53-07:32/39	19:28		18:16		16:15	15:53
17	05:04	19:47-20:59/72	05:54	06:22-06:45/23 18:52-20:06/74	06:48	18:06-18:57/51	07:41	17:11-17:43/32	07:40	08:23
	21:32		20:38	06:53-07:31/38	19:26		18:14		16:14	15:53
18	05:05	19:47-20:57/70	05:56	06:24-06:45/21 18:51-20:04/73	06:50	18:06-18:54/48	07:43	17:08-17:40/32	07:42	08:24
	21:31		20:36	06:53-07:31/38	19:23		18:11		16:13	15:53
19	05:07	19:45-20:56/71	05:57	06:26-06:44/18 18:51-20:03/72	06:51	18:06-18:48/42	07:45	17:07-17:37/30	07:44	08:25
	21:30		20:34	06:53-07:31/38	19:21		18:09		16:11	15:54
20	05:08	19:45-20:55/70	05:59	06:27-06:43/16 18:49-20:00/71	06:53	18:05-18:47/42	07:47	17:07-17:36/29	07:46	08:25
	21:29		20:32	06:52-07:30/38	19:18		18:07		16:10	15:54
21	05:09	19:43-20:54/71	06:01	06:29-06:42/13 18:49-19:57/68	06:55	18:05-18:46/41	07:49	17:06-17:34/28	07:47	08:26
	21:27		20:30	06:53-07:30/37	19:16		18:05		16:08	15:54
22	05:11	19:42-20:52/70	06:02	06:31-06:40/9 18:48-19:55/67	06:57	18:05-18:44/39	07:51	17:06-17:32/26	07:49	08:27
	21:26		20:27	06:53-07:30/37	19:13		18:03		16:07	15:55
23	05:12	19:42-20:51/69	06:04	06:32-06:36/4 18:47-19:54/67	06:58	18:04-18:41/37	07:53	17:06-17:30/24	07:51	08:27
	21:24		20:25	06:53-07:28/35	19:11		18:00		16:06	15:55
24	05:14	19:41-20:49/68	06:06	06:54-07:28/34	07:00	18:04-18:38/34	07:55	17:06-17:28/22	07:53	08:27
	21:23		20:23	18:47-19:52/65	19:08		17:58		16:05	15:56
25	05:15	19:40-20:47/67	06:08	06:55-07:27/32	07:02	18:04-18:32/28	06:56	16:07-16:25/18	07:54	08:28
	21:22		20:21	18:46-19:50/64	19:06		16:56		16:04	15:57
26	05:17	19:40-20:46/66	06:09	06:55-07:25/30	07:04	18:05-18:30/25	06:58	16:08-16:24/16	07:56	08:28
	21:20		20:18	18:46-19:48/62	19:04		16:54		16:03	15:57
27	05:19	19:39-20:45/66	06:11	06:56-07:24/28	07:05	18:05-18:26/21	07:00	16:10-16:22/12	07:58	08:28
	21:18		20:16	18:47-19:46/59	19:01		16:52		16:02	15:58
28	05:20	19:39-20:44/65	06:13	06:58-07:22/24	07:07	18:06-18:25/19	07:02	16:11-16:20/9	07:59	08:29
	21:17		20:14	18:43-19:44/61	18:59		16:50		16:01	15:59
29	05:22	19:38-20:42/64	06:15	06:59-07:19/20	07:09	18:07-18:23/16	07:04		08:01	08:29
	21:15		20:11	18:40-19:42/62	18:56		16:48		16:00	16:00
30	05:23	19:38-20:40/62	06:16	07:02-07:16/14	07:11	18:10-18:20/10	07:06		08:02	08:29
	21:13		20:09	18:39-19:40/61	18:54		16:46		15:59	16:01
31	05:25	19:37-20:39/62	06:18	18:37-19:36/59			07:08			08:29
	21:12		20:07	18:21-18:35/14			16:44			16:02
Sonnenscheinstunden	510		459		382		329		260	235
Anzahl Minuten mit Schatten	2270		3312		1550		557		0	0

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten
	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 2 - W2

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar		März		April		Mai		Juni	
1	08:29	07:59		07:02	16:36-17:21/45	06:48		05:40	06:16-06:43/27	04:51	18:46-20:47/121
	16:03	16:54		17:49		19:46		20:41	18:51-20:05/74	21:30	
2	08:29	07:57		07:00	16:36-17:23/47	06:46		05:38	06:16-06:43/27	04:50	18:47-20:49/122
	16:04	16:56		17:50		19:48		20:43	18:52-20:05/73	21:31	
3	08:28	07:56		06:58	16:37-17:25/48	06:43	18:52-19:06/14	05:36	06:16-06:43/27	04:49	18:47-20:50/123
	16:05	16:58		17:52		19:50		20:44	18:54-20:07/73	21:32	
4	08:28	07:54		06:55	16:38-17:27/49	06:41	18:48-19:08/20	05:34	06:17-06:43/26	04:49	18:47-20:50/123
	16:06	17:00		17:54		19:52		20:46	18:55-20:08/73	21:33	
5	08:28	07:52		06:53	16:38-17:28/50	06:39	18:46-19:10/24	05:32	06:16-06:43/27	04:48	18:48-20:52/124
	16:08	17:01		17:56		19:54		20:48	18:56-20:10/74	21:34	
6	08:27	07:50		06:51	16:40-17:30/50	06:36	18:45-19:12/27	05:30	06:16-06:42/26	04:47	18:48-20:53/125
	16:09	17:03		17:58		19:55		20:50	18:56-20:11/75	21:35	
7	08:27	07:49		06:48	16:41-17:31/50	06:34	18:42-19:12/30	05:28	06:16-06:42/26	04:46	18:48-20:53/125
	16:10	17:05		18:00		19:57		20:51	18:56-20:12/76	21:36	
8	08:26	07:47		06:46	16:43-17:33/50	06:31	18:41-19:21/40	05:26	06:17-06:41/24	04:46	18:48-20:55/127
	16:12	17:07		18:02		19:59		20:53	18:54-20:13/79	21:37	
9	08:26	07:45		06:44	16:46-17:34/48	06:29	18:41-19:25/44	05:24	06:18-06:41/23	04:45	18:49-20:56/127
	16:13	17:09		18:04		20:01		20:55	18:54-20:19/85	21:38	
10	08:25	07:43		06:41	16:50-17:34/44	06:27	18:39-19:26/47	05:22	06:18-06:40/22	04:45	18:49-20:56/127
	16:15	17:11		18:06		20:03		20:57	18:52-20:20/88	21:39	
11	08:25	07:41		06:39	16:50-17:35/45	06:24	18:38-19:28/50	05:21	06:19-06:38/19	04:44	18:49-20:57/128
	16:16	17:13		18:08		20:04		20:58	18:51-20:21/90	21:40	
12	08:24	07:39		06:37	16:50-17:34/44	06:22	18:38-19:29/51	05:19	06:20-06:38/18	04:44	18:50-20:58/128
	16:18	17:15		18:09		20:06		21:00	18:51-20:23/92	21:41	
13	08:23	07:37		06:34	16:51-17:34/43	06:20	18:37-19:29/52	05:17	06:21-06:36/15	04:44	18:49-20:58/129
	16:19	17:17		18:11		20:08		21:02	18:50-20:23/93	21:41	
14	08:22	07:35		06:32	16:52-17:33/41	06:17	18:37-19:30/53	05:15	06:24-06:35/11	04:43	18:50-20:59/129
	16:21	17:19		18:13		20:10		21:03	18:50-20:25/95	21:42	
15	08:21	07:33		06:29	16:53-17:33/40	06:15	18:37-19:31/54	05:14	06:26-06:31/5	04:43	18:50-21:00/130
	16:22	17:21		18:15		20:12		21:05	18:49-20:25/96	21:43	
16	08:20	07:31		06:27	16:55-17:32/37	06:13	18:37-19:39/62	05:12	18:49-20:27/98	04:43	18:50-21:01/131
	16:24	17:23		18:17		20:14		21:07		21:43	
17	08:19	07:29		06:25	16:57-17:31/34	06:10	18:36-19:41/65	05:10	18:48-20:28/100	04:43	18:50-21:01/131
	16:26	17:25		18:19		20:15		21:08		21:44	
18	08:18	07:27		06:22	16:58-17:30/32	06:08	18:36-19:43/67	05:09	18:48-20:31/103	04:43	18:51-21:02/131
	16:28	17:27		18:21		20:17		21:10		21:44	
19	08:17	07:25	16:47-16:54/7	06:20	16:58-17:27/29	06:06	18:37-19:45/68	05:07	18:47-20:32/105	04:43	18:51-21:02/131
	16:29	17:29		18:22		20:19		21:12		21:44	
20	08:16	07:22	16:43-17:01/18	06:17	16:59-17:23/24	06:04	18:37-19:47/70	05:06	18:47-20:33/106	04:43	18:51-21:02/131
	16:31	17:31		18:24		20:21		21:13		21:45	
21	08:15	07:20	16:41-17:05/24	06:15	17:00-17:20/20	06:01	18:38-19:49/71	05:04	18:47-20:34/107	04:43	18:51-21:02/131
	16:33	17:33		18:26		20:23		21:15		21:45	
22	08:14	07:18	16:40-17:07/27	06:12	17:02-17:19/17	05:59	18:38-19:49/71	05:03	18:46-20:34/108	04:43	18:52-21:03/131
	16:35	17:35		18:28		20:24		21:16		21:45	
23	08:12	07:16	16:39-17:09/30	06:10	17:04-17:15/11	05:57	06:28-06:34/6	05:02	18:46-20:36/110	04:43	18:52-21:03/131
	16:36	17:37		18:30		20:26	18:39-19:52/73	21:18		21:45	
24	08:11	07:14	16:37-17:10/33	06:08		05:55	06:24-06:37/13	05:00	18:46-20:38/112	04:44	18:52-21:03/131
	16:38	17:39		18:32		20:28	18:40-19:54/74	21:19		21:46	
25	08:10	07:11	16:37-17:12/35	06:05		05:52	06:22-06:39/17	04:59	18:46-20:39/113	04:44	18:53-21:04/131
	16:40	17:41		18:33		20:30	18:41-19:56/75	21:21		21:46	
26	08:08	07:09	16:37-17:16/39	06:03		05:50	06:21-06:40/19	04:58	18:46-20:40/114	04:44	18:52-21:03/131
	16:42	17:43		18:35		20:32	18:43-19:58/75	21:22		21:46	
27	08:07	07:07	16:36-17:17/41	06:00		05:48	06:19-06:41/22	04:56	18:46-20:41/115	04:45	18:53-21:03/130
	16:44	17:45		18:37		20:34	18:45-19:59/74	21:23		21:45	
28	08:05	07:05	16:36-17:19/43	05:58		05:46	06:18-06:42/24	04:55	18:46-20:41/115	04:45	18:53-21:02/129
	16:46	17:47		18:39		20:35	18:47-20:01/74	21:25		21:45	
29	08:04			06:55		05:44	06:18-06:43/25	04:54	18:47-20:42/115	04:46	18:53-21:02/129
	16:48			19:41		20:37	18:48-20:02/74	21:26		21:45	
30	08:02			06:53		05:42	06:17-06:43/26	04:53	18:47-20:44/117	04:47	18:53-21:01/128
	16:50			19:43		20:39	18:49-20:03/74	21:27		21:45	
31	08:01			06:51				04:52	18:47-20:46/119		
	16:52			19:44				21:29			
Sonnenscheinstunden	252	274		367		419		492		508	
Anzahl Minuten mit Schatten	0	297		898		1725		3316		3845	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten
	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 2 - W2

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November	Dezember
1	04:47	18:53-21:01/128	05:26	06:30-06:49/19	06:20	18:37-19:27/50	07:12	17:29-18:13/44	07:10	08:04
	21:45		21:10	19:02-20:33/91	20:04		18:51		16:42	15:58
2	04:48	18:54-21:01/127	05:28	06:29-06:49/20	06:22	18:38-19:25/47	07:14	17:28-18:13/45	07:12	08:06
	21:44		21:08	19:02-20:31/89	20:02		18:49		16:40	15:57
3	04:49	18:53-21:00/127	05:30	06:28-06:50/22	06:23	18:38-19:22/44	07:16	17:28-18:12/44	07:14	08:07
	21:44		21:06	19:03-20:30/87	20:00		18:47		16:38	15:57
4	04:50	18:54-21:00/126	05:31	06:27-06:51/24	06:25	18:38-19:18/40	07:18	17:25-18:11/46	07:16	08:08
	21:43		21:05	19:04-20:27/83	19:57		18:44		16:36	15:56
5	04:50	18:54-21:00/126	05:33	06:27-06:51/24	06:27	18:39-19:10/31	07:20	17:21-18:10/49	07:17	08:10
	21:43		21:03	19:05-20:22/77	19:55		18:42		16:34	15:55
6	04:51	18:54-20:59/125	05:35	06:27-06:52/25	06:29	18:40-19:07/27	07:21	17:19-18:09/50	07:19	08:11
	21:42		21:01	19:06-20:21/75	19:52		18:39		16:32	15:55
7	04:52	18:54-20:59/125	05:37	06:26-06:52/26	06:30	18:41-19:06/25	07:23	17:16-18:06/50	07:21	08:13
	21:42		20:59	19:06-20:20/74	19:50		18:37		16:30	15:54
8	04:53	18:55-20:58/123	05:38	06:26-06:52/26	06:32	18:43-19:03/20	07:25	17:14-18:04/50	07:23	08:14
	21:41		20:57	19:05-20:19/74	19:48		18:35		16:29	15:54
9	04:54	18:55-20:57/122	05:40	06:25-06:52/27	06:34	18:45-18:59/14	07:27	17:13-18:02/49	07:25	08:15
	21:40		20:55	19:04-20:17/73	19:45		18:32		16:27	15:54
10	04:55	18:55-20:57/122	05:42	06:25-06:52/27	06:36		07:29	17:11-18:00/49	07:27	08:16
	21:39		20:53	19:03-20:16/73	19:43		18:30		16:25	15:53
11	04:57	18:55-20:56/121	05:43	06:26-06:52/26	06:37		07:30	17:10-17:58/48	07:29	08:17
	21:38		20:51	19:00-20:14/74	19:40		18:28		16:23	15:53
12	04:58	18:55-20:55/120	05:45	06:25-06:51/26	06:39		07:32	17:10-17:56/46	07:31	08:18
	21:38		20:49	18:59-20:13/74	19:38		18:25		16:22	15:53
13	04:59	18:55-20:54/119	05:47	06:26-06:51/25	06:41		07:34	17:09-17:53/44	07:33	08:20
	21:37		20:47	18:57-20:12/75	19:35		18:23		16:20	15:53
14	05:00	18:55-20:52/117	05:49	06:25-06:50/25	06:43		07:36	17:09-17:52/43	07:35	08:20
	21:36		20:45	18:55-20:09/74	19:33		18:21		16:18	15:53
15	05:01	18:55-20:50/115	05:50	06:26-06:49/23	06:44		07:38	17:09-17:49/40	07:36	08:21
	21:35		20:43	18:54-20:08/74	19:31		18:18		16:17	15:53
16	05:03	18:55-20:50/115	05:52	06:27-06:49/22	06:46		07:40	17:09-17:47/38	07:38	08:22
	21:33		20:41	18:52-20:06/74	19:28		18:16		16:15	15:53
17	05:04	18:56-20:50/114	05:54	06:28-06:47/19	06:48		07:41	17:09-17:43/34	07:40	08:23
	21:32		20:38	18:49-20:04/75	19:26		18:14		16:14	15:53
18	05:05	18:56-20:49/113	05:55	06:29-06:45/16	06:49		07:43	17:09-17:41/32	07:42	08:24
	21:31		20:36	18:47-20:02/75	19:23		18:11		16:12	15:53
19	05:07	18:56-20:48/112	05:57	06:31-06:43/12	06:51		07:45	17:09-17:39/30	07:44	08:25
	21:30		20:34	18:46-19:59/73	19:21		18:09		16:11	15:54
20	05:08	18:56-20:47/111	05:59	06:35-06:38/3	06:53	17:52-18:00/8	07:47	17:10-17:37/27	07:46	08:25
	21:29		20:32	18:44-19:57/73	19:18		18:07		16:10	15:54
21	05:09	18:57-20:46/109	06:01	18:43-19:54/71	06:55	17:48-18:04/16	07:49	17:12-17:34/22	07:47	08:26
	21:27		20:30		19:16		18:05		16:08	15:54
22	05:11	18:57-20:45/108	06:02	18:41-19:52/71	06:56	17:46-18:05/19	07:51	17:14-17:27/13	07:49	08:26
	21:26		20:27		19:13		18:03		16:07	15:55
23	05:12	18:57-20:44/107	06:04	18:41-19:50/69	06:58	17:43-18:06/23	07:53	17:18-17:22/4	07:51	08:27
	21:24		20:25		19:11		18:00		16:06	15:55
24	05:14	18:57-20:43/106	06:06	18:40-19:48/68	07:00	17:42-18:09/27	07:55		07:53	08:27
	21:23		20:23		19:08		17:58		16:05	15:56
25	05:15	18:57-20:41/104	06:08	18:39-19:45/66	07:02	17:41-18:12/31	06:56		07:54	08:28
	21:21		20:21		19:06		16:56		16:04	15:57
26	05:17	18:58-20:40/102	06:09	18:39-19:43/64	07:04	17:40-18:13/33	06:58		07:56	08:28
	21:20		20:18		19:04		16:54		16:03	15:57
27	05:18	18:58-20:38/100	06:11	18:39-19:40/61	07:05	17:38-18:13/35	07:00		07:58	08:28
	21:18		20:16		19:01		16:52		16:02	15:58
28	05:20	18:59-20:37/98	06:13	18:38-19:31/53	07:07	17:35-18:14/39	07:02		07:59	08:29
	21:17		20:14		18:59		16:50		16:01	15:59
29	05:22	06:35-06:43/8	06:15	18:38-19:31/53	07:09	17:33-18:14/41	07:04		08:01	08:29
	21:15	18:59-20:35/96	20:11		18:56		16:48		16:00	16:00
30	05:23	06:33-06:46/13	06:16	18:38-19:30/52	07:11	17:32-18:14/42	07:06		08:02	08:29
	21:13	19:00-20:35/95	20:09		18:54		16:46		15:59	16:01
31	05:25	06:31-06:47/16	06:18	18:37-19:28/51			07:08			08:29
	21:12	19:00-20:34/94	20:07				16:44			16:02
Sonnenscheinstunden	510		459		382		329		260	235
Anzahl Minuten mit Schatten	3564		2653		612		897		0	0

