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Errichtung von drei Windenergieanlagen des Typs Nordex N163/6.X in 26388 Wilhelmshaven, OT Sengwarden

**Schattenwurfprognose nach den
LAI-Hinweisen [2] für den Neubau und
Betrieb von 3 Windenergieanlagen**

Bericht Nr. M180777/02

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Inhaltsverzeichnis

Zusammenfassung	3
1 Situation und Aufgabenstellung	6
2 Zitierte Unterlagen	8
3 Örtliche Situation	9
3.1 Standort und Parameter der WEA	9
3.2 Maßgebliche Immissionsorte	9
4 Beurteilungsgrundlagen	11
4.1 Beurteilung von Schattenwurf nach den Vorgaben der WKA-Schattenwurfhinweise des LAI [2]	11
5 Schattenwurfberechnungen	12
5.1 Berechnungsverfahren	12
5.2 Berechnungsergebnisse	12
6 Schlussbetrachtung	16
 Anhang A: Lagepläne und Beschattungskarten	
Anhang B: Berechnungsergebnisse Zusatzbelastung	
Anhang C: Berechnungsergebnisse Gesamtbelastung	

Zusammenfassung

Die Bioenergie Nord GmbH plant in 26388 Wilhelmshaven, OT Sengwarden drei WEA des Typs Nordex N163/6.X mit jeweils 7 MW Nennleistung zu errichten und zu betreiben (geplante Standorte: Flurstücke 24/2, 107 und 111, Flur 17, Gemarkung Sengwarden).

Im Zuge des erforderlichen BImSchG Genehmigungsverfahrens [1] wurde für die geplanten Windenergieanlagen eine Schattenwurfberechnung erstellt. Es wurde vorliegend die Zusatzbelastung des Schattenwurfs der drei geplanten Neu-WEA, sowie die Gesamtbelastung durch die drei geplanten Neu-WEA, und zwanzig weitere WEA (VB 01 – VB 20) unterschiedlicher Typen betrachtet. Folgende Ergebnisse sind festzuhalten:

Astronomisch maximal mögliche Beschattungsdauern:

Immissionsort	Astron. Max. mögl. Beschattungsdauer			
	Zusatzbelastung		Gesamtbelastung	
	Stunden/ Jahr	Max. Schatten- dauer/Tag	Stunden/ Jahr	Max. Schatten- dauer/Tag
	[hh:mm]	[hh:mm]	[hh:mm]	[hh:mm]
IO1 Utwarfe 1	00:00	00:00	297:19	02:15
IO2 Utwarfe 2	00:00	00:00	256:54	02:08
IO3 Utwarfe 3	00:00	00:00	242:00	02:01
IO4 Utwarfe 4	00:00	00:00	243:17	01:59
IO5 Klein Buschhausen 3	00:00	00:00	73:22	00:59
IO6 Bohnenburg 20	00:00	00:00	87:39	01:00
IO7 Sengwarder Chausseehaus	00:00	00:00	152:49	01:31
IO8 Idschenhausen 1	00:00	00:00	46:26	00:36
IO9 Idschenhausen 2	00:00	00:00	51:02	00:33
IO10 Remmelhausen 4	00:00	00:00	11:52	00:17
IO11 Westerhausen 3	36:09	00:39	70:32	00:39
IO12 Westerhausen 4	44:44	00:38	82:54	00:44
IO13 Westerhausen 11	144:36	00:57	166:53	01:04
IO14 Westerhausen 12	146:22	00:58	164:08	01:02
IO15 Westerhausen 9A	221:20	02:26	352:23	02:26
IO16 Westerhausen 9	168:28	02:10	253:47	02:10
IO17 Rüschentede 1	20:28	00:33	167:08	01:32
IO18 Langengroden 1	00:00	00:00	87:02	01:57
IO19 WA Sengwarden BP207	00:00	00:00	08:29	00:16
IO20 Langengrodener Weg 17	00:00	00:00	00:00	00:00
IO21 Am Sudring 15	00:00	00:00	00:00	00:00
IO22 Georg-Adden-Straße 55	00:00	00:00	00:00	00:00