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten
	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 3 - W3

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April		Mai		Juni	
1	08:29	09:27-09:46/19	07:59		07:02	07:27-07:48/21	06:48		05:40	19:11-20:11/60	04:51	05:33-05:58/25
	16:03		16:54		17:49		19:46		20:41		21:30	20:02-20:55/53
2	08:29	09:28-09:46/18	07:57		07:00	07:25-07:48/23	06:46	19:10-19:18/8	05:38	19:11-20:11/62	04:50	05:33-05:57/24 20:05-20:11/6
	16:04		16:56		17:51		19:48		20:43		21:31	20:12-20:57/45
3	08:28	09:29-09:47/18	07:56		06:58	07:22-07:47/25	06:43	19:07-19:21/14	05:36	19:12-20:14/62	04:49	05:33-05:57/24
	16:05		16:58		17:52		19:50		20:44		21:32	20:12-20:58/46
4	08:28	09:29-09:46/17	07:54		06:56	07:20-07:47/27	06:41	19:05-19:22/17	05:34	19:14-20:16/62	04:49	05:33-05:56/23
	16:07		17:00		17:54	17:26-17:27/1	19:52		20:46		21:33	20:12-20:59/47
5	08:28	09:30-09:47/17	07:52		06:53	07:17-07:46/29	06:39	19:04-19:24/20	05:32	19:15-20:18/63	04:48	05:34-05:56/22
	16:08		17:02		17:56	17:20-17:29/9	19:54		20:48		21:35	20:13-21:00/47
6	08:27	09:31-09:46/15	07:50		06:51	07:16-07:45/29	06:36	19:03-19:29/26	05:30	19:16-20:19/63	04:47	05:34-05:56/22
	16:09		17:03		17:58	17:19-17:32/13	19:55		20:50		21:36	20:13-21:01/48
7	08:27	09:32-09:47/15	07:49		06:49	07:16-07:44/28	06:34	19:01-19:30/29	05:28	19:18-20:21/63	04:46	05:35-05:56/21
	16:10		17:05		18:00	17:17-17:33/16	19:57		20:51		21:37	20:13-21:01/48
8	08:26	09:33-09:46/13	07:47		06:46	07:15-07:42/27	06:31	19:01-19:32/31	05:26	19:37-20:22/45	04:46	05:35-05:55/20
	16:12		17:07		18:02	17:16-17:34/18	19:59		20:53	19:20-19:28/8	21:37	20:13-21:02/49
9	08:26	09:34-09:46/12	07:45		06:44	07:15-07:40/25	06:29	19:01-19:33/32	05:24	19:37-20:24/47	04:45	05:36-05:55/19
	16:13		17:09		18:04	17:16-17:35/19	20:01		20:55		21:38	20:14-21:04/50
10	08:25	09:35-09:45/10	07:43		06:41	07:15-07:38/23	06:27	19:00-19:33/33	05:22	19:37-20:26/49	04:45	05:35-05:54/19
	16:15		17:11		18:06	17:15-17:39/24	20:03		20:57		21:39	20:14-21:04/50
11	08:25	09:37-09:44/7	07:41		06:39	07:15-07:36/21	06:24	19:00-19:37/37	05:21	19:37-20:27/50	04:44	05:36-05:54/18
	16:16		17:13		18:08	17:15-17:41/26	20:04		20:58		21:40	20:14-21:05/51
12	08:24		07:39		06:37	07:15-07:34/19	06:22	19:01-19:39/38	05:19	19:37-20:29/52	04:44	05:37-05:53/16
	16:18		17:15		18:09	17:15-17:42/27	20:06		21:00		21:41	20:15-21:06/51
13	08:23		07:37		06:34	07:17-07:31/14	06:20	19:00-19:40/40	05:17	05:44-05:49/5	04:44	05:37-05:53/16
	16:19		17:17		18:11	17:16-17:43/27	20:08		21:02	19:37-20:30/53	21:41	20:15-21:06/51
14	08:22		07:35		06:32	07:19-07:28/10	06:17	19:01-19:42/41	05:15	05:43-05:52/9	04:43	05:37-05:52/15
	16:21		17:19		18:13	17:16-17:46/30	20:10		21:03	19:38-20:32/54	21:42	20:15-21:06/51
15	08:21		07:33		06:29	07:18-07:49/31	06:15	19:03-19:44/41	05:14	05:41-05:53/12	04:43	05:38-05:52/14
	16:23		17:21		18:15		20:12		21:05	19:37-20:33/56	21:43	20:15-21:07/52
16	08:20		07:31		06:27	07:21-07:49/28	06:13	19:05-19:46/41	05:12	05:40-05:55/15	04:43	05:38-05:53/15
	16:24		17:23		18:17		20:14		21:07	19:38-20:35/57	21:43	20:16-21:08/52
17	08:19		07:29		06:25	07:24-07:50/26	06:10	19:06-19:47/41	05:10	05:38-05:55/17	04:43	05:38-05:54/16
	16:26		17:25		18:19		20:15		21:08	19:38-20:36/58	21:44	20:16-21:08/52
18	08:18		07:27		06:22	07:24-07:51/27	06:08	19:07-19:47/40	05:09	05:37-05:56/19	04:43	05:39-05:55/16
	16:28		17:27		18:21		20:17		21:10	19:39-20:38/59	21:44	20:16-21:08/52
19	08:17		07:25		06:20	07:25-07:51/26	06:06	19:09-19:51/42	05:07	05:36-05:57/21	04:43	05:39-05:55/16
	16:29		17:29		18:22		20:19		21:12	19:39-20:39/60	21:45	20:17-21:09/52
20	08:16		07:22		06:17	07:26-07:51/25	06:04	19:12-19:53/41	05:06	05:34-05:57/23	04:43	05:39-05:55/16
	16:31		17:31		18:24		20:21		21:13	19:40-20:41/61	21:45	20:17-21:09/52
21	08:15		07:20		06:15	07:28-07:50/22	06:01	19:12-19:55/43	05:04	05:33-05:57/24	04:43	05:40-05:56/16
	16:33		17:33		18:26		20:23		21:15	19:41-20:42/61	21:45	20:17-21:09/52
22	08:14		07:18		06:12	07:30-07:50/20	05:59	19:11-19:56/45	05:03	05:33-05:58/25	04:43	05:40-05:56/16
	16:35		17:35		18:28		20:24		21:16	19:41-20:43/62	21:45	20:18-21:10/52
23	08:13		07:16		06:10	07:30-07:48/18	05:57	19:11-19:57/46	05:02	05:32-05:57/25	04:43	05:40-05:56/16
	16:37		17:37		18:30		20:26		21:18	19:42-20:45/63	21:45	20:18-21:10/52
24	08:11		07:14		06:08	07:31-07:47/16	05:55	19:10-19:59/49	05:00	05:32-05:57/25	04:44	05:40-05:56/16
	16:38		17:39		18:32		20:28		21:19	19:44-20:46/62	21:46	20:17-21:10/53
25	08:10		07:12	07:36-07:43/7	06:05	07:32-07:45/13	05:53	19:10-20:01/51	04:59	05:32-05:58/26	04:44	05:41-05:56/15
	16:40		17:41		18:33		20:30		21:21	19:45-20:47/62	21:46	20:18-21:10/52
26	08:08		07:09	07:34-07:46/12	06:03	07:35-07:42/7	05:50	19:10-20:03/53	04:58	05:32-05:58/26	04:45	05:40-05:56/16
	16:42		17:43		18:35		20:32		21:22	19:47-20:49/62	21:46	20:18-21:10/52
27	08:07		07:07	07:32-07:47/15	06:00		05:48	19:10-20:04/54	04:56	05:32-05:58/26	04:45	05:41-05:56/15
	16:44		17:45		18:37		20:34		21:23	19:49-20:50/61	21:46	20:19-21:10/51
28	08:05		07:05	07:29-07:47/18	05:58		05:46	19:10-20:06/56	04:55	05:32-05:58/26	04:45	05:40-05:55/15
	16:46		17:47		18:39		20:35		21:25	19:58-20:51/53	21:45	20:18-21:10/52
29	08:04				06:55		05:44	19:10-20:08/58	04:54	05:32-05:57/25	04:46	05:41-05:56/15
	16:48				19:41		20:37		21:26	19:59-20:52/53	21:45	20:19-21:10/51
30	08:02				06:53		05:42	19:10-20:09/59	04:53	05:32-05:57/25	04:47	05:40-05:56/16
	16:50				19:43		20:39		21:27	20:00-20:54/54	21:45	20:18-21:09/51
31	08:01				06:51				04:52	05:32-05:57/25		
	16:52				19:44				21:29	20:01-20:55/54		
Sonnenscheinstunden	252		274		367		419		492		508	
Anzahl Minuten mit Schatten		161		52		790		1126		2190		2056

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten
	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 3 - W3

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli	August	September	Oktober	November	Dezember
1	04:47 05:40-05:57/17	05:27 19:48-20:39/51	06:20 18:59-19:36/37	07:12 07:56-08:13/17	07:10	08:04 09:20-09:25/5
	21:45 20:19-21:09/50	21:10	20:04	18:51 17:54-18:22/28	16:42	15:58
2	04:48 05:41-05:59/18	05:28 19:47-20:37/50	06:22 18:59-19:32/33	07:14 07:53-08:14/21	07:12	08:06 09:19-09:28/9
	21:44 20:19-21:09/50	21:08	20:02	18:49 17:53-18:20/27	16:40	15:57
3	04:49 05:41-06:00/19	05:30 19:47-20:36/49	06:23 18:58-19:30/32	07:16 07:53-08:15/22	07:14	08:07 09:18-09:30/12
	21:44 20:18-21:08/50	21:06	20:00	18:47 17:53-18:18/25	16:38	15:57
4	04:50 05:40-06:00/20	05:31 19:47-20:33/46	06:25 18:58-19:29/31	07:18 07:52-08:16/24	07:16	08:08 09:17-09:30/13
	21:43 20:19-21:08/49	21:05	19:57	18:44 17:53-18:15/22	16:36	15:56
5	04:50 05:40-06:01/21	05:33 19:47-20:32/45	06:27 18:58-19:27/29	07:20 07:52-08:18/26	07:17	08:10 09:17-09:32/15
	21:43 20:19-21:08/49	21:03 19:29-19:39/10	19:55	18:42 17:53-18:11/18	16:34	15:55
6	04:51 05:40-06:02/22	05:35 19:26-20:30/64	06:29 18:58-19:24/26	07:21 07:52-08:19/27	07:19	08:11 09:17-09:33/16
	21:42 20:19-21:07/48	21:01	19:52	18:39 17:53-18:10/17	16:32	15:55
7	04:52 05:40-06:02/22	05:37 19:25-20:28/63	06:30 18:59-19:19/20	07:23 07:52-08:21/29	07:21	08:13 09:17-09:34/17
	21:42 20:19-21:07/48	20:59	19:50	18:37 17:53-18:08/15	16:30	15:54
8	04:53 05:40-06:03/23	05:38 19:24-20:27/63	06:32 19:00-19:17/17	07:25 07:53-08:22/29	07:23	08:14 09:17-09:34/17
	21:41 20:19-21:06/47	20:57	19:48	18:35 17:54-18:05/11	16:29	15:54
9	04:54 05:40-06:04/24	05:40 19:22-20:24/62	06:34 19:00-19:15/15	07:27 07:53-08:21/28	07:25	08:15 09:17-09:35/18
	21:40 20:20-21:06/46	20:55	19:45	18:32 17:57-18:03/6	16:27	15:54
10	04:55 05:40-06:04/24 20:14-20:17/3	05:42 19:21-20:23/62	06:36 19:03-19:12/9	07:29 07:55-08:21/26	07:27	08:16 09:17-09:35/18
	21:39 20:20-21:05/45	20:53	19:43	18:30	16:25	15:53
11	04:57 05:40-06:05/25	05:43 19:19-20:21/62	06:37	07:30 07:57-08:21/24	07:29	08:17 09:18-09:37/19
	21:39 20:11-21:04/53	20:51	19:40	18:28	16:23	15:53
12	04:58 05:40-06:05/25	05:45 19:19-20:19/60	06:39	07:32 07:59-08:21/22	07:31	08:18 09:18-09:37/19
	21:38 20:10-21:03/53	20:49	19:38	18:25	16:22	15:53
13	04:59 05:40-06:06/26	05:47 19:19-20:17/58	06:41	07:34 08:01-08:21/20	07:33	08:20 09:18-09:38/20
	21:37 20:09-21:02/53	20:47	19:35	18:23	16:20	15:53
14	05:00 05:40-06:06/26	05:49 19:18-20:15/57	06:43	07:36 08:03-08:20/17	07:35	08:21 09:19-09:38/19
	21:36 20:08-21:01/53	20:45	19:33	18:21	16:18	15:53
15	05:01 05:40-06:06/26	05:50 19:17-20:13/56	06:44	07:38 08:05-08:19/14	07:36	08:21 09:19-09:39/20
	21:35 20:07-21:00/53	20:43	19:31	18:18	16:17	15:53
16	05:03 05:41-06:07/26 19:58-20:05/7	05:52 19:17-20:12/55	06:46	07:40 08:07-08:17/10	07:38	08:22 09:19-09:40/21
	21:33 20:06-20:59/53	20:41	19:28	18:16	16:15	15:53
17	05:04 05:41-06:07/26	05:54 19:16-20:09/53	06:48 18:25-18:29/4	07:41 08:09-08:15/6	07:40	08:23 09:20-09:40/20
	21:32 19:57-20:59/62	20:38	19:26	18:14	16:14	15:53
18	05:05 05:41-06:07/26	05:56 19:17-20:07/50	06:50 18:21-18:33/12	07:43	07:42	08:24 09:20-09:40/20
	21:31 19:55-20:58/63	20:36	19:23	18:11	16:13	15:53
19	05:07 05:41-06:07/26	05:57 19:17-20:04/47	06:51 18:18-18:33/15	07:45	07:44	08:25 09:20-09:41/21
	21:30 19:54-20:56/62	20:34	19:21	18:09	16:11	15:54
20	05:08 05:42-06:08/26	05:59 19:16-20:03/47	06:53 18:17-18:34/17	07:47	07:46	08:25 09:21-09:42/21
	21:29 19:53-20:55/62	20:32	19:18	18:07	16:10	15:54
21	05:09 05:42-06:07/25	06:01 19:17-20:01/44	06:55 18:16-18:35/19	07:49	07:47	08:26 09:21-09:42/21
	21:27 19:52-20:54/62	20:30	19:16	18:05	16:08	15:54
22	05:11 05:42-06:07/25	06:02 19:16-19:58/42	06:57 18:14-18:36/22	07:51	07:49	08:27 09:22-09:43/21
	21:26 19:51-20:53/62	20:27	19:13	18:03	16:07	15:55
23	05:12 05:44-06:07/23	06:04 19:15-19:56/41	06:58 18:10-18:35/25	07:53	07:51	08:27 09:22-09:43/21
	21:24 19:51-20:52/61	20:25	19:11	18:00	16:06	15:55
24	05:14 05:45-06:07/22	06:06 19:13-19:54/41	07:00 18:09-18:34/25	07:55	07:53	08:27 09:22-09:43/21
	21:23 19:50-20:50/60	20:23	19:09	17:58	16:05	15:56
25	05:15 05:47-06:07/20	06:08 19:10-19:50/40	07:02 18:07-18:34/27	06:56	07:54	08:28 09:24-09:44/20
	21:22 19:49-20:49/60	20:21	19:06	16:56	16:04	15:57
26	05:17 05:48-06:06/18	06:09 19:09-19:49/40	07:04 18:07-18:33/26	06:58	07:56	08:28 09:24-09:44/20
	21:20 19:49-20:48/59	20:18	19:04	16:54	16:03	15:57
27	05:19 05:49-06:05/16	06:11 19:06-19:48/42	07:05 18:05-18:31/26	07:00	07:58	08:28 09:24-09:44/20
	21:18 19:48-20:46/58	20:16	19:01	16:52	16:02	15:58
28	05:20 05:51-06:05/14	06:13 19:03-19:45/42	07:07 18:00-18:30/30	07:02	07:59	08:29 09:25-09:45/20
	21:17 19:48-20:45/57	20:14	18:59	16:50	16:01	15:59
29	05:22 05:52-06:03/11	06:15 19:02-19:43/41	07:09 08:00-08:08/8	07:04	08:01	08:29 09:25-09:45/20
	21:15 19:48-20:43/55	20:11	18:56 17:57-18:28/31	16:48	16:00	16:00
30	05:23 05:54-06:01/7	06:16 19:01-19:41/40	07:11 07:57-08:10/13	07:06	08:02	08:29 09:26-09:46/20
	21:14 19:48-20:42/54	20:09	18:54 17:56-18:24/28	16:46	15:59	16:01
31	05:25 19:47-20:40/53	06:18 19:00-19:38/38		07:08		08:29 09:27-09:46/19
	21:12	20:07		16:44		16:02
Sonnenscheinstunden	510	459	382	329	260	235
Anzahl Minuten mit Schatten	2349	1561	577	531	0	563

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten
	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 4 - W4

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:29 09:02-09:38/36 16:03	07:59 16:54	07:02 17:49	06:48 07:31-07:53/22 19:46	05:40 19:39-20:10/31 20:41	04:51 20:05-20:53/48 21:30
2	08:29 09:02-09:39/37 16:04	07:57 16:56	07:00 17:51	06:46 07:31-07:50/19 19:48	05:38 19:39-20:10/31 20:43	04:50 20:07-20:54/47 21:31
3	08:28 09:02-09:40/38 16:05	07:56 16:58	06:58 17:52	06:43 07:33-07:47/14 19:50	05:36 20:11-20:13/2 20:44 19:40-20:10/30	04:49 20:07-20:55/48 21:32
4	08:28 09:01-09:40/39 16:07	07:54 17:00	06:56 17:54	06:41 07:35-07:45/10 19:52	05:34 19:41-20:16/35 20:46	04:49 20:08-20:55/47 21:33
5	08:28 09:01-09:41/40 16:08	07:52 17:02	06:53 17:56	06:39 19:54	05:32 19:44-20:18/34 20:48	04:48 20:09-20:56/47 21:35
6	08:27 09:01-09:42/41 16:09	07:50 17:03	06:51 17:58	06:36 19:55	05:30 19:45-20:19/34 20:50	04:47 20:23-20:55/32 21:36 20:10-20:22/12
7	08:27 09:01-09:43/42 16:10	07:49 17:05	06:49 18:00	06:34 19:57	05:28 19:46-20:21/35 20:51	04:46 20:23-20:55/32 21:37 20:10-20:21/11
8	08:27 08:59-09:43/44 16:12	07:47 17:07	06:46 18:02	06:31 19:59	05:26 19:48-20:22/34 20:53	04:46 20:58-21:02/4 20:12-20:21/9 21:37 20:24-20:56/32
9	08:26 08:58-09:43/45 16:13	07:45 17:09	06:44 07:09-07:13/4 18:04	06:29 20:01	05:24 19:51-20:24/33 20:55	04:45 20:24-21:04/40 21:38 20:14-20:20/6
10	08:25 08:57-09:44/47 16:15	07:43 17:11	06:41 07:05-07:16/11 18:06	06:27 20:03	05:22 19:51-20:26/35 20:57	04:45 20:24-21:04/40 21:39 20:16-20:17/1
11	08:25 08:56-09:44/48 16:16	07:41 17:13	06:39 07:03-07:18/15 18:08	06:24 20:04	05:21 19:52-20:27/35 20:58	04:44 20:25-21:05/40 21:40
12	08:24 08:56-09:45/49 16:18	07:39 17:15	06:37 07:00-07:19/19 18:09	06:22 20:06	05:19 19:54-20:29/35 21:00	04:44 20:25-21:06/41 21:41
13	08:23 08:55-09:46/51 16:19	07:37 17:17	06:34 06:58-07:20/22 18:11	06:20 20:08	05:17 19:55-20:30/35 21:02	04:44 20:25-21:06/41 21:41
14	08:22 08:53-09:45/52 16:21	07:35 17:19	06:32 06:57-07:20/23 18:13	06:17 20:10	05:15 19:58-20:32/34 21:03	04:43 20:25-21:06/41 21:42
15	08:21 08:53-09:45/52 16:23	07:33 17:21	06:29 06:53-07:20/27 18:15	06:15 20:12	05:14 20:01-20:33/32 21:05	04:43 20:26-21:07/41 21:43
16	08:21 08:53-09:46/53 16:24	07:31 17:23	06:27 06:51-07:20/29 18:17	06:13 20:14	05:12 20:02-20:35/33 21:07	04:43 20:26-21:08/42 21:43
17	08:20 08:53-09:46/53 16:26	07:29 17:25	06:25 06:48-07:19/31 18:19	06:10 20:15	05:10 20:01-20:36/35 21:08	04:43 20:26-21:08/42 21:44
18	08:18 08:54-09:46/52 16:28	07:27 17:27	06:22 06:47-07:18/31 18:21	06:08 20:17	05:09 20:01-20:38/37 21:10	04:43 20:26-21:08/42 21:44
19	08:17 08:53-09:46/53 16:29	07:25 17:29	06:20 06:44-07:17/33 18:22	06:06 20:19	05:07 20:00-20:39/39 21:12	04:43 20:27-21:09/42 21:45
20	08:16 08:54-09:46/52 16:31	07:23 17:31	06:17 06:42-07:16/34 18:24	06:04 20:21	05:06 20:01-20:41/40 21:13	04:43 20:27-21:09/42 21:45
21	08:15 08:54-09:46/52 16:33	07:20 17:33	06:15 06:39-07:13/34 18:26	06:01 19:46-19:55/9 20:23	05:04 20:01-20:42/41 21:15	04:43 20:27-21:09/42 21:45
22	08:14 08:54-09:45/51 16:35	07:18 17:35	06:12 06:37-07:11/34 18:28	05:59 19:43-19:56/13 20:25	05:03 20:00-20:43/43 21:16	04:43 20:28-21:10/42 21:45
23	08:13 08:55-09:45/50 16:37	07:16 17:37	06:10 06:36-07:10/34 18:30	05:57 19:41-19:57/16 20:26	05:02 20:01-20:45/44 21:18	04:43 20:28-21:10/42 21:46
24	08:11 08:55-09:44/49 16:38	07:14 17:39	06:08 06:33-07:08/35 18:32	05:55 19:40-19:59/19 20:28	05:00 20:01-20:46/45 21:19	04:44 20:28-21:10/42 21:46
25	08:10 08:56-09:43/47 16:40	07:12 17:41	06:05 06:33-07:07/34 18:33	05:53 19:40-20:01/21 20:30	04:59 20:02-20:47/45 21:21	04:44 20:28-21:10/42 21:46
26	08:08 08:56-09:25/29 16:42 09:30-09:41/11	07:09 17:43	06:03 06:31-07:04/33 18:35	05:50 19:39-20:03/24 20:32	04:58 20:02-20:49/47 21:22	04:45 20:28-21:10/42 21:46
27	08:07 08:57-09:25/28 16:44 09:33-09:37/4	07:07 17:45	06:00 06:31-07:03/32 18:37	05:48 19:39-20:04/25 20:34	04:56 20:03-20:50/47 21:23	04:45 20:29-21:10/41 21:46
28	08:05 08:58-09:23/25 16:46	07:05 17:47	05:58 06:30-07:00/30 18:39	05:46 19:39-20:06/27 20:35	04:55 20:03-20:51/48 21:25	04:45 20:28-21:10/42 21:45
29	08:04 08:59-09:21/22 16:48		06:55 07:30-07:58/28 19:41	05:44 19:39-20:08/29 20:37	04:54 20:04-20:52/48 21:26	04:46 20:29-21:10/41 21:45
30	08:02 09:00-09:13/13 16:50		06:53 07:30-07:57/27 19:43	05:42 19:39-20:09/30 20:39	04:53 20:04-20:53/49 21:27	04:47 20:28-21:09/41 21:45
31	08:01 09:03-09:11/8 16:52		06:51 07:30-07:55/25 19:44		04:52 20:05-20:53/48 21:29	
Sonnenscheinstunden	252	274	367	419	492	508
Anzahl Minuten mit Schatten	1313	0	625	278	1194	1287

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM) Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 4 - W4

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli	August	September	Oktober	November	Dezember
1	04:47 20:29-21:09/40 21:45	05:27 20:03-20:39/36 21:10	06:20 20:04	07:12 07:39-07:59/20 18:51	07:10 16:42	08:04 08:38-09:26/48 15:58
2	04:48 20:29-21:09/40 21:44	05:28 20:02-20:37/35 21:08	06:22 20:02	07:14 07:40-07:57/17 18:49	07:12 16:40	08:06 08:40-09:27/47 15:57
3	04:49 20:29-21:08/39 21:44 20:19-20:23/4	05:30 20:01-20:36/35 21:07	06:23 20:00	07:16 07:42-07:55/13 18:47	07:14 16:38	08:07 08:42-09:27/45 15:57
4	04:50 21:02-21:08/6 20:18-20:25/7 21:43 20:29-21:01/32	05:31 20:00-20:33/33 21:05	06:25 19:57	07:18 07:44-07:53/9 18:44	07:16 16:36	08:08 08:43-09:27/44 15:56
5	04:50 20:29-21:02/33 21:43 20:17-20:27/10	05:33 19:57-20:32/35 21:03	06:27 19:55	07:20 18:42	07:17 16:34	08:10 08:46-09:28/42 15:55
6	04:51 20:30-21:02/32 21:42 20:16-20:28/12	05:35 19:55-20:30/35 21:01	06:29 19:52	07:21 18:39	07:19 16:32	08:11 08:47-09:28/41 15:55
7	04:52 20:30-21:02/32 21:42 20:16-20:29/13	05:37 19:54-20:28/34 20:59	06:30 19:50	07:23 18:37	07:21 16:30	08:13 08:48-09:29/41 15:54
8	04:53 20:15-21:02/47 21:41	05:38 19:52-20:27/35 20:57	06:32 07:30-07:39/9 19:48	07:25 18:35	07:23 16:29	08:14 08:49-09:28/39 15:54
9	04:54 20:15-21:02/47 21:40	05:40 19:50-20:24/34 20:55	06:34 07:27-07:41/14 19:45	07:27 18:32	07:25 16:27	08:15 08:50-09:28/38 15:54
10	04:55 20:14-21:02/48 21:39	05:42 19:49-20:20/31 20:53	06:36 07:24-07:43/19 19:43	07:29 18:30	07:27 16:25	08:16 08:51-09:28/37 15:53
11	04:57 20:14-21:02/48 21:39	05:43 19:48-20:18/30 20:51	06:37 07:23-07:45/22 19:40	07:30 18:28	07:29 08:34-08:42/8 16:23	08:17 08:53-09:29/36 15:53
12	04:58 20:13-21:02/49 21:38	05:45 19:47-20:18/31 20:49	06:39 07:22-07:47/25 19:38	07:32 18:25	07:31 08:32-08:45/13 16:22 08:47-08:49/2	08:19 08:54-09:30/36 15:53
13	04:59 20:13-21:01/48 21:37	05:47 19:47-20:17/30 20:47	06:41 07:21-07:47/26 19:35	07:34 18:23	07:33 08:31-08:53/22 16:20	08:20 08:55-09:30/35 15:53
14	05:00 20:12-21:01/49 21:36	05:49 19:46-20:15/29 20:45	06:43 07:20-07:48/28 19:33	07:36 18:21	07:35 08:30-08:55/25 16:18	08:21 08:56-09:30/34 15:53
15	05:01 20:12-21:00/48 21:35	05:50 19:46-20:13/27 20:43	06:44 07:20-07:50/30 19:31	07:38 18:18	07:36 08:29-08:57/28 16:17 09:06-09:11/5	08:22 08:57-09:30/33 15:53
16	05:03 20:11-20:59/48 21:34	05:52 19:46-20:12/26 20:41	06:46 07:19-07:51/32 19:28	07:40 18:16	07:38 08:29-08:58/29 16:15 09:03-09:14/11	08:22 08:58-09:31/33 15:53
17	05:04 20:12-20:59/47 21:32	05:54 19:46-20:09/23 20:38	06:48 07:20-07:52/32 19:26	07:41 18:14	07:40 08:29-09:16/47 16:14	08:23 08:59-09:31/32 15:53
18	05:05 20:11-20:58/47 21:31	05:56 19:46-20:07/21 20:36	06:50 07:20-07:54/34 19:23	07:43 18:11	07:42 08:29-09:18/49 16:13	08:24 08:59-09:31/32 15:53
19	05:07 20:11-20:56/45 21:30	05:57 19:47-20:05/18 20:34	06:51 07:21-07:55/34 19:21	07:45 18:09	07:44 08:29-09:19/50 16:11	08:25 09:00-09:32/32 15:54
20	05:08 20:11-20:55/44 21:29	05:59 19:47-20:03/16 20:32	06:53 07:21-07:55/34 19:18	07:47 18:07	07:46 08:29-09:20/51 16:10	08:25 09:01-09:32/31 15:54
21	05:09 20:11-20:54/43 21:27	06:01 19:49-20:01/12 20:30	06:55 07:22-07:56/34 19:16	07:49 18:05	07:47 08:29-09:21/52 16:08	08:26 09:01-09:32/31 15:54
22	05:11 20:11-20:53/42 21:26	06:02 19:50-19:58/8 20:27	06:57 07:24-07:58/34 19:13	07:51 18:03	07:49 08:30-09:22/52 16:07	08:27 09:02-09:33/31 15:55
23	05:12 20:11-20:52/41 21:25	06:04 20:25	06:58 07:25-07:59/34 19:11	07:53 18:00	07:51 08:30-09:23/53 16:06	08:27 09:02-09:33/31 15:55
24	05:14 20:11-20:50/39 21:23	06:06 20:23	07:00 07:27-08:00/33 19:09	07:55 17:58	07:53 08:31-09:24/53 16:05	08:27 09:02-09:34/32 15:56
25	05:15 20:11-20:49/38 21:22	06:08 20:21	07:02 07:29-08:01/32 19:06	06:56 16:56	07:54 08:31-09:24/53 16:04	08:28 09:03-09:35/32 15:57
26	05:17 20:11-20:48/37 21:20	06:09 20:18	07:04 07:31-08:01/30 19:04	06:58 16:54	07:56 08:32-09:25/53 16:03	08:28 09:03-09:35/32 15:57
27	05:18 20:11-20:46/35 21:18	06:11 20:16	07:05 07:32-08:02/30 19:01	07:00 16:52	07:58 08:33-09:26/53 16:02	08:28 09:03-09:36/33 15:58
28	05:20 20:12-20:45/33 21:17	06:13 20:14	07:07 07:33-08:00/27 18:59	07:02 16:50	07:59 08:33-09:25/52 16:01	08:29 09:03-09:36/33 15:59
29	05:22 20:12-20:43/31 21:15	06:15 20:11	07:09 07:36-08:00/24 18:56	07:04 16:48	08:01 08:35-09:26/51 16:00	08:29 09:03-09:37/34 16:00
30	05:23 20:07-20:42/35 21:14	06:16 20:09	07:11 07:37-08:00/23 18:54	07:06 16:46	08:03 08:37-09:26/49 15:59	08:29 09:03-09:38/35 16:01
31	05:25 20:04-20:40/36 21:12	06:18 20:07		07:08 16:44		08:29 09:03-09:38/35 16:02
Sonnenscheinstunden	510	459	382	329	260	235
Anzahl Minuten mit Schatten	1325	614	640	59	861	1115

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM) Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** S - W5

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April		Mai		Juni	
1	08:29		07:59	08:27-08:46/19	07:02		06:48	18:57-19:19/22	05:40	19:28-19:33/5	04:51	20:11-20:55/44
	16:03		16:54		17:49		19:46		20:41		21:30	
2	08:29		07:57	08:25-08:47/22	07:00		06:46	18:56-19:21/25	05:38		04:50	20:12-20:57/45
	16:04		16:56		17:51		19:48		20:43		21:31	
3	08:28		07:56	08:23-08:47/24	06:58		06:43	18:56-19:23/27	05:36		04:49	20:12-20:58/46
	16:05		16:58		17:52		19:50		20:44		21:32	
4	08:28		07:54	08:21-08:47/26	06:56		06:41	18:55-19:25/30	05:34		04:49	20:12-20:59/47
	16:06		17:00		17:54		19:52		20:46		21:33	
5	08:28		07:52	08:19-08:47/28	06:53		06:39	18:55-19:27/32	05:32		04:48	20:13-21:00/47
	16:08		17:01		17:56		19:54		20:48		21:35	
6	08:27		07:50	08:17-08:47/30	06:51		06:36	18:55-19:29/34	05:30		04:47	20:13-21:01/48
	16:09		17:03		17:58		19:55		20:50		21:36	
7	08:27		07:49	08:16-08:47/31	06:49		06:34	18:55-19:30/35	05:28		04:46	20:13-21:01/48
	16:10		17:05		18:00		19:57		20:51		21:37	
8	08:27		07:47	08:16-08:47/31	06:46		06:31	18:55-19:32/37	05:26		04:46	20:13-21:03/50
	16:12		17:07		18:02		19:59		20:53		21:37	
9	08:26		07:45	08:16-08:47/31	06:44		06:29	18:56-19:33/37	05:24		04:45	20:14-21:04/50
	16:13		17:09		18:04		20:01		20:55		21:38	
10	08:25		07:43	08:16-08:47/31	06:41		06:27	18:56-19:33/37	05:22		04:45	20:14-21:04/50
	16:15		17:11		18:06		20:03		20:57		21:39	
11	08:25		07:41	08:16-08:47/31	06:39		06:24	18:57-19:34/37	05:21		04:44	20:15-21:05/50
	16:16		17:13		18:08		20:04		20:58		21:40	
12	08:24		07:39	08:17-08:46/29	06:37		06:22	18:59-19:34/35	05:19		04:44	20:15-21:06/51
	16:18		17:15		18:09		20:06		21:00		21:41	
13	08:23		07:37	08:18-08:45/27	06:34		06:20	19:00-19:33/33	05:17	20:25-20:29/4	04:44	20:15-21:06/51
	16:19		17:17		18:11		20:08		21:02		21:41	
14	08:22		07:35	08:19-08:44/25	06:32		06:17	19:02-19:39/37	05:15	20:21-20:32/11	04:43	20:15-21:06/51
	16:21		17:19		18:13		20:10		21:03		21:42	
15	08:21		07:33	08:21-08:42/21	06:29		06:15	19:10-19:41/31	05:14	20:18-20:33/15	04:43	20:16-21:07/51
	16:22		17:21		18:15		20:12		21:05		21:43	
16	08:20		07:31	08:24-08:30/6	06:27		06:13	19:10-19:43/33	05:12	20:16-20:35/19	04:43	20:16-21:08/52
	16:24		17:23		18:17		20:14		21:07		21:43	
17	08:20		07:29		06:25		06:10	19:09-19:43/34	05:10	20:14-20:36/22	04:43	20:16-21:08/52
	16:26		17:25		18:19		20:15		21:08		21:44	
18	08:18		07:27		06:22		06:08	19:10-19:44/34	05:09	20:14-20:38/24	04:43	20:17-21:08/51
	16:28		17:27		18:21		20:17		21:10		21:44	
19	08:17		07:25		06:20		06:06	19:10-19:44/34	05:07	20:12-20:39/27	04:43	20:17-21:09/52
	16:29		17:29		18:22		20:19		21:12		21:45	
20	08:16		07:22		06:17		06:04	19:11-19:45/34	05:06	20:12-20:41/29	04:43	20:17-21:09/52
	16:31		17:31		18:24		20:21		21:13		21:45	
21	08:15		07:20		06:15		06:01	19:13-19:45/32	05:04	20:12-20:42/30	04:43	20:17-21:09/52
	16:33		17:33		18:26		20:23		21:15		21:45	
22	08:14		07:18		06:12		05:59	19:14-19:44/30	05:03	20:11-20:43/32	04:43	20:18-21:10/52
	16:35		17:35		18:28		20:24		21:16		21:45	
23	08:13		07:16		06:10		05:57	19:19-19:44/25	05:02	20:11-20:45/34	04:43	20:18-21:10/52
	16:36		17:37		18:30		20:26		21:18		21:45	
24	08:11		07:14		06:08		05:55	19:20-19:43/23	05:00	20:11-20:46/35	04:44	20:18-21:10/52
	16:38		17:39		18:32		20:28		21:19		21:46	
25	08:10		07:11		06:05		05:52	19:20-19:43/23	04:59	20:11-20:47/36	04:44	20:19-21:10/51
	16:40		17:41		18:33		20:30		21:21		21:46	
26	08:08		07:09		06:03		05:50	19:20-19:42/22	04:58	20:11-20:48/38	04:44	20:18-21:10/52
	16:42		17:43		18:35		20:32		21:22		21:46	
27	08:07		07:07		06:00		05:48	19:21-19:41/20	04:56	20:11-20:50/39	04:45	20:19-21:10/51
	16:44		17:45		18:37		20:34		21:23		21:46	
28	08:05	08:34-08:40/6	07:05		05:58		05:46	19:22-19:40/18	04:55	20:11-20:51/40	04:45	20:18-21:10/52
	16:46		17:47		18:39		20:35		21:25		21:45	
29	08:04	08:32-08:42/10			06:55	19:03-19:15/12	05:44	19:23-19:39/16	04:54	20:11-20:52/41	04:46	20:19-21:10/51
	16:48				19:41		20:37		21:26		21:45	
30	08:02	08:30-08:43/13			06:53	19:00-19:16/16	05:42	19:25-19:37/12	04:53	20:11-20:54/43	04:47	20:18-21:09/51
	16:50				19:43		20:39		21:27		21:45	
31	08:01	08:29-08:45/16			06:51	18:59-19:18/19			04:52	20:11-20:55/44		
	16:52				19:44				21:29			
Sonnenscheinstunden	252		274		367		419		492		508	
Anzahl Minuten mit Schatten	45		412		47		879		568		1504	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten
	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 5 - W5