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IO23 Hooksiel	00:00	00:00	00:00	00:00
IO24 Depenhausen/Pakens 1	92:28	01:38	122:46	01:38
IO25 Tain 3	40:01	00:42	94:05	01:13
IO26 Waterpott 1	40:16	00:40	109:11	01:17
IO27 Klein Depenhausen 1	75:18	00:49	122:21	01:19
IO28 Klein Westerhausen 1	108:16	01:09	122:54	01:09
IO29 Depenhausen 1	77:36	00:47	81:42	00:47
IO30 Purkswarfe 2	00:00	00:00	12:33	00:19
IO31 Purkswarfe 3	00:00	00:00	04:08	00:11
IO32 Putzwei 1	22:05	00:35	35:33	00:51
IO33 Westerhausen 5	232:06	02:02	265:31	02:02
IO34 Westerhausen 6	328:08	01:36	342:36	01:36
IO35 Westerhausen 7	259:45	01:36	275:15	01:36
IO36 Westerhausen 10	231:46	01:17	245:55	01:17
IO37 Westerhausen 1	83:41	01:14	102:47	01:14

Zusatzbelastung

Die durch die drei Neu-WEA an den maßgeblichen Immissionsorten hervorgerufenen astronomisch maximal möglichen Beschattungsdauern betragen bis zu 328 Stunden und 8 Minuten im Jahr am Immissionsort IO34; die maximale Schattendauer pro Tag beträgt bis zu 146 Minuten am Immissionsort IO15.

Die zulässigen jährlichen Immissionswerte der WEA-Schattenwurf-Leitlinie [2] von maximal 30 Stunden pro Jahr werden durch die drei Neu-WEA an den Immissionsorten IO11 bis IO16, IO24 bis IO29 und IO33 bis IO37 überschritten.

Die zulässigen täglichen Immissionswerte der WEA-Schattenwurf-Leitlinie [2] von maximal 30 Minuten pro Tag werden durch die drei Neu-WEA an den Immissionsorten IO11 bis IO17, IO24 bis IO29 und IO32 bis IO37 überschritten.

Gesamtbelastung

Die durch die drei Neu-WEA und zwanzig Vorbelastungs-WEA an den maßgeblichen Immissionsorten hervorgerufenen astronomisch maximal möglichen Beschattungsdauern betragen bis zu 352 Stunden und 23 Minuten im Jahr am Immissionsort IO15; die maximale Schattendauer pro Tag beträgt bis zu 146 Minuten am Immissionsort IO15.

Die zulässigen jährlichen Immissionswerte der WEA-Schattenwurf-Leitlinie [2] von maximal 30 Stunden pro Jahr werden durch die drei Neu-WEA und zwanzig VB-WEA an den Immissionsorten IO1 bis IO9, IO11 bis IO18, IO24 bis IO29 und IO32 bis IO37 überschritten.

Die zulässigen täglichen Immissionswerte der WEA-Schattenwurf-Leitlinie [2] von maximal 30 Minuten pro Tag werden durch die drei Neu-WEA und zwanzig VB-WEA an den Immissionsorten IO1 bis IO9, IO11 bis IO18, IO24 bis IO29 und IO32 bis IO37 überschritten.



B. Sc. Felix Bergholz

1 Situation und Aufgabenstellung

Die Bioenergie Nord GmbH plant in 26388 Wilhelmshaven, OT Sengwarden drei WEA des Typs Nordex N163/6.X zu errichten und zu betreiben (geplante Standorte: Flurstücke 24/2, 107 und 111, Flur 17, Gemarkung Sengwarden).

Für dieses Vorhaben soll von Müller-BBM eine immissionsschutzrechtliche Verträglichkeitsprüfung unter Berücksichtigung der aktuellen LAI-Hinweise zur Beurteilung der optischen Immissionen von Windkraftanlagen [2] durchgeführt werden.