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember
1	04:47	20:19-21:09/50	05:26		06:20	18:56-19:33/37	07:12		07:10	07:46-08:17/31	08:04
	21:45		21:10		20:04		18:51		16:42		15:58
2	04:48	20:19-21:09/50	05:28		06:22	18:55-19:32/37	07:14		07:12	07:46-08:17/31	08:06
	21:44		21:08		20:02		18:49		16:40		15:57
3	04:49	20:19-21:08/49	05:30		06:23	18:53-19:31/38	07:16		07:14	07:46-08:17/31	08:07
	21:44		21:06		20:00		18:47		16:38		15:57
4	04:50	20:19-21:08/49	05:31		06:25	18:52-19:29/37	07:18		07:16	07:46-08:17/31	08:08
	21:43		21:05		19:57		18:44		16:36		15:56
5	04:50	20:19-21:08/49	05:33		06:27	18:52-19:27/35	07:20		07:17	07:47-08:17/30	08:10
	21:43		21:03		19:55		18:42		16:34		15:55
6	04:51	20:19-21:07/48	05:35		06:29	18:50-19:24/34	07:21		07:19	07:50-08:18/28	08:11
	21:42		21:01		19:52		18:39		16:32		15:55
7	04:52	20:19-21:07/48	05:37		06:30	18:50-19:22/32	07:23		07:21	07:52-08:18/26	08:13
	21:42		20:59		19:50		18:37		16:30		15:54
8	04:53	20:19-21:06/47	05:38		06:32	18:50-19:20/30	07:25		07:23	07:54-08:18/24	08:14
	21:41		20:57		19:48		18:35		16:29		15:54
9	04:54	20:19-21:06/47	05:40		06:34	18:49-19:17/28	07:27		07:25	07:56-08:17/21	08:15
	21:40		20:55		19:45		18:32		16:27		15:54
10	04:55	20:19-21:05/46	05:42		06:36	18:49-19:15/26	07:29		07:27	07:58-08:17/19	08:16
	21:39		20:53		19:43		18:30		16:25		15:53
11	04:56	20:19-21:04/45	05:43		06:37	18:50-19:13/23	07:30		07:29	08:00-08:16/16	08:17
	21:39		20:51		19:40		18:28		16:23		15:53
12	04:58	20:19-21:03/44	05:45	19:35-19:43/8	06:39	18:50-19:09/19	07:32		07:31	08:02-08:15/13	08:19
	21:38		20:49		19:38		18:25		16:22		15:53
13	04:59	20:19-21:03/44	05:47	19:33-19:46/13	06:41	18:51-19:07/16	07:34		07:33	08:04-08:14/10	08:20
	21:37		20:47		19:35		18:23		16:20		15:53
14	05:00	20:19-21:01/42	05:49	19:30-19:47/17	06:43	18:53-19:05/12	07:36		07:35	08:06-08:12/6	08:21
	21:36		20:45		19:33		18:21		16:18		15:53
15	05:01	20:19-21:00/41	05:50	19:29-19:48/19	06:44	19:00-19:02/2	07:38		07:36		08:21
	21:35		20:43		19:31		18:18		16:17		15:53
16	05:03	20:19-20:59/40	05:52	19:28-19:49/21	06:46		07:40		07:38		08:22
	21:33		20:41		19:28		18:16		16:15		15:53
17	05:04	20:20-20:58/39	05:54	19:27-19:49/22	06:48		07:41		07:40		08:23
	21:32		20:38		19:26		18:14		16:14		15:53
18	05:05	20:20-20:58/38	05:55	19:26-19:50/24	06:50		07:43		07:42		08:24
	21:31		20:36		19:23		18:11		16:12		15:53
19	05:07	20:20-20:56/36	05:57	19:25-19:49/24	06:51		07:45		07:44		08:25
	21:30		20:34		19:21		18:09		16:11		15:54
20	05:08	20:20-20:55/35	05:59	19:23-19:49/26	06:53		07:47		07:46		08:25
	21:29		20:32		19:18		18:07		16:10		15:54
21	05:09	20:21-20:54/33	06:01	19:19-19:50/31	06:55		07:49		07:47		08:26
	21:27		20:30		19:16		18:05		16:08		15:54
22	05:11	20:21-20:53/32	06:02	19:16-19:49/33	06:57		07:51		07:49		08:27
	21:26		20:27		19:13		18:03		16:07		15:55
23	05:12	20:23-20:52/29	06:04	19:15-19:48/33	06:58		07:53		07:51		08:27
	21:24		20:25		19:11		18:00		16:06		15:55
24	05:14	20:23-20:50/27	06:06	19:14-19:48/34	07:00		07:55		07:53		08:27
	21:23		20:23		19:08		17:58		16:05		15:56
25	05:15	20:23-20:49/26	06:08	19:12-19:46/34	07:02		06:56		07:54		08:28
	21:22		20:21		19:06		16:56		16:04		15:57
26	05:17	20:25-20:48/23	06:09	19:12-19:46/34	07:04		06:58	07:52-08:00/8	07:56		08:28
	21:20		20:18		19:04		16:54	08:05-08:08/3	16:03		15:57
27	05:18	20:25-20:46/21	06:11	19:12-19:44/32	07:05		07:00	07:50-08:12/22	07:58		08:28
	21:18		20:16		19:01		16:52		16:02		15:58
28	05:20	20:27-20:45/18	06:13	19:11-19:42/31	07:07		07:02	07:48-08:14/26	07:59		08:29
	21:17		20:14	19:07-19:10/3	18:59		16:50		16:01		15:59
29	05:22	20:29-20:43/14	06:15	19:03-19:39/36	07:09		07:04	07:47-08:15/28	08:01		08:29
	21:15		20:11		18:56		16:48		16:00		16:00
30	05:23	20:33-20:42/9	06:16	19:01-19:34/33	07:11		07:06	07:47-08:16/29	08:02		08:29
	21:14		20:09		18:54		16:46		15:59		16:01
31	05:25		06:18	18:58-19:33/35			07:08	07:46-08:16/30			08:29
	21:12		20:07				16:44				16:02
Sonnenscheinstunden	510		459		382		329		260		235
Anzahl Minuten mit Schatten	1119		543		406		146		317		0

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten
	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 6 - W11

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:29	07:59	07:02	06:48 18:22-19:14/52	05:40	04:51 05:29-05:52/23
	16:03	16:54	17:49	19:46	20:41	21:30 19:55-20:52/57
2	08:29	07:57	07:00	06:46 18:24-19:14/50	05:38	04:50 05:30-05:53/23
	16:04	16:56	17:50	19:48	20:43	21:31 19:56-20:54/58
3	08:28	07:56	06:58	06:43 18:26-19:15/49	05:36	04:49 05:29-05:53/24
	16:05	16:58	17:52	19:50	20:44	21:32 19:55-20:55/60
4	08:28	07:54	06:55	06:41 18:26-19:14/48	05:34	04:49 05:29-05:53/24
	16:06	16:59	17:54	19:52	20:46	21:33 19:55-20:56/61
5	08:28	07:52	06:53	06:39 18:28-19:14/46	05:32	04:48 05:30-05:54/24
	16:08	17:01	17:56	19:54	20:48	21:34 19:56-20:57/61
6	08:27	07:50	06:51	06:36 18:32-19:17/45	05:30	04:47 05:29-05:54/25
	16:09	17:03	17:58	19:55	20:50	21:36 19:56-20:58/62
7	08:27	07:49	06:48	06:34 18:37-19:18/41	05:28	04:46 05:30-05:55/25
	16:10	17:05	18:00	19:57	20:51	21:37 19:55-20:58/63
8	08:26	07:47	06:46	06:31 18:37-19:20/43	05:26	04:46 05:30-05:54/24
	16:12	17:07	18:02	19:59	20:53	21:37 19:56-20:59/63
9	08:26	07:45	06:44	06:29 18:38-19:21/43	05:24	04:45 05:30-05:55/25
	16:13	17:09	18:04	20:01	20:55	21:38 19:56-21:00/64
10	08:25	07:43	06:41	06:27 18:37-19:21/44	05:22	04:45 05:30-05:54/24
	16:15	17:11	18:06	20:03	20:57	21:39 19:56-21:00/64
11	08:25	07:41	06:39	06:24 18:38-19:21/43	05:21	04:44 05:31-05:55/24
	16:16	17:13	18:08	20:04	20:58	21:40 19:56-21:01/65
12	08:24	07:39	06:37 17:36-17:39/3	06:22 18:39-19:22/43	05:19	04:44 05:31-05:55/24
	16:18	17:15	18:09	20:06	21:00	21:41 19:57-21:02/65
13	08:23	07:37	06:34 17:32-17:44/12	06:20 18:39-19:21/42	05:17	04:44 05:32-05:56/24
	16:19	17:17	18:11	20:08	21:02	21:41 19:56-21:02/66
14	08:22	07:35	06:32 17:29-17:45/16	06:17 18:41-19:22/41	05:15 20:17-20:22/5	04:43 05:31-05:55/24
	16:21	17:19	18:13	20:10	21:03	21:42 19:57-21:03/66
15	08:21	07:33	06:29 17:28-17:47/19	06:15 18:43-19:22/39	05:14 20:13-20:25/12	04:43 05:31-05:55/24
	16:22	17:21	18:15	20:12	21:05	21:43 19:57-21:03/66
16	08:20	07:31	06:27 17:26-17:48/22	06:13 18:47-19:22/35	05:12 20:08-20:28/20	04:43 05:32-05:56/24
	16:24	17:23	18:17	20:14	21:07	21:43 19:57-21:04/67
17	08:19	07:29	06:25 17:26-17:50/24	06:10 18:48-19:20/32	05:10 20:05-20:29/24	04:43 05:32-05:56/24
	16:26	17:25	18:19	20:15	21:08	21:44 19:57-21:04/67
18	08:18	07:27	06:22 17:25-17:54/29	06:08 18:49-19:20/31	05:09 20:03-20:30/27	04:43 05:32-05:56/24
	16:28	17:27	18:21	20:17	21:10	21:44 19:58-21:05/67
19	08:17	07:25	06:20 17:24-17:55/31	06:06 18:49-19:20/31	05:07 20:01-20:31/30	04:43 05:32-05:56/24
	16:29	17:29	18:22	20:19	21:12	21:45 19:58-21:05/67
20	08:16	07:22	06:17 17:25-17:57/32	06:04 18:50-19:19/29	05:06 05:38-05:42/4	04:43 05:32-05:56/24
	16:31	17:31	18:24	20:21	21:13 20:00-20:35/35	21:45 19:58-21:05/67
21	08:15	07:20	06:15 17:24-17:57/33	06:01 18:50-19:18/28	05:04 05:35-05:45/10	04:43 05:33-05:57/24
	16:33	17:33	18:26	20:23	21:15 20:00-20:38/38	21:45 19:58-21:05/67
22	08:14	07:18	06:12 17:23-18:00/37	05:59 18:50-19:16/26	05:03 05:34-05:47/13	04:43 05:33-05:57/24
	16:35	17:35	18:28	20:24	21:16 19:58-20:39/41	21:45 19:59-21:06/67
23	08:12	07:16	06:10 17:22-18:02/40	05:57 18:51-19:15/24	05:02 05:32-05:47/15	04:43 05:33-05:57/24
	16:36	17:37	18:30	20:26	21:18 19:58-20:40/42	21:45 19:59-21:06/67
24	08:11	07:14	06:08 17:21-18:03/42	05:55 18:53-19:14/21	05:00 05:31-05:48/17	04:44 05:33-05:57/24
	16:38	17:39	18:32	20:28	21:19 19:57-20:43/46	21:46 19:59-21:06/67
25	08:10	07:11	06:05 17:20-18:05/45	05:52 18:54-19:12/18	04:59 05:31-05:49/18	04:44 05:34-05:58/24
	16:40	17:41	18:33	20:30	21:21 19:57-20:44/47	21:46 20:00-21:06/66
26	08:08	07:09	06:03 17:20-18:07/47	05:50 18:57-19:09/12	04:58 05:30-05:50/20	04:44 05:34-05:58/24
	16:42	17:43	18:35	20:32	21:22 19:56-20:46/50	21:46 19:59-21:06/67
27	08:07	07:07	06:00 17:21-18:08/47	05:48	04:56 05:30-05:51/21	04:45 05:34-05:58/24
	16:44	17:45	18:37	20:34	21:23 19:56-20:47/51	21:46 20:00-21:07/67
28	08:05	07:05	05:58 17:20-18:09/49	05:46	04:55 05:30-05:51/21	04:45 05:34-05:58/24
	16:46	17:47	18:39	20:35	21:25 19:56-20:48/52	21:45 20:00-21:06/66
29	08:04		06:55 18:21-19:11/50	05:44	04:54 05:29-05:52/23	04:46 05:35-05:59/24
	16:48		19:41	20:37	21:26 19:56-20:50/54	21:45 20:00-21:06/66
30	08:02		06:53 18:21-19:12/51	05:42	04:53 05:29-05:52/23	04:47 05:34-05:59/25
	16:50		19:43	20:39	21:27 19:55-20:51/56	21:45 20:00-21:05/65
31	08:01		06:51 18:22-19:13/51		04:52 05:29-05:52/23	
	16:52		19:44		21:29 19:55-20:51/56	
Sonnenscheinstunden	252	274	367	419	492	508
Anzahl Minuten mit Schatten	0	0	680	956	894	2663

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten
	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 6 - W11

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November	Dezember
1	04:47	05:35-05:59/24	05:26		06:20	18:37-19:20/43	07:12	18:12-18:20/8	07:10	08:04
	21:45	20:01-21:06/65	21:10		20:04		18:51		16:42	15:58
2	04:48	05:35-06:00/25	05:28		06:22	18:36-19:20/44	07:14		07:12	08:06
	21:44	20:01-21:06/65	21:08		20:02		18:49		16:40	15:57
3	04:49	05:35-05:59/24	05:30		06:23	18:35-19:18/43	07:16		07:14	08:07
	21:44	20:01-21:05/64	21:06		20:00		18:47		16:38	15:57
4	04:50	05:35-06:00/25	05:31		06:25	18:34-19:17/43	07:18		07:16	08:08
	21:43	20:01-21:05/64	21:05		19:57		18:44		16:36	15:56
5	04:50	05:35-06:00/25	05:33		06:27	18:34-19:15/41	07:20		07:17	08:10
	21:43	20:01-21:05/64	21:03		19:55		18:42		16:34	15:55
6	04:51	05:36-06:00/24	05:35		06:29	18:28-19:12/44	07:21		07:19	08:11
	21:42	20:02-21:04/62	21:01		19:52		18:39		16:32	15:55
7	04:52	05:36-06:01/25	05:37		06:30	18:24-19:09/45	07:23		07:21	08:13
	21:42	20:02-21:04/62	20:59		19:50		18:37		16:30	15:54
8	04:53	05:36-06:01/25	05:38		06:32	18:22-19:09/47	07:25		07:23	08:14
	21:41	20:02-21:03/61	20:57		19:48		18:35		16:29	15:54
9	04:54	05:37-06:01/24	05:40		06:34	18:19-19:08/49	07:27		07:25	08:15
	21:40	20:03-21:03/60	20:55		19:45		18:32		16:27	15:54
10	04:55	05:37-06:01/24	05:42		06:36	18:17-19:08/51	07:29		07:27	08:16
	21:39	20:03-21:02/59	20:53		19:43		18:30		16:25	15:53
11	04:56	05:37-06:01/24	05:43		06:37	18:15-19:07/52	07:30		07:29	08:17
	21:38	20:03-21:01/58	20:51		19:40		18:28		16:23	15:53
12	04:58	05:37-06:01/24	05:45		06:39	18:13-19:05/52	07:32		07:31	08:18
	21:38	20:04-21:00/56	20:49		19:38		18:25		16:22	15:53
13	04:59	05:38-06:01/23	05:47		06:41	18:12-19:04/52	07:34		07:33	08:20
	21:37	20:04-21:00/56	20:47		19:35		18:23		16:20	15:53
14	05:00	05:38-06:00/22	05:49		06:43	18:11-19:01/50	07:36		07:35	08:21
	21:36	20:04-20:59/55	20:45		19:33		18:21		16:18	15:53
15	05:01	05:38-06:00/22	05:50		06:44	18:11-19:00/49	07:38		07:36	08:21
	21:35	20:04-20:57/53	20:43		19:31		18:18		16:17	15:53
16	05:03	05:39-06:01/22	05:52	19:08-19:13/5	06:46	18:09-18:57/48	07:40		07:38	08:22
	21:33	20:05-20:56/51	20:41		19:28		18:16		16:15	15:53
17	05:04	05:40-06:00/20	05:54	19:03-19:16/13	06:48	18:09-18:55/46	07:41		07:40	08:23
	21:32	20:06-20:56/50	20:38		19:26		18:14		16:14	15:53
18	05:05	05:40-05:59/19	05:55	19:01-19:19/18	06:49	18:09-18:54/45	07:43		07:42	08:24
	21:31	20:06-20:54/48	20:36		19:23		18:11		16:12	15:53
19	05:07	05:40-05:58/18	05:57	18:58-19:20/22	06:51	18:08-18:50/42	07:45		07:44	08:25
	21:30	20:06-20:53/47	20:34		19:21		18:09		16:11	15:54
20	05:08	05:42-05:58/16	05:59	18:57-19:21/24	06:53	18:08-18:49/41	07:47		07:46	08:25
	21:29	20:07-20:51/44	20:32		19:18		18:07		16:10	15:54
21	05:09	05:43-05:57/14	06:01	18:56-19:22/26	06:55	18:08-18:46/38	07:49		07:47	08:26
	21:27	20:08-20:50/42	20:30		19:16		18:05		16:08	15:54
22	05:11	05:44-05:56/12	06:02	18:54-19:22/28	06:56	18:09-18:43/34	07:51		07:49	08:27
	21:26	20:09-20:48/39	20:27		19:13		18:03		16:07	15:55
23	05:12	05:46-05:54/8	06:04	18:53-19:23/30	06:58	18:08-18:41/33	07:53		07:51	08:27
	21:24	20:10-20:47/37	20:25		19:11		18:00		16:06	15:55
24	05:14	20:11-20:44/33	06:06	18:53-19:23/30	07:00	18:08-18:39/31	07:55		07:53	08:27
	21:23		20:23		19:08		17:58		16:05	15:56
25	05:15	20:12-20:41/29	06:08	18:51-19:23/32	07:02	18:08-18:37/29	06:56		07:54	08:28
	21:22		20:21		19:06		16:56		16:04	15:57
26	05:17	20:14-20:40/26	06:09	18:51-19:23/32	07:04	18:08-18:34/26	06:58		07:56	08:28
	21:20		20:18		19:04		16:54		16:03	15:57
27	05:18	20:16-20:38/22	06:11	18:48-19:23/35	07:05	18:08-18:31/23	07:00		07:58	08:28
	21:18		20:16		19:01		16:52		16:02	15:58
28	05:20	20:20-20:37/17	06:13	18:44-19:23/39	07:07	18:08-18:28/20	07:02		07:59	08:29
	21:17		20:14		18:59		16:50		16:01	15:59
29	05:22	20:25-20:34/9	06:15	18:42-19:22/40	07:09	18:09-18:26/17	07:04		08:01	08:29
	21:15		20:11		18:56		16:48		16:00	16:00
30	05:23		06:16	18:40-19:22/42	07:11	18:11-18:24/13	07:06		08:02	08:29
	21:13		20:09		18:54		16:46		15:59	16:01
31	05:25		06:18	18:38-19:21/43			07:08			08:29
	21:12		20:07				16:44			16:02
Sonnenscheinstunden	510		459		382		329		260	235
Anzahl Minuten mit Schatten	1887		459		1191		8		0	0

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten
	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 7 - W6

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:29 16:03	07:59 16:54	07:02 08:01-08:25/24 17:49	06:48 19:46	05:40 19:41-20:11/30 20:41	04:51 20:43-20:55/12 21:30
2	08:29 16:04	07:57 16:56	07:00 08:08-08:22/14 17:51	06:46 19:48	05:38 19:41-20:11/30 20:43	04:50 20:44-20:57/13 21:31
3	08:28 16:05	07:56 16:58	06:58 08:12-08:18/6 17:52	06:43 19:50	05:36 19:42-20:12/30 20:44	04:49 20:43-20:58/15 21:32
4	08:28 16:06	07:54 17:00	06:56 17:54	06:41 19:52	05:34 19:42-20:12/30 20:46	04:49 20:42-20:59/17 21:33
5	08:28 16:08	07:52 17:01	06:53 17:56	06:39 19:54	05:32 19:44-20:13/29 20:48	04:48 20:43-21:00/17 21:35
6	08:27 16:09	07:50 17:03	06:51 17:58	06:36 07:00-07:06/6 19:55	05:30 19:45-20:13/28 20:50	04:47 20:42-21:01/19 21:36
7	08:27 16:10	07:49 17:05	06:49 18:00	06:34 06:57-07:08/11 19:57	05:28 19:47-20:13/26 20:51	04:46 20:41-21:01/20 21:37
8	08:27 16:12	07:47 17:07	06:46 18:02	06:31 06:55-07:09/14 19:59	05:26 19:52-20:12/20 20:53	04:46 20:42-21:03/21 21:38
9	08:26 16:13	07:45 08:14-08:23/9 17:09	06:44 18:04	06:29 06:53-07:10/17 20:01	05:24 19:53-20:13/20 20:55	04:45 20:42-21:04/22 21:38
10	08:25 16:15	07:43 08:10-08:26/16 17:11	06:41 18:06	06:27 06:50-07:10/20 20:03	05:22 19:53-20:12/19 20:57	04:45 20:42-21:04/22 21:39
11	08:25 16:16	07:41 08:08-08:28/20 17:13	06:39 18:08	06:24 06:48-07:10/22 20:04	05:21 19:53-20:11/18 20:58	04:44 20:42-21:05/23 21:40
12	08:24 16:18	07:39 08:07-08:30/23 17:15	06:37 18:09	06:22 06:46-07:10/24 20:06	05:19 19:54-20:11/17 21:00	04:44 20:42-21:06/24 21:41
13	08:23 16:19	07:37 08:06-08:31/25 17:17	06:34 18:11	06:20 06:43-07:09/26 20:08 19:33-19:40/7	05:17 19:55-20:09/14 21:02	04:44 20:42-21:05/23 21:41
14	08:22 16:21	07:35 08:03-08:32/29 17:19	06:32 18:13	06:17 06:41-07:09/28 20:10 19:31-19:42/11	05:15 19:56-20:09/13 21:03	04:43 20:42-21:06/24 21:42
15	08:21 16:22	07:33 07:59-08:33/34 17:21	06:29 18:15	06:15 06:39-07:08/29 20:12 19:30-19:44/14	05:14 19:58-20:07/9 21:05	04:43 20:42-21:06/24 21:43
16	08:21 16:24	07:31 07:58-08:33/35 17:23	06:27 18:17	06:13 06:37-07:07/30 20:14 19:29-19:46/17	05:12 20:01-20:04/3 21:07	04:43 20:42-21:07/25 21:43
17	08:20 16:26	07:29 07:56-08:33/37 17:25	06:25 18:19	06:10 06:34-07:05/31 20:15 19:27-19:47/20	05:10 21:08	04:43 20:43-21:08/25 21:44
18	08:18 16:28	07:27 07:55-08:33/38 17:27	06:22 18:21	06:08 06:32-07:03/31 20:17 19:27-19:49/22	05:09 21:10	04:43 20:43-21:09/26 21:44
19	08:17 16:29	07:25 07:54-08:33/39 17:29	06:20 18:22	06:06 06:31-07:02/31 20:19 19:27-19:50/23	05:07 21:12	04:43 20:43-21:09/26 21:45
20	08:16 16:31	07:22 07:54-08:33/39 17:31	06:17 18:24	06:04 06:31-07:00/29 20:21 19:27-19:50/23	05:06 21:13	04:43 20:43-21:09/26 21:45
21	08:15 16:33	07:20 07:53-08:32/39 17:33	06:15 18:26	06:01 06:31-06:58/27 20:23 19:27-19:51/24	05:04 21:15	04:43 20:43-21:09/26 21:45
22	08:14 16:35	07:18 07:53-08:31/38 17:35	06:12 18:28	05:59 06:31-06:57/26 20:25 19:26-19:55/29	05:03 21:16	04:43 20:44-21:10/26 21:45
23	08:13 16:36	07:16 07:54-08:31/37 17:37	06:10 18:30	05:57 06:30-06:53/23 20:26 19:27-19:57/30	05:02 21:18	04:43 20:44-21:10/26 21:46
24	08:11 16:38	07:14 07:54-08:31/37 17:39	06:08 18:32	05:55 06:30-06:52/22 20:28 19:28-19:59/31	05:00 21:19	04:44 20:44-21:10/26 21:46
25	08:10 16:40	07:12 07:54-08:30/36 17:41	06:05 18:33	05:52 06:30-06:50/20 20:30 19:29-20:00/31	04:59 21:21	04:44 20:45-21:10/25 21:46
26	08:08 16:42	07:09 07:55-08:29/34 17:43	06:03 18:35	05:50 06:31-06:49/18 20:32 19:30-20:01/31	04:58 21:22	04:44 20:45-21:10/25 21:46
27	08:07 16:44	07:07 07:57-08:28/31 17:45	06:00 18:37	05:48 06:32-06:47/15 20:34 19:31-20:01/30	04:56 21:24	04:45 20:45-21:10/25 21:46
28	08:06 16:46	07:05 07:59-08:26/27 17:47	05:58 18:39	05:46 06:34-06:44/10 20:35 19:33-20:02/29	04:55 21:25	04:45 20:45-21:09/24 21:45
29	08:04 16:48		06:55 19:41	05:44 06:37-06:40/3 20:37 19:35-20:08/33	04:54 20:48-20:52/4 21:26	04:46 20:46-21:10/24 21:45
30	08:02 16:50		06:53 19:43	05:42 19:41-20:09/28 20:39	04:53 20:46-20:54/8 21:28	04:47 20:46-21:09/23 21:45
31	08:01 16:52		06:51 19:44		04:52 20:44-20:55/11 21:29	
Sonnenscheinstunden	252	274	367	419	492	508
Anzahl Minuten mit Schatten	0	623	44	946	359	674

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten
	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 7 - W6

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli	August	September	Oktober	November	Dezember
1	04:47 20:46-21:09/23 21:45	05:26 20:04-20:21/17 21:10	06:20 06:47-07:09/22 20:04	07:12 18:51	07:10 07:40-07:55/15 16:42	08:04 15:58
2	04:48 20:47-21:09/22 21:44	05:28 20:03-20:22/19 21:08	06:22 06:49-07:09/20 20:02	07:14 18:49	07:12 07:44-07:52/8 16:40	08:06 15:57
3	04:49 20:46-21:08/22 21:44	05:30 20:03-20:22/19 21:07	06:23 06:51-07:08/17 20:00	07:16 18:47	07:14 16:38	08:07 15:57
4	04:50 20:47-21:08/21 21:43	05:31 20:02-20:22/20 21:05	06:25 06:52-07:06/14 19:57	07:18 18:44	07:16 16:36	08:09 15:56
5	04:50 20:48-21:08/20 21:43	05:33 20:02-20:23/21 21:03	06:27 06:54-07:05/11 19:55	07:20 18:42	07:17 16:34	08:10 15:55
6	04:51 20:48-21:07/19 21:42	05:35 19:56-20:22/26 21:01	06:29 06:56-07:02/6 19:52	07:21 18:39	07:19 16:32	08:11 15:55
7	04:52 20:49-21:07/18 21:42	05:37 19:54-20:22/28 20:59	06:30 19:50	07:23 18:37	07:21 16:30	08:13 15:54
8	04:53 20:49-21:06/17 21:41	05:38 19:53-20:22/29 20:57	06:32 19:48	07:25 18:35	07:23 16:29	08:14 15:54
9	04:54 20:50-21:06/16 21:40	05:40 19:52-20:21/29 20:55	06:34 19:45	07:27 18:32	07:25 16:27	08:15 15:54
10	04:55 20:51-21:05/14 21:39	05:42 19:51-20:21/30 20:53	06:36 19:43	07:29 18:30	07:27 16:25	08:16 15:53
11	04:56 20:51-21:04/13 21:39	05:43 19:50-20:20/30 20:51	06:37 19:40	07:30 08:44-08:54/10 18:28	07:29 16:23	08:17 15:53
12	04:58 20:52-21:03/11 21:38	05:45 19:50-20:19/29 20:49	06:39 19:38	07:32 08:37-08:57/20 18:25	07:31 16:22	08:19 15:53
13	04:59 20:53-21:03/10 21:37	05:47 19:50-20:17/27 20:47	06:41 19:35	07:34 08:33-08:59/26 18:23	07:33 16:20	08:20 15:53
14	05:00 20:55-21:02/7 21:36	05:49 06:43-06:49/6 20:45 19:42-20:15/33	06:43 19:33	07:36 08:31-09:00/29 18:21	07:35 16:18	08:21 15:53
15	05:01 21:35	05:50 06:41-06:52/11 20:43 19:40-20:09/29	06:44 19:31	07:38 08:29-09:01/32 18:18	07:36 16:17	08:22 15:53
16	05:03 21:34	05:52 06:39-06:55/16 20:41 19:39-20:09/30	06:46 19:28	07:40 08:27-09:02/35 18:16	07:38 16:15	08:22 15:53
17	05:04 21:32	05:54 06:37-06:56/19 20:38 19:36-20:08/32	06:48 19:26	07:41 08:26-09:02/36 18:14	07:40 16:14	08:23 15:53
18	05:05 21:31	05:55 06:37-06:57/20 20:36 19:35-20:07/32	06:50 19:23	07:43 08:25-09:02/37 18:11	07:42 16:12	08:24 15:53
19	05:07 21:30	05:57 06:36-06:59/23 20:34 19:33-20:04/31	06:51 19:21	07:45 08:25-09:02/37 18:09	07:44 16:11	08:25 15:54
20	05:08 21:29	05:59 06:35-06:59/24 20:32 19:32-20:03/31	06:53 19:18	07:47 08:25-09:03/38 18:07	07:46 16:10	08:25 15:54
21	05:09 21:27	06:01 06:35-07:01/26 19:32-19:55/23 20:30 19:56-20:00/4	06:55 19:16	07:49 08:25-09:03/38 18:05	07:47 16:08	08:26 15:54
22	05:11 21:26	06:02 06:35-07:03/28 20:27 19:30-19:54/24	06:57 19:13	07:51 08:25-09:03/38 18:03	07:49 16:07	08:27 15:55
23	05:12 21:25	06:04 06:35-07:04/29 20:25 19:30-19:54/24	06:58 19:11	07:53 08:25-09:03/38 18:00	07:51 16:06	08:27 15:55
24	05:14 21:23	06:06 06:35-07:06/31 20:23 19:30-19:54/24	07:00 19:09	07:55 08:25-09:03/38 17:58	07:53 16:05	08:27 15:56
25	05:15 21:22	06:08 06:36-07:07/31 20:21 19:29-19:52/23	07:02 19:06	06:56 07:26-08:03/37 16:56	07:54 16:04	08:28 15:57
26	05:17 21:20	06:09 06:37-07:08/31 20:18 19:30-19:50/20	07:04 19:04	06:58 07:27-08:03/36 16:54	07:56 16:03	08:28 15:57
27	05:18 21:18	06:11 06:39-07:09/30 20:16 19:31-19:48/17	07:05 19:01	07:00 07:29-08:02/33 16:52	07:58 16:02	08:28 15:58
28	05:20 20:10-20:16/6 21:17	06:13 06:41-07:10/29 20:14 19:31-19:45/14	07:07 18:59	07:02 07:33-08:01/28 16:50	07:59 16:01	08:29 15:59
29	05:22 20:07-20:18/11 21:15	06:15 06:42-07:10/28 20:11 19:32-19:43/11	07:09 18:56	07:04 07:36-08:00/24 16:48	08:01 16:00	08:29 16:00
30	05:23 20:06-20:20/14 21:14	06:16 06:44-07:10/26 20:09 19:34-19:41/7	07:11 18:54	07:06 07:37-07:59/22 16:46	08:03 15:59	08:29 16:01
31	05:25 20:05-20:20/15 21:12	06:18 06:46-07:10/24 20:07		07:08 07:38-07:58/20 16:44		08:29 16:02
Sonnenscheinstunden	510	459	382	329	260	235
Anzahl Minuten mit Schatten	279	1165	90	652	23	0

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM) Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 8 - W7