Als Vorbelastung sind 20 bestehende WEA unterschiedlicher Typen zu berücksichtigen, die im Umfeld bzw. im Einwirkungsbereich der geplanten Neustandorte betrieben werden.

In der nachfolgenden Tabelle sind die Daten der berücksichtigten WEA zusammengestellt (vgl. Lageplan in Anhang A).

Tabelle 1. Anlagendaten

WEA Nr.	Typ	Nennleistung in kW	Nabenhöhe in m	Rotordurchmesser in m	UTM-Koordinaten (Zone 32)	
					Rechtswert	Hochwert
ZB1	Nordex 163/6.X	7.000	118	163	32.434.029	5.940.044
ZB2	Nordex 163/6.X	7.000	118	163	32.434.212	5.939.722
ZB3	Nordex 163/6.X	7.000	118	163	32.434.540	5.939.539
VB1	V112 3.3 MW	3.300	94	112	32.434.774	5.940.580
VB2	V112 3.3 MW	3.300	119	112	32.435.138	5.940.834
VB3	V112 3.3 MW	3.300	119	112	32.435.257	5.940.480
VB4	V112 3.3 MW	3.300	119	112	32.435.599	5.940.725
VB5	V112 3.3 MW	3.300	119	112	32.435.874	5.940.249
VB6	V112 3.3 MW	3.300	119	112	32.436.206	5.940.107
VB7	V112 3.3 MW	3.300	94	112	32.436.556	5.940.198
VB8	Micon_M1500-600	600	46	43	32.433.106	5.941.146
VB9	Micon_M750/250	250	36	31	32.433.437	5.941.235
VB10	E-82 E2 2.3 MW	2.300	108,4	82	32.432.205	5.941.014
VB11	E-82 E2 2.3 MW	2.300	108,4	82	32.432.241	5.940.674

WEA Nr.	Typ	Nennleistung in kW	Nabenhöhe in m	Rotordurchmesser in m	UTM-Koordinaten (Zone 32)	
					Rechtswert	Hochwert
VB12	E-101 3 MW	3.000	99	101	32.432.356	5.940.371
VB13	E-101 3 MW	3.000	99	101	32.432.527	5.940.125
VB14	Siemens SWT 6MW	6.000	120	154	32.435.137	5.937.518
VB15	Micon NM900-52	900	49	52	32.434.680	5.937.333
VB16	Micon NM900-52	900	49	52	32.434.720	5.937.091
VB17	V112-3.3 MW	3.300	112	112	32.435.480	5.937.236
VB18	Nordex N117 2.4MW	2.400	91	117	32.435.622	5.937.556
VB19	Siemens SWT 6 MW	6.000	120	154	32.435.903	5.937.129
VB20	Vestas V39 500kW	500	41	39	32.431.787	5.939.386

Der vorliegende Bericht stellt die Ergebnisse der Untersuchung zu den optischen Immissionen der drei geplanten WEA des Typs Nordex N163/6.X an den Immissionsorten dar.

2 Zitierte Unterlagen

- [1] Bundes-Immissionsschutzgesetz – Gesetz zum Schutz vor schädlichen Umwelteinwirkungen durch Luftverunreinigungen, Geräusche, Erschütterungen und ähnliche Vorgänge (Bundes-Immissionsschutzgesetz – BImSchG) in der Fassung der Bekanntmachung vom 17.05.2013 (BGBl. I S. 1274), das zuletzt durch Artikel 1 des Gesetzes vom 3. Juli 2024 (BGBl. 2024 I Nr. 225) geändert worden ist
- [2] Hinweise zur Ermittlung und Beurteilung der optischen Immissionen von Windkraftanlagen – Aktualisierung 2019 (WKA-Schattenwurfhinweise) vom 23. Januar 2020, Bund/Länder-Arbeitsgemeinschaft Immissionsschutz.
- [3] windPro Softwarepaket zur Planung und Entwicklung von Windparkprojekten, Version 4.0.531, EMD International A/S, Niels Jernesvej 10, 9220 Aalborg, Dänemark.
- [4] Digitales Geländemodell (DGM): EMD/windPRO elevation model based on data from Landesamt für Geoinformation and Landesvermessung Niedersachsen (LGLN), Rasterweite 5 m.
- [5] Bioenergie Nord GmbH: aktueller Lageplan des Standorts Westerhausen mit Stand vom 25.04.2024 und Anlagendaten relevanter WEA in einem Radius von 2,25 km um die Potentialfläche, jeweils mit Stand vom 01.08.2024.