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar		März		April		Mai		Juni
1	08:29	14:26-15:08/42	07:59		07:02	07:56-08:50/54	06:48		05:40	06:07-06:47/40	04:51
	16:03		16:54		17:40		19:46		20:41		21:30
2	08:29	14:28-15:08/40	07:58		07:00	07:57-08:49/52	06:46		05:38	06:05-06:45/40	04:50
	16:04		16:56		17:51		19:48		20:43		21:31
3	08:28	14:30-15:09/39	07:56		06:58	07:58-08:49/51	06:43		05:36	06:04-06:43/39	04:49
	16:05		16:58		17:52		19:50		20:44		21:32
4	08:28	14:31-15:09/38	07:54		06:56	07:59-08:48/49	06:41		05:34	06:02-06:42/40	04:49
	16:06		17:00		17:54		19:52		20:46		21:33
5	08:28	14:34-15:10/36	07:52		06:53	08:00-08:47/47	06:39		05:32	06:01-06:41/40	04:48
	16:08		17:02		17:56		19:54		20:48		21:35
6	08:27	14:35-15:10/35	07:51		06:51	08:02-08:46/44	06:36		05:30	05:59-06:40/41	04:47
	16:09		17:03		17:58		19:55		20:50		21:36
7	08:27	14:40-15:11/31	07:49		06:49	08:04-08:45/41	06:34		05:28	05:58-06:38/40	04:46
	16:10		17:05		18:00		19:57		20:51		21:37
8	08:27	14:41-15:11/30	07:47		06:46	08:07-08:43/36	06:31		05:26	05:57-06:37/40	04:46
	16:12		17:07		18:02		19:59		20:53		21:38
9	08:26	14:43-15:11/28	07:45	08:23-08:38/15	06:44	08:14-08:41/27	06:29		05:24	05:57-06:36/39	04:45
	16:13		17:09		18:04		20:01		20:55		21:38
10	08:25	14:45-15:11/26	07:43	08:19-08:42/23	06:41	08:15-08:38/23	06:27		05:22	05:56-06:34/38	04:45
	16:15		17:11		18:06		20:03		20:57		21:39
11	08:25	14:46-15:11/25	07:41	08:17-08:44/27	06:39	08:18-08:36/18	06:24		05:21	05:56-06:32/36	04:44
	16:16		17:13		18:08		20:05		20:58		21:40
12	08:24	14:47-15:11/24	07:39	08:15-08:46/31	06:37	08:22-08:30/8	06:22		05:19	05:56-06:32/36	04:44
	16:18		17:15		18:09		20:06		21:00		21:41
13	08:23	14:49-15:11/22	07:37	08:14-08:47/33	06:34		06:20		05:17	05:56-06:30/34	04:44
	16:19		17:17		18:11		20:08		21:02		21:42
14	08:22	14:51-15:11/20	07:35	08:13-08:49/36	06:32		06:17		05:15	05:56-06:29/33	04:43
	16:21		17:19		18:13		20:10		21:03		21:42
15	08:21	14:52-15:11/19	07:33	08:11-08:50/39	06:29		06:15	06:41-06:52/11	05:14	05:56-06:27/31	04:43
	16:22		17:21		18:15		20:12		21:05		21:43
16	08:21	14:53-15:11/18	07:31	08:05-08:50/45	06:27		06:13	06:39-06:54/15	05:12	05:56-06:26/30	04:43
	16:24		17:23		18:17		20:14		21:07		21:43
17	08:20	14:54-15:10/16	07:29	08:02-08:50/48	06:25		06:10	06:36-06:54/18	05:10	05:56-06:24/28	04:43
	16:26		17:25		18:19		20:15		21:08		21:44
18	08:19	14:56-15:10/14	07:27	08:00-08:51/51	06:22		06:08	06:34-06:55/21	05:09	05:57-06:24/27	04:43
	16:28		17:27		18:21		20:17		21:10		21:44
19	08:17	14:57-15:08/11	07:25	07:59-08:51/52	06:20		06:06	06:32-06:56/24	05:07	05:57-06:22/25	04:43
	16:29		17:29		18:22		20:19		21:12		21:45
20	08:16	15:01-15:05/4	07:23	07:58-08:52/54	06:17		06:04	06:31-06:56/25	05:06	05:57-06:22/25	04:43
	16:31		17:31		18:24		20:21		21:13		21:45
21	08:15		07:20	07:57-08:51/54	06:15		06:01	06:29-06:57/28	05:04	05:58-06:21/23	04:43
	16:33		17:33		18:26		20:23		21:15		21:45
22	08:14		07:18	07:56-08:51/55	06:13		05:59	06:26-06:57/31	05:03	05:59-06:20/21	04:43
	16:35		17:35		18:28		20:25		21:16		21:45
23	08:13		07:16	07:56-08:51/55	06:10		05:57	06:24-06:56/32	05:02	05:59-06:18/19	04:43
	16:37		17:37		18:30		20:26		21:18		21:46
24	08:11		07:14	07:56-08:51/55	06:08		05:55	06:21-06:55/34	05:00	06:01-06:17/16	04:44
	16:38		17:39		18:32		20:28		21:19		21:46
25	08:10		07:12	07:55-08:50/55	06:05		05:53	06:19-06:55/36	04:59	06:02-06:16/14	04:44
	16:40		17:41		18:33		20:30		21:21		21:46
26	08:08		07:09	07:55-08:51/56	06:03		05:50	06:17-06:54/37	04:58	06:03-06:14/11	04:44
	16:42		17:43		18:35		20:32		21:22		21:46
27	08:07		07:07	07:56-08:51/55	06:00		05:48	06:15-06:53/38	04:56	06:06-06:12/6	04:45
	16:44		17:45		18:37		20:34		21:24		21:46
28	08:06		07:05	07:55-08:50/55	05:58		05:46	06:13-06:52/39	04:55		04:45
	16:46		17:47		18:39		20:35		21:25		21:45
29	08:04				06:55		05:44	06:11-06:50/39	04:54		04:46
	16:48				19:41		20:37		21:26		21:45
30	08:02				06:53		05:42	06:09-06:49/40	04:53		04:47
	16:50				19:43		20:39		21:28		21:45
31	08:01				06:51				04:52		
	16:52				19:44				21:29		
Sonnenscheinstunden	252		274		367		419		492		508
Anzahl Minuten mit Schatten	518		894		450		468		812		0

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten
	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 8 - W7

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September	Oktober		November		Dezember	
1	04:47		05:27	06:06-06:42/36	06:20	07:12		07:10	07:49-08:11/22	08:04	14:28-14:53/25
	21:45		21:10		20:04	18:51		16:42		15:58	
2	04:48		05:28	06:06-06:43/37	06:22	07:14	08:58-09:12/14	07:12	07:53-08:07/14	08:06	14:28-14:54/26
	21:44		21:08		20:02	18:49		16:40		15:57	
3	04:49		05:30	06:07-06:45/38	06:23	07:16	08:54-09:15/21	07:14		08:07	14:27-14:55/28
	21:44		21:07		20:00	18:47		16:38		15:57	
4	04:50		05:31	06:08-06:47/39	06:25	07:18	08:52-09:17/25	07:16		08:09	14:26-14:55/29
	21:43		21:05		19:57	18:44		16:36		15:56	
5	04:50		05:33	06:08-06:47/39	06:27	07:20	08:48-09:19/31	07:18		08:10	14:25-14:56/31
	21:43		21:03		19:55	18:42		16:34		15:55	
6	04:51		05:35	06:09-06:49/40	06:29	07:21	08:42-09:20/38	07:19		08:11	14:22-14:56/34
	21:42		21:01		19:52	18:39		16:32		15:55	
7	04:52		05:37	06:09-06:50/41	06:30	07:23	08:39-09:21/42	07:21		08:13	14:21-14:57/36
	21:42		20:59		19:50	18:37		16:30		15:54	
8	04:53		05:38	06:10-06:51/41	06:32	07:25	08:37-09:21/44	07:23		08:14	14:19-14:57/38
	21:41		20:57		19:48	18:35		16:29		15:54	
9	04:54		05:40	06:11-06:51/40	06:34	07:27	08:34-09:22/48	07:25		08:15	14:18-14:57/39
	21:40		20:55		19:45	18:32		16:27		15:54	
10	04:55		05:42	06:13-06:52/39	06:36	07:29	08:32-09:23/51	07:27		08:16	14:17-14:58/41
	21:39		20:53		19:43	18:30		16:25		15:53	
11	04:57		05:43	06:15-06:55/40	06:37	07:30	08:31-09:23/52	07:29		08:17	14:18-14:59/41
	21:39		20:51		19:40	18:28		16:23		15:53	
12	04:58		05:45	06:16-06:56/40	06:39	07:32	08:30-09:23/53	07:31		08:19	14:17-14:59/42
	21:38		20:49		19:38	18:25		16:22		15:53	
13	04:59		05:47	06:18-06:57/39	06:41	07:34	08:29-09:23/54	07:33		08:20	14:17-14:59/42
	21:37		20:47		19:35	18:23		16:20		15:53	
14	05:00		05:49	06:19-06:58/39	06:43	07:36	08:28-09:23/55	07:35		08:21	14:17-15:00/43
	21:36		20:45		19:33	18:21		16:18		15:53	
15	05:01		05:50	06:21-07:00/39	06:44	07:38	08:28-09:23/55	07:36		08:22	14:17-15:00/43
	21:35		20:43		19:31	18:18		16:17		15:53	
16	05:03	06:17-06:19/2	05:52	06:23-07:01/38	06:46	07:40	08:27-09:23/56	07:38		08:22	14:17-15:01/44
	21:34		20:41		19:28	18:16		16:15		15:53	
17	05:04	06:14-06:22/8	05:54	06:24-07:01/37	06:48	07:41	08:27-09:23/56	07:40		08:23	14:16-15:00/44
	21:32		20:39		19:26	18:14		16:14		15:53	
18	05:05	06:12-06:24/12	05:56	06:26-07:01/35	06:50	07:43	08:27-09:22/55	07:42		08:24	14:16-15:01/45
	21:31		20:36		19:23	18:11		16:13		15:53	
19	05:07	06:11-06:26/15	05:57	06:28-07:02/34	06:51	07:45	08:27-09:23/56	07:44		08:25	14:16-15:02/46
	21:30		20:34		19:21	18:09		16:11		15:54	
20	05:08	06:11-06:28/17	05:59	06:29-07:01/32	06:53	07:47	08:28-09:22/54	07:46		08:25	14:17-15:03/46
	21:29		20:32		19:18	18:07		16:10		15:54	
21	05:09	06:09-06:29/20	06:01	06:31-07:01/30	06:55	07:49	08:28-09:22/54	07:47		08:26	14:17-15:03/46
	21:27		20:30		19:16	18:05		16:08		15:54	
22	05:11	06:08-06:30/22	06:02	06:34-07:01/27	06:57	07:51	08:29-09:22/53	07:49	14:37-14:41/4	08:27	14:18-15:04/46
	21:26		20:28		19:13	18:03		16:07		15:55	
23	05:12	06:08-06:32/24	06:04	06:34-07:00/26	06:58	07:53	08:30-09:22/52	07:51	14:34-14:45/11	08:27	14:18-15:04/46
	21:25		20:25		19:11	18:00		16:06		15:55	
24	05:14	06:08-06:33/25	06:06	06:36-07:00/24	07:00	07:55	08:31-09:21/50	07:53	14:33-14:47/14	08:28	14:18-15:04/46
	21:23		20:23		19:09	17:58		16:05		15:56	
25	05:15	06:08-06:33/25	06:08	06:38-06:59/21	07:02	06:56	07:33-08:21/48	07:54	14:32-14:48/16	08:28	14:20-15:05/45
	21:22		20:21		19:06	16:56		16:04		15:57	
26	05:17	06:07-06:35/28	06:09	06:39-06:57/18	07:04	06:58	07:35-08:20/45	07:56	14:32-14:50/18	08:28	14:20-15:05/45
	21:20		20:18		19:04	16:54		16:03		15:57	
27	05:18	06:06-06:35/29	06:11	06:41-06:56/15	07:05	07:00	07:42-08:19/37	07:58	14:31-14:50/19	08:28	14:21-15:06/45
	21:18		20:16		19:01	16:52		16:02		15:58	
28	05:20	06:07-06:37/30	06:13	06:43-06:54/11	07:07	07:02	07:43-08:18/35	07:59	14:31-14:51/20	08:29	14:22-15:06/44
	21:17		20:14		18:59	16:50		16:01		15:59	
29	05:22	06:06-06:38/32	06:15		07:09	07:04	07:44-08:17/33	08:01	14:30-14:52/22	08:29	14:24-15:07/43
	21:15		20:11		18:56	16:48		16:00		16:00	
30	05:23	06:06-06:40/34	06:16		07:11	07:06	07:45-08:15/30	08:03	14:30-14:53/23	08:29	14:25-15:07/42
	21:14		20:09		18:54	16:46		15:59		16:01	
31	05:25	06:06-06:41/35	06:18			07:08	07:47-08:13/26			08:29	14:26-15:08/42
	21:12		20:07			16:44				16:02	
Sonnenscheinstunden	510		459		382	329		260		235	
Anzahl Minuten mit Schatten	358		935		0	1323		183		1253	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten
	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 9 - W8

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar	März		April	Mai		Juni	
1	08:29	13:17-13:33/16	07:59	07:02		06:48	05:40		04:51	20:14-20:49/35
	16:03		16:54	17:49		19:46	20:41		21:30	
2	08:29	13:18-13:33/15	07:57	07:00		06:46	05:38		04:50	20:14-20:50/36
	16:04		16:56	17:51		19:48	20:43		21:31	
3	08:28	13:20-13:33/13	07:56	06:58		06:43	05:36		04:49	20:52-20:55/3
	16:05		16:58	17:52		19:50	20:44		21:32	20:16-20:50/34
4	08:28	13:21-13:31/10	07:54	06:56		06:41	05:34		04:48	20:17-20:57/40
	16:06		16:59	17:54		19:52	20:46		21:33	
5	08:28	13:24-13:30/6	07:52	06:53	07:19-07:22/3	06:39	05:32		04:48	20:17-20:59/42
	16:08		17:01	17:56		19:54	20:48		21:35	
6	08:27		07:50	06:51	07:15-07:27/12	06:36	05:30	20:11-20:19/8	04:47	20:18-21:00/42
	16:09		17:03	17:58		19:55	20:50		21:36	
7	08:27		07:49	06:49	07:13-07:29/16	06:34	05:28	20:09-20:21/12	04:46	20:19-21:00/41
	16:10		17:05	18:00		19:57	20:51		21:37	
8	08:27		07:47	06:46	07:10-07:29/19	06:31	05:26	20:08-20:22/14	04:46	20:20-21:01/41
	16:12		17:07	18:02		19:59	20:53		21:38	
9	08:26		07:45	06:44	07:08-07:31/23	06:29	05:24	20:08-20:25/17	04:45	20:21-21:02/41
	16:13		17:09	18:04		20:01	20:55		21:38	
10	08:25		07:43	06:41	07:05-07:30/25	06:27	05:22	20:07-20:26/19	04:45	20:21-21:02/41
	16:15		17:11	18:06		20:03	20:57		21:39	
11	08:25		07:41	06:39	07:04-07:31/27	06:24	05:21	20:06-20:27/21	04:44	20:23-21:03/40
	16:16		17:13	18:08		20:04	20:58		21:40	
12	08:24		07:39	06:37	07:02-07:30/28	06:22	05:19	20:06-20:28/22	04:44	20:24-21:04/40
	16:18		17:15	18:09		20:06	21:00		21:41	
13	08:23		07:37	06:34	07:01-07:30/29	06:20	05:17	20:05-20:29/24	04:44	20:30-21:04/34
	16:19		17:17	18:11		20:08	21:02		21:42	20:24-20:29/5
14	08:22		07:35	06:32	07:01-07:30/29	06:17	05:15	20:05-20:30/25	04:43	20:30-21:04/34
	16:21		17:19	18:13		20:10	21:03		21:42	20:27-20:28/1
15	08:21		07:33	06:29	07:00-07:29/29	06:15	05:14	20:05-20:32/27	04:43	20:31-21:05/34
	16:22		17:21	18:15		20:12	21:05		21:43	
16	08:21		07:31	06:27	06:59-07:29/30	06:13	05:12	20:05-20:32/27	04:43	20:31-21:05/34
	16:24		17:23	18:17		20:14	21:07		21:43	
17	08:20		07:29	06:25	06:58-07:28/30	06:10	05:10	20:06-20:33/27	04:43	20:31-21:05/34
	16:26		17:25	18:19		20:15	21:08		21:44	
18	08:18		07:27	06:22	06:57-07:27/30	06:08	05:09	20:06-20:34/28	04:43	20:31-21:06/35
	16:28		17:27	18:21		20:17	21:10		21:44	
19	08:17		07:25	06:20	06:56-07:25/29	06:06	05:07	20:06-20:34/28	04:43	20:32-21:06/34
	16:29		17:29	18:22		20:19	21:12		21:45	
20	08:16		07:22	06:17	06:57-07:23/26	06:04	05:06	20:06-20:34/28	04:43	20:32-21:06/34
	16:31		17:31	18:24		20:21	21:13		21:45	
21	08:15		07:20	06:15	06:56-07:21/25	06:01	05:04	20:07-20:35/28	04:43	20:32-21:06/34
	16:33		17:33	18:26		20:23	21:15		21:45	
22	08:14		07:18	06:12	06:57-07:20/23	05:59	05:03	20:07-20:41/34	04:43	20:33-21:07/34
	16:35		17:35	18:28		20:25	21:16		21:45	
23	08:13		07:16	06:10	06:58-07:20/22	05:57	05:01	20:07-20:43/36	04:43	20:33-21:07/34
	16:36		17:37	18:30		20:26	21:18		21:46	
24	08:11		07:14	06:08	06:58-07:18/20	05:55	05:00	20:08-20:45/37	04:44	20:32-21:07/35
	16:38		17:39	18:32		20:28	21:19		21:46	
25	08:10		07:12	06:05	06:59-07:17/18	05:52	04:59	20:09-20:46/37	04:44	20:33-21:08/35
	16:40		17:41	18:33		20:30	21:21		21:46	
26	08:08		07:09	06:03	07:00-07:14/14	05:50	04:58	20:10-20:47/37	04:44	20:33-21:07/34
	16:42		17:43	18:35		20:32	21:22		21:46	
27	08:07		07:07	06:00	07:04-07:10/6	05:48	04:56	20:10-20:48/38	04:45	20:34-21:08/34
	16:44		17:45	18:37		20:34	21:24		21:46	
28	08:05		07:05	05:58		05:46	04:55	20:11-20:48/37	04:45	20:33-21:07/34
	16:46		17:47	18:39		20:35	21:25		21:45	
29	08:04			06:55		05:44	04:54	20:12-20:49/37	04:46	20:34-21:08/34
	16:48			19:41		20:37	21:26		21:45	20:29-20:33/4
30	08:02			06:53		05:42	04:53	20:13-20:49/36	04:47	20:34-21:07/33
	16:50			19:43		20:39	21:28		21:45	20:28-20:33/5
31	08:01			06:51			04:52	20:13-20:49/36		
	16:52			19:44			21:29			
Sonnenscheinstunden	251		274	367		419	492		508	
Anzahl Minuten mit Schatten		60		0	513		0	720		1105

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten
	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 9 - W8

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November	Dezember	
1	04:47 21:45	20:27-21:08/41	05:26 21:10	20:16-20:38/22	06:20 20:04		07:12 18:51	07:41-08:10/29	07:10 16:42	08:04 15:58	
2	04:48 21:44	20:27-21:08/41	05:28 21:08	20:16-20:37/21	06:22 20:02		07:14 18:49	07:41-08:09/28	07:12 16:40	08:06 15:57	
3	04:49 21:44	20:26-21:07/41	05:30 21:07	20:17-20:36/19	06:23 20:00		07:16 18:47	07:42-08:09/27	07:14 16:38	08:07 15:57	
4	04:50 21:43	20:25-21:07/42	05:31 21:05	20:17-20:33/16	06:25 19:57		07:18 18:44	07:44-08:08/24	07:16 16:36	08:09 15:56	
5	04:50 21:43	20:25-21:07/42	05:33 21:03	20:19-20:32/13	06:27 19:55		07:20 18:42	07:46-08:07/21	07:17 16:34	08:10 15:55	
6	04:51 21:42	20:25-21:06/41	05:35 21:01	20:19-20:30/11	06:29 19:52		07:21 18:39	07:48-08:06/18	07:19 16:32	08:11 15:55	
7	04:52 21:42	20:25-21:06/41	05:36 20:59	20:22-20:28/6	06:30 19:50		07:23 18:37	07:50-08:04/14	07:21 16:30	08:13 15:54	13:12-13:17/5
8	04:53 21:41	20:24-21:05/41	05:38 20:57		06:32 19:48		07:25 18:35	07:52-08:01/9	07:23 16:28	08:14 15:54	13:09-13:19/10
9	04:54 21:40	20:24-21:04/40	05:40 20:55		06:34 19:45		07:27 18:32		07:25 16:27	08:15 15:54	13:08-13:21/13
10	04:55 21:39	20:23-20:58/35	05:42 20:53		06:36 19:43		07:29 18:30		07:27 16:25	08:16 15:53	13:07-13:22/15
11	04:56 21:39	20:22-20:58/36	05:43 20:51		06:37 19:40		07:30 18:28		07:29 16:23	08:17 15:53	13:08-13:24/16
12	04:58 21:38	20:22-20:58/36	05:45 20:49		06:39 19:38		07:32 18:25		07:31 16:22	08:19 15:53	13:07-13:25/18
13	04:59 21:37	20:21-20:58/37	05:47 20:47		06:41 19:35		07:34 18:23		07:33 16:20	08:20 15:53	13:07-13:27/20
14	05:00 21:36	20:21-20:57/36	05:49 20:45		06:43 19:33		07:36 18:21		07:35 16:18	08:21 15:53	13:07-13:29/22
15	05:01 21:35	20:20-20:57/37	05:50 20:43		06:44 19:31		07:38 18:18		07:36 16:17	08:22 15:53	13:07-13:30/23
16	05:03 21:34	20:19-20:56/37	05:52 20:41		06:46 19:28		07:40 18:16		07:38 16:15	08:22 15:53	13:08-13:31/23
17	05:04 21:32	20:19-20:57/38	05:54 20:38		06:48 19:26	07:49-08:01/12	07:41 18:14		07:40 16:14	08:23 15:53	13:07-13:31/24
18	05:05 21:31	20:19-20:56/37	05:55 20:36		06:50 19:23	07:47-08:04/17	07:43 18:11		07:42 16:12	08:24 15:53	13:07-13:32/25
19	05:07 21:30	20:18-20:55/37	05:57 20:34		06:51 19:21	07:45-08:05/20	07:45 18:09		07:44 16:11	08:25 15:54	13:08-13:33/25
20	05:08 21:29	20:17-20:54/37	05:59 20:32		06:53 19:18	07:43-08:05/22	07:47 18:07		07:46 16:10	08:25 15:54	13:09-13:34/25
21	05:09 21:27	20:17-20:53/36	06:01 20:30		06:55 19:16	07:42-08:06/24	07:49 18:05		07:47 16:08	08:26 15:54	13:09-13:34/25
22	05:11 21:26	20:17-20:51/34	06:02 20:27		06:56 19:13	07:42-08:06/24	07:51 18:03		07:49 16:07	08:27 15:55	13:10-13:35/25
23	05:12 21:25	20:16-20:44/28	06:04 20:25		06:58 19:11	07:40-08:06/26	07:53 18:00		07:51 16:06	08:27 15:55	13:10-13:35/25
24	05:14 21:23	20:17-20:45/28	06:06 20:23		07:00 19:08	07:40-08:08/28	07:55 17:58		07:53 16:05	08:27 15:56	13:10-13:35/25
25	05:15 21:22	20:16-20:44/28	06:08 20:21		07:02 19:06	07:40-08:09/29	06:56 16:56		07:54 16:04	08:28 15:57	13:11-13:36/25
26	05:17 21:20	20:17-20:44/27	06:09 20:18		07:04 19:04	07:40-08:10/30	06:58 16:54		07:56 16:03	08:28 15:57	13:12-13:36/24
27	05:18 21:18	20:16-20:43/27	06:11 20:16		07:05 19:01	07:40-08:10/30	07:00 16:52		07:58 16:02	08:28 15:58	13:12-13:36/24
28	05:20 21:17	20:16-20:43/27	06:13 20:14		07:07 18:59	07:40-08:10/30	07:02 16:50		07:59 16:01	08:29 15:59	13:13-13:36/23
29	05:22 21:15	20:16-20:41/25	06:15 20:11		07:09 18:56	07:40-08:10/30	07:04 16:48		08:01 16:00	08:29 16:00	13:14-13:36/22
30	05:23 21:14	20:16-20:41/25	06:16 20:09		07:11 18:54	07:41-08:10/29	07:06 16:46		08:03 15:59	08:29 16:01	13:15-13:35/20
31	05:25 21:12	20:16-20:39/23	06:18 20:07				07:08 16:44			08:29 16:02	13:16-13:35/19
Sonnenscheinstunden	510		459		382		329		260	235	
Anzahl Minuten mit Schatten	1081		108		351		170		0	521	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten
	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 10 - W9

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar		Februar	März		April	Mai		Juni	
1	08:29	10:01-10:13/12	07:59	07:02		06:48	05:40		04:51	20:08-20:53/45
	16:03		16:54	17:49		19:46	20:41		21:30	
2	08:29	10:03-10:12/9	07:57	07:00		06:46	05:38		04:50	20:09-20:54/45
	16:04		16:56	17:50		19:48	20:43		21:31	
3	08:28		07:56	06:58		06:43	05:36		04:49	20:10-20:55/45
	16:05		16:57	17:52		19:50	20:44		21:32	
4	08:28		07:54	06:55		06:41	05:34	20:04-20:12/8	04:48	20:11-20:55/44
	16:06		16:59	17:54		19:52	20:46		21:33	
5	08:28		07:52	06:53		06:39	05:32	20:02-20:16/14	04:48	20:13-20:56/43
	16:08		17:01	17:56		19:54	20:48		21:35	
6	08:27		07:50	06:51		06:36	05:30	20:00-20:17/17	04:47	20:14-20:57/43
	16:09		17:03	17:58		19:55	20:50		21:36	
7	08:27		07:49	06:48		06:34	05:28	19:59-20:19/20	04:46	20:14-20:57/43
	16:10		17:05	18:00		19:57	20:51		21:37	
8	08:27		07:47	06:46		06:31	05:26	19:58-20:21/23	04:46	20:15-20:58/43
	16:12		17:07	18:02		19:59	20:53		21:37	
9	08:26		07:45	06:44		06:29	05:24	19:58-20:23/25	04:45	20:15-20:58/43
	16:13		17:09	18:04		20:01	20:55		21:38	
10	08:25		07:43	06:41		06:27	05:22	19:57-20:24/27	04:45	20:16-20:58/42
	16:15		17:11	18:06		20:03	20:57		21:39	
11	08:25		07:41	06:39	07:03-07:06/3	06:24	05:20	19:56-20:25/29	04:44	20:17-20:59/42
	16:16		17:13	18:08		20:04	20:58		21:40	
12	08:24		07:39	06:37	07:00-07:09/9	06:22	05:19	19:56-20:27/31	04:44	20:18-21:00/42
	16:18		17:15	18:09		20:06	21:00		21:41	
13	08:23		07:37	06:34	06:58-07:10/12	06:20	05:17	19:56-20:28/32	04:44	20:17-20:59/42
	16:19		17:17	18:11		20:08	21:02		21:41	
14	08:22		07:35	06:32	06:56-07:12/16	06:17	05:15	19:55-20:30/35	04:43	20:18-21:00/42
	16:21		17:19	18:13		20:10	21:03		21:42	
15	08:21		07:33	06:29	06:53-07:11/18	06:15	05:14	19:56-20:32/36	04:43	20:19-21:00/41
	16:22		17:21	18:15		20:12	21:05		21:43	
16	08:20		07:31	06:27	06:53-07:12/19	06:13	05:12	19:55-20:33/38	04:43	20:19-21:01/42
	16:24		17:23	18:17		20:14	21:07		21:43	
17	08:19		07:29	06:25	06:52-07:11/19	06:10	05:10	19:56-20:35/39	04:43	20:19-21:01/42
	16:26		17:25	18:19		20:15	21:08		21:44	
18	08:18		07:27	06:22	06:53-07:11/18	06:08	05:09	19:57-20:36/39	04:43	20:20-21:01/41
	16:27		17:27	18:21		20:17	21:10		21:44	
19	08:17		07:25	06:20	06:52-07:10/18	06:06	05:07	19:56-20:37/41	04:43	20:20-21:01/41
	16:29		17:29	18:22		20:19	21:12		21:45	
20	08:16		07:22	06:17	06:53-07:09/16	06:04	05:06	19:57-20:39/42	04:43	20:20-21:01/41
	16:31		17:31	18:24		20:21	21:13		21:45	
21	08:15		07:20	06:15	06:54-07:07/13	06:01	05:04	19:58-20:41/43	04:43	20:20-21:01/41
	16:33		17:33	18:26		20:23	21:15		21:45	
22	08:14		07:18	06:12	06:56-07:05/9	05:59	05:03	19:58-20:41/43	04:43	20:21-21:02/41
	16:35		17:35	18:28		20:24	21:16		21:45	
23	08:13		07:16	06:10		05:57	05:01	19:59-20:43/44	04:43	20:21-21:02/41
	16:36		17:37	18:30		20:26	21:18		21:46	
24	08:11		07:14	06:08		05:55	05:00	20:00-20:44/44	04:44	20:21-21:02/41
	16:38		17:39	18:32		20:28	21:19		21:46	
25	08:10		07:11	06:05		05:52	04:59	20:01-20:45/44	04:44	20:21-21:03/42
	16:40		17:41	18:33		20:30	21:21		21:46	
26	08:08		07:09	06:03		05:50	04:58	20:02-20:46/44	04:44	20:21-21:03/42
	16:42		17:43	18:35		20:32	21:22		21:46	
27	08:07		07:07	06:00		05:48	04:56	20:03-20:47/44	04:45	20:21-21:03/42
	16:44		17:45	18:37		20:34	21:23		21:46	
28	08:05		07:05	05:58		05:46	04:55	20:04-20:48/44	04:45	20:21-21:03/42
	16:46		17:47	18:39		20:35	21:25		21:45	
29	08:04			06:55		05:44	04:54	20:05-20:48/43	04:46	20:22-21:04/42
	16:48			19:41		20:37	21:26		21:45	
30	08:02			06:53		05:42	04:53	20:06-20:51/45	04:47	20:21-21:03/42
	16:50			19:43		20:39	21:27		21:45	
31	08:01			06:51			04:52	20:07-20:52/45		
	16:52			19:44			21:29			
Sonnenscheinstunden	251		274	367		419	492		508	
Anzahl Minuten mit Schatten	21		0	170		0	979		1268	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten
	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 10 - W9

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November	Dezember
1	04:47 21:45	20:21-21:03/42	05:26 21:10	20:07-20:37/30	06:20 20:04		07:12 18:51	07:39-07:49/10	07:10 16:42	08:04 15:58
2	04:48 21:44	20:21-21:04/43	05:28 21:08	20:07-20:35/28	06:22 20:02		07:14 18:49	07:40-07:46/6	07:12 16:40	08:06 15:57
3	04:49 21:44	20:21-21:03/42	05:30 21:06	20:07-20:34/27	06:23 20:00		07:16 18:47		07:14 16:38	08:07 15:57
4	04:50 21:43	20:21-21:03/42	05:31 21:05	20:07-20:32/25	06:25 19:57		07:18 18:44		07:16 16:36	08:08 15:56
5	04:50 21:43	20:21-21:03/42	05:33 21:03	20:08-20:31/23	06:27 19:55		07:20 18:42		07:17 16:34	08:10 15:55
6	04:51 21:42	20:21-21:03/42	05:35 21:01	20:09-20:27/18	06:29 19:52		07:21 18:39		07:19 16:32	08:11 15:55
7	04:52 21:42	20:21-21:03/42	05:36 20:59	20:10-20:26/16	06:30 19:50		07:23 18:37		07:21 16:30	08:13 15:54
8	04:53 21:41	20:19-21:03/44	05:38 20:57	20:12-20:24/12	06:32 19:48		07:25 18:35		07:23 16:28	08:14 15:54
9	04:54 21:40	20:18-21:03/45	05:40 20:55	20:15-20:20/5	06:34 19:45		07:27 18:32		07:25 16:27	08:15 15:54
10	04:55 21:39	20:17-21:02/45	05:42 20:53		06:36 19:43		07:29 18:30		07:27 16:25	08:16 09:52-10:01/9 15:53
11	04:56 21:39	20:17-21:02/45	05:43 20:51		06:37 19:40		07:30 18:28		07:29 16:23	08:17 09:52-10:04/12 15:53
12	04:58 21:38	20:16-21:01/45	05:45 20:49		06:39 19:38		07:32 18:25		07:31 16:22	08:19 09:51-10:05/14 15:53
13	04:59 21:37	20:15-21:00/45	05:47 20:47		06:41 19:35		07:34 18:23		07:33 16:20	08:20 09:51-10:06/15 15:53
14	05:00 21:36	20:14-20:58/44	05:48 20:45		06:43 19:33		07:36 18:21		07:35 16:18	08:21 09:51-10:07/16 15:53
15	05:01 21:35	20:13-20:56/43	05:50 20:43		06:44 19:31		07:38 18:18		07:36 16:17	08:21 09:51-10:08/17 15:53
16	05:03 21:33	20:12-20:56/44	05:52 20:41		06:46 19:28		07:40 18:16		07:38 16:15	08:22 09:51-10:09/18 15:53
17	05:04 21:32	20:12-20:56/44	05:54 20:38		06:48 19:26		07:41 18:14		07:40 16:14	08:23 09:52-10:10/18 15:53
18	05:05 21:31	20:11-20:55/44	05:55 20:36		06:49 19:23		07:43 18:11		07:42 16:12	08:24 09:51-10:10/19 15:53
19	05:07 21:30	20:10-20:54/44	05:57 20:34		06:51 19:21		07:45 18:09		07:44 16:11	08:25 09:52-10:11/19 15:54
20	05:08 21:29	20:09-20:53/44	05:59 20:32		06:53 19:18		07:47 18:07		07:46 16:10	08:25 09:53-10:12/19 15:54
21	05:09 21:27	20:09-20:52/43	06:01 20:30		06:55 19:16	07:42-07:50/8	07:49 18:05		07:47 16:08	08:26 09:52-10:12/20 15:54
22	05:11 21:26	20:08-20:51/43	06:02 20:27		06:56 19:13	07:40-07:52/12	07:51 18:03		07:49 16:07	08:27 09:53-10:13/20 15:55
23	05:12 21:24	20:07-20:50/43	06:04 20:25		06:58 19:11	07:37-07:53/16	07:53 18:00		07:51 16:06	08:27 09:53-10:13/20 15:55
24	05:14 21:23	20:07-20:49/42	06:06 20:23		07:00 19:08	07:36-07:53/17	07:55 17:58		07:53 16:05	08:27 09:54-10:13/19 15:56
25	05:15 21:22	20:07-20:47/40	06:08 20:21		07:02 19:06	07:35-07:54/19	06:56 16:56		07:54 16:04	08:28 09:55-10:14/19 15:57
26	05:17 21:20	20:07-20:46/39	06:09 20:18		07:03 19:04	07:35-07:54/19	06:58 16:54		07:56 16:03	08:28 09:55-10:14/19 15:57
27	05:18 21:18	20:06-20:45/39	06:11 20:16		07:05 19:01	07:34-07:53/19	07:00 16:52		07:58 16:02	08:28 09:56-10:14/18 15:58
28	05:20 21:17	20:07-20:44/37	06:13 20:14		07:07 18:59	07:34-07:52/18	07:02 16:50		07:59 16:01	08:29 09:57-10:14/17 15:59
29	05:22 21:15	20:06-20:41/35	06:15 20:11		07:09 18:56	07:35-07:52/17	07:04 16:48		08:01 16:00	08:29 09:58-10:14/16 16:00
30	05:23 21:14	20:07-20:40/33	06:16 20:09		07:11 18:54	07:37-07:51/14	07:06 16:46		08:02 15:59	08:29 09:59-10:14/15 16:01
31	05:25 21:12	20:06-20:38/32	06:18 20:07				07:08 16:44			08:29 10:00-10:14/14 16:02
Sonnenscheinstunden	510		459		382		329		260	235
Anzahl Minuten mit Schatten	1297		184		159		16		0	373

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten
	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 11 - W10

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April		Mai		Juni	
1	08:29	07:59	07:02	06:48		05:40	19:18-20:05/47	04:51	19:48-20:37/49
	16:03	16:54	17:49	19:46		20:41		21:30	
2	08:29	07:57	07:00	06:46		05:38	19:18-20:05/47	04:50	19:50-20:39/49
	16:04	16:56	17:50	19:48		20:43		21:31	
3	08:28	07:56	06:58	06:43		05:36	19:18-20:05/47	04:49	19:50-20:39/49
	16:05	16:58	17:52	19:50		20:44		21:32	
4	08:28	07:54	06:55	06:41		05:34	19:18-20:05/47	04:48	19:50-20:39/49
	16:06	16:59	17:54	19:52		20:46		21:33	
5	08:28	07:52	06:53	06:39		05:32	19:20-20:06/46	04:48	19:50-20:40/50
	16:08	17:01	17:56	19:54		20:48		21:34	
6	08:27	07:50	06:51	06:36		05:30	19:20-20:08/48	04:47	19:51-20:39/48
	16:09	17:03	17:58	19:55		20:50		21:36	
7	08:27	07:49	06:48	06:34	19:18-19:26/8	05:28	19:20-20:10/50	04:46	19:52-20:39/47
	16:10	17:05	18:00	19:57		20:51		21:37	
8	08:26	07:47	06:46	06:31	19:15-19:29/14	05:26	19:21-20:11/50	04:46	19:53-20:40/47
	16:12	17:07	18:02	19:59		20:53		21:37	
9	08:26	07:45	06:44	06:29	19:13-19:30/17	05:24	19:22-20:13/51	04:45	19:54-20:41/47
	16:13	17:09	18:04	20:01		20:55		21:38	
10	08:25	07:43	06:41	06:27	19:11-19:32/21	05:22	19:22-20:14/52	04:45	19:54-20:40/46
	16:15	17:11	18:06	20:03		20:57		21:39	
11	08:25	07:41	06:39	06:24	19:11-19:34/23	05:21	19:22-20:14/52	04:44	19:55-20:41/46
	16:16	17:13	18:08	20:04		20:58		21:40	
12	08:24	07:39	06:37	06:22	19:10-19:38/28	05:19	19:24-20:15/51	04:44	19:56-20:41/45
	16:18	17:15	18:09	20:06		21:00		21:41	
13	08:23	07:37	06:34	06:20	19:09-19:39/30	05:17	19:25-20:15/50	04:44	19:55-20:41/46
	16:19	17:17	18:11	20:08		21:02		21:41	
14	08:22	07:35	06:32	06:17	19:08-19:40/32	05:15	19:25-20:15/50	04:43	19:56-20:41/45
	16:21	17:19	18:13	20:10		21:03		21:42	
15	08:21	07:33	06:29	06:15	19:08-19:42/34	05:14	19:27-20:16/49	04:43	19:57-20:41/44
	16:22	17:21	18:15	20:12		21:05		21:43	
16	08:20	07:31	06:27	06:13	19:07-19:43/36	05:12	19:28-20:16/48	04:43	19:58-20:42/44
	16:24	17:23	18:17	20:14		21:07		21:43	
17	08:19	07:29	06:25	06:10	19:08-19:44/36	05:10	19:29-20:17/48	04:43	19:58-20:42/44
	16:26	17:25	18:19	20:15		21:08		21:44	
18	08:18	07:27	06:22	06:08	19:08-19:47/39	05:09	20:18-20:23/5	04:43	19:58-20:42/44
	16:28	17:27	18:21	20:17		21:10	19:31-20:17/46	21:44	
19	08:17	07:25	06:20	06:06	19:09-19:49/40	05:07	19:32-20:26/54	04:43	19:59-20:42/43
	16:29	17:29	18:22	20:19		21:12		21:45	
20	08:16	07:22	06:17	06:04	19:10-19:50/40	05:06	19:34-20:29/55	04:43	19:59-20:42/43
	16:31	17:31	18:24	20:21		21:13		21:45	
21	08:15	07:20	06:15	06:01	19:11-19:52/41	05:04	19:37-20:31/54	04:43	19:59-20:42/43
	16:33	17:33	18:26	20:23		21:15		21:45	
22	08:14	07:18	06:12	05:59	19:12-19:53/41	05:03	19:44-20:31/47	04:43	20:00-20:43/43
	16:35	17:35	18:28	20:24		21:16		21:45	
23	08:12	07:16	06:10	05:57	19:13-19:55/42	05:01	19:45-20:32/47	04:43	20:00-20:43/43
	16:36	17:37	18:30	20:26		21:18		21:45	
24	08:11	07:14	06:08	05:55	19:15-19:56/41	05:00	19:45-20:33/48	04:44	20:00-20:43/43
	16:38	17:39	18:32	20:28		21:19		21:46	
25	08:10	07:11	06:05	05:52	19:16-19:57/41	04:59	19:46-20:34/48	04:44	20:00-20:44/44
	16:40	17:41	18:33	20:30		21:21		21:46	
26	08:08	07:09	06:03	05:50	19:19-19:58/39	04:58	19:46-20:35/49	04:44	20:00-20:44/44
	16:42	17:43	18:35	20:32		21:22		21:46	
27	08:07	07:07	06:00	05:48	19:19-20:00/41	04:56	19:46-20:36/50	04:45	20:00-20:45/45
	16:44	17:45	18:37	20:34		21:23		21:46	
28	08:05	07:05	05:58	05:46	19:19-20:02/43	04:55	19:47-20:36/49	04:45	20:00-20:44/44
	16:46	17:47	18:39	20:35		21:25		21:45	
29	08:04		06:55	05:44	19:18-20:03/45	04:54	19:47-20:37/50	04:46	20:00-20:45/45
	16:48		19:41	20:37		21:26		21:45	
30	08:02		06:53	05:42	19:18-20:04/46	04:53	19:48-20:37/49	04:47	19:59-20:44/45
	16:50		19:43	20:39		21:27		21:45	
31	08:01		06:51			04:52	19:48-20:37/49		
	16:52		19:44			21:29			
Sonnenscheinstunden	252	274	367	419		492		508	
Anzahl Minuten mit Schatten	0	0	0	818		1533		1364	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten
	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

SHADOW - Kalender pro WEA

Berechnung: GB_Werder/Lübz**WEA:** 11 - W10

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
407	284	469	652	800	659	587	764	1,037	1,051	712	568	7,990

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November	Dezember
1	04:47	19:59-20:45/46	05:26	19:34-20:25/51	06:20	19:10-19:33/23	07:12		07:10	08:04
	21:45		21:10		20:04		18:51		16:42	15:58
2	04:48	19:59-20:45/46	05:28	19:33-20:24/51	06:22	19:10-19:31/21	07:14		07:12	08:06
	21:44		21:08		20:02		18:49		16:40	15:57
3	04:49	19:58-20:45/47	05:30	19:32-20:24/52	06:23	19:11-19:28/17	07:16		07:14	08:07
	21:44		21:06		20:00		18:47		16:38	15:57
4	04:50	19:58-20:45/47	05:31	19:31-20:22/51	06:25	19:12-19:26/14	07:18		07:16	08:08
	21:43		21:05		19:57		18:44		16:36	15:56
5	04:50	19:58-20:46/48	05:33	19:31-20:21/50	06:27	19:15-19:24/9	07:20		07:17	08:10
	21:43		21:03		19:55		18:42		16:34	15:55
6	04:51	19:58-20:46/48	05:35	19:30-20:19/49	06:29		07:21		07:19	08:11
	21:42		21:01		19:52		18:39		16:32	15:55
7	04:52	19:58-20:46/48	05:36	19:29-20:17/48	06:30		07:23		07:21	08:13
	21:42		20:59		19:50		18:37		16:30	15:54
8	04:53	19:58-20:46/48	05:38	19:29-20:15/46	06:32		07:25		07:23	08:14
	21:41		20:57		19:48		18:35		16:28	15:54
9	04:54	19:57-20:46/49	05:40	19:28-20:14/46	06:34		07:27		07:25	08:15
	21:40		20:55		19:45		18:32		16:27	15:54
10	04:55	19:57-20:46/49	05:42	19:28-20:14/46	06:36		07:29		07:27	08:16
	21:39		20:53		19:43		18:30		16:25	15:53
11	04:56	19:57-20:46/49	05:43	19:27-20:13/46	06:37		07:30		07:29	08:17
	21:39		20:51		19:40		18:28		16:23	15:53
12	04:58	19:57-20:46/49	05:45	19:27-20:13/46	06:39		07:32		07:31	08:18
	21:38		20:49		19:38		18:25		16:22	15:53
13	04:59	19:56-20:46/50	05:47	19:27-20:12/45	06:41		07:34		07:33	08:20
	21:37		20:47		19:35		18:23		16:20	15:53
14	05:00	19:56-20:45/49	05:49	19:26-20:11/45	06:43		07:36		07:35	08:21
	21:36		20:45		19:33		18:21		16:18	15:53
15	05:01	19:55-20:45/50	05:50	19:26-20:09/43	06:44		07:38		07:36	08:21
	21:35		20:43		19:31		18:18		16:17	15:53
16	05:03	19:55-20:44/49	05:52	19:27-20:08/41	06:46		07:40		07:38	08:22
	21:33		20:41		19:28		18:16		16:15	15:53
17	05:04	19:56-20:45/49	05:54	19:25-20:04/39	06:48		07:41		07:40	08:23
	21:32		20:38		19:26		18:14		16:14	15:53
18	05:05	19:55-20:44/49	05:55	19:23-20:04/41	06:49		07:43		07:42	08:24
	21:31		20:36		19:23		18:11		16:12	15:53
19	05:07	19:55-20:43/48	05:57	19:20-20:01/41	06:51		07:45		07:44	08:25
	21:30		20:34		19:21		18:09		16:11	15:54
20	05:08	19:54-20:42/48	05:59	19:19-20:00/41	06:53		07:47		07:46	08:25
	21:29		20:32		19:18		18:07		16:10	15:54
21	05:09	19:55-20:42/47	06:01	19:17-19:58/41	06:55		07:49		07:47	08:26
	21:27		20:30		19:16		18:05		16:08	15:54
22	05:11	19:55-20:41/46	06:02	19:15-19:56/41	06:56		07:51		07:49	08:27
	21:26	19:49-19:53/4	20:27		19:13		18:03		16:07	15:55
23	05:12	19:45-20:40/55	06:04	19:14-19:53/39	06:58		07:53		07:51	08:27
	21:24		20:25		19:11		18:00		16:06	15:55
24	05:14	19:43-20:38/55	06:06	19:13-19:52/39	07:00		07:55		07:53	08:27
	21:23		20:23		19:08		17:58		16:05	15:56
25	05:15	19:42-20:36/54	06:08	19:11-19:50/39	07:02		06:56		07:54	08:28
	21:22		20:21		19:06		16:56		16:04	15:57
26	05:17	19:41-20:28/47	06:09	19:11-19:47/36	07:04		06:58		07:56	08:28
	21:20		20:18		19:04		16:54		16:03	15:57
27	05:18	19:39-20:27/48	06:11	19:10-19:45/35	07:05		07:00		07:58	08:28
	21:18		20:16		19:01		16:52		16:02	15:58
28	05:20	19:39-20:27/48	06:13	19:09-19:42/33	07:07		07:02		07:59	08:29
	21:17		20:14		18:59		16:50		16:01	15:59
29	05:22	19:37-20:27/50	06:15	19:09-19:41/32	07:09		07:04		08:01	08:29
	21:15		20:11		18:56		16:48		16:00	16:00
30	05:23	19:36-20:27/51	06:16	19:09-19:40/31	07:11		07:06		08:02	08:29
	21:14		20:09		18:54		16:46		15:59	16:01
31	05:25	19:34-20:26/52	06:18	19:09-19:37/28			07:08			08:29
	21:12		20:07				16:44			16:02
Sonnenscheinstunden	510		459		382		329		260	235
Anzahl Minuten mit Schatten	1523		1312		84		0		0	0

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten
	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattenende/Minuten mit Schatten

Projekt:
180926_Werder-Lübz_II

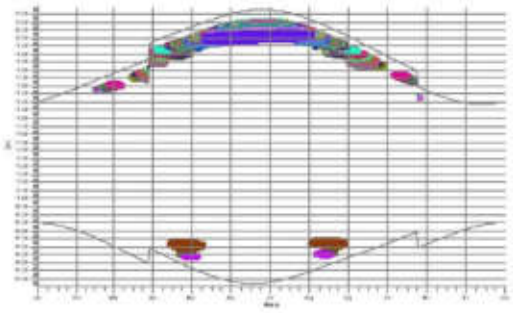
Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

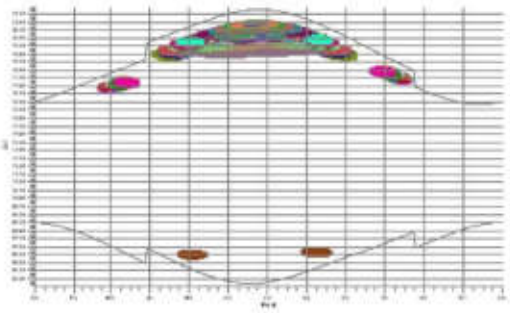
SHADOW - Grafischer Kalender pro WEA

Berechnung: GB_Werder/Lübz

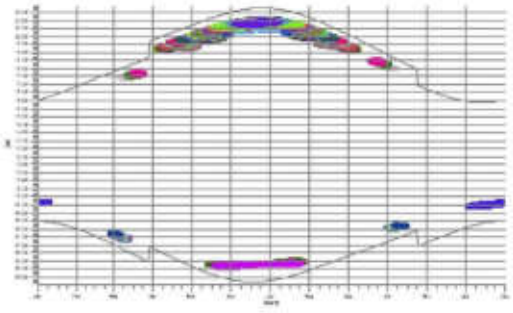
1: W1



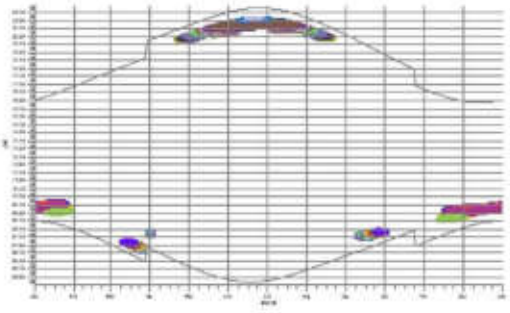
2: W2



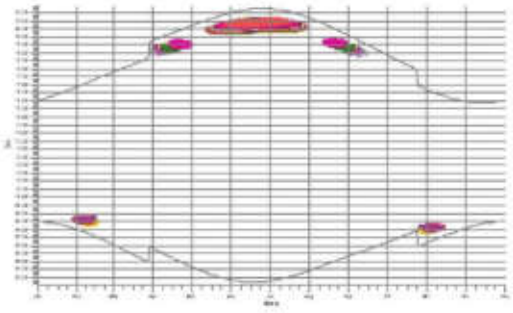
3: W3



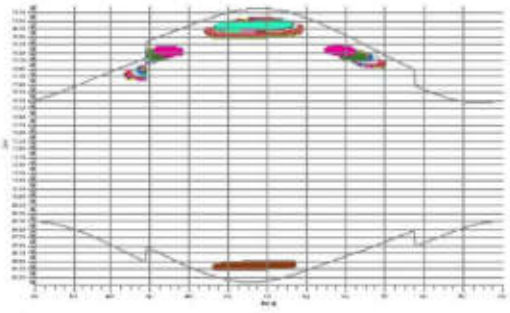
4: W4



5: W5



6: W11





Projekt:
180926_Werder-Lübz_II

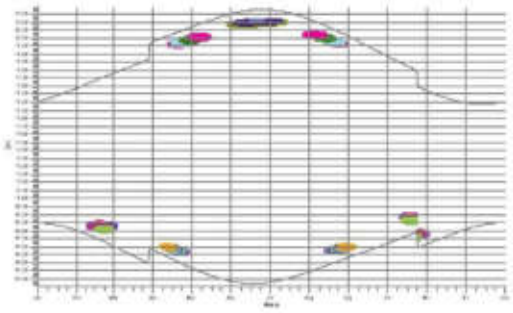
Beschreibung:
Windpark Werder

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
28.01.2019 15:06/3.2.737

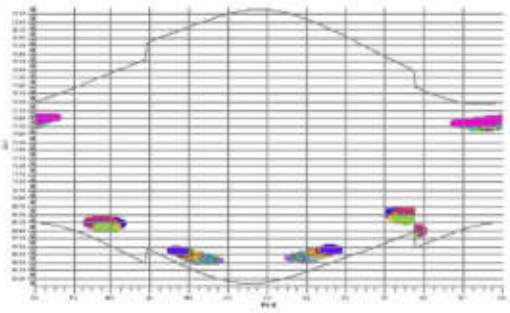
SHADOW - Grafischer Kalender pro WEA

Berechnung: GB_Werder/Lübz

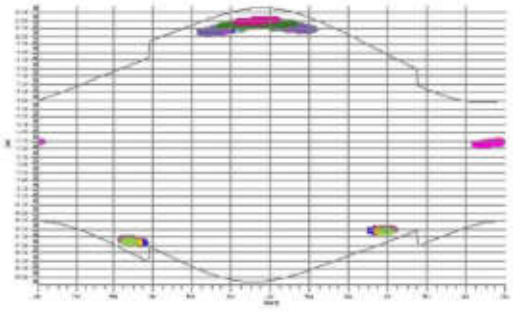
7: W6



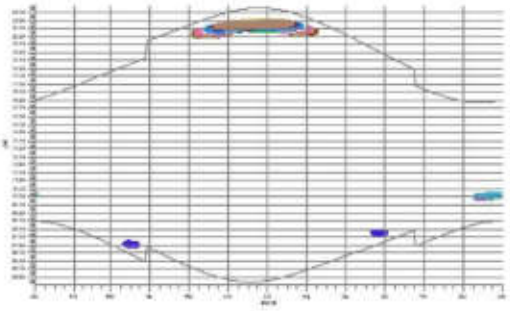
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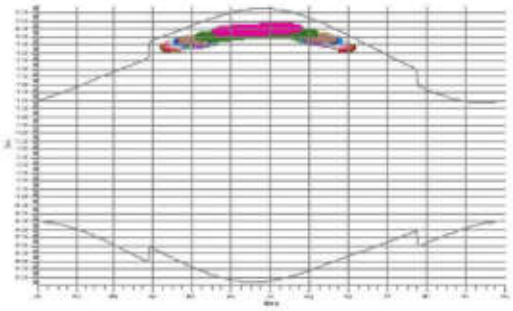
9: W8



10: W9



11: W10





Anhang 3/ Fotodokumentation der Immissionsorte

Die Fotodokumentation der Immissionsorte ist im Ergänzungsdokument für die Berichte I17-SCHATTEN-2019-08, I17-SCHATTEN-2019-09 und I17-SCHATTEN-2019-10 zu finden.