3 Örtliche Situation

3.1 Standort und Parameter der WEA

Die Windenergieanlagen sollen in 26388 Wilhelmshaven errichtet werden. Die Positionen der geplanten Neu-WEA sind im Lageplan im Anhang A dargestellt.

Die drei geplanten Neu-Windenergieanlagen sind Anlagen vom Typ Nordex N163/6.X mit einer Leistung von 7 MW und einer Nabenhöhe von 118 m. Die Anlagendaten der in dieser Untersuchung betrachteten WEA können der Tabelle 1 entnommen werden.

3.2 Maßgebliche Immissionsorte

Die Beurteilung des Vorhabens erfolgt für insgesamt 37 Immissionsorte, die alle nach unserer Einschätzung als maßgebliche Immissionsorte gemäß 1.2 der LAI-Hinweise [2] gelten.

In Tabelle 2 sind die ausgewählten Immissionsorte und deren Position aufgeführt.

Tabelle 2. Immissionsorte und Standortkoordinaten.

Immissionsort	UTM-Koordinaten (Zone 32)	
	Rechtswert	Hochwert
IO1 Utwarfe 1	436.131	5.940.572
IO2 Utwarfe 2	436.140	5.940.625
IO3 Utwarfe 3	436.153	5.940.685
IO4 Utwarfe 4	436.089	5.940.708
IO5 Klein Buschhausen 3	436.045	5.941.392
IO6 Bohnenburg 20	436.785	5.940.793
IO7 Sengwarder Chausseehaus	436.664	5.940.615
IO8 Idschenhausen 1	437.215	5.939.770
IO9 Idschenhausen 2	437.310	5.939.811
IO10 Remmelhausen 4	436.614	5.939.542
IO11 Westerhausen 3	435.587	5.939.724
IO12 Westerhausen 4	435.445	5.939.994
IO13 Westerhausen 11	434.919	5.940.137
IO14 Westerhausen 12	434.838	5.940.170
IO15 Westerhausen 9A	434.262	5.940.420
IO16 Westerhausen 9	434.230	5.940.481
IO17 Rüschenstede 1	434.591	5.941.001
IO18 Langengroden 1	435.289	5.941.414
IO19 WA Sengwarden BP207	436.605	5.939.173
IO20 Langengrodener Weg 17	435.491	5.942.055
IO21 Am Sudring 15	435.532	5.942.394
IO22 Georg-Adden-Straße 55	435.830	5.942.859
IO23 Hooksiel	436.324	5.943.054

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Immissionsort	UTM-Koordinaten (Zone 32)	
	Rechtswert	Hochwert
IO24 Depenhausen/Pakens 1	433.854	5.940.646
IO25 Tain 3	433.154	5.940.529
IO26 Waterpott 1	433.089	5.940.168
IO27 Klein Depenhausen 1	433.254	5.939.909
IO28 Klein Westerhausen 1	433.683	5.939.767
IO29 Depenhausen 1	433.437	5.939.318
IO30 Purkswarfe 2	433.950	5.939.029
IO31 Purkswarfe 3	434.370	5.939.047
IO32 Putzwei 1	434.854	5.939.246
IO33 Westerhausen 5	434.903	5.939.704
IO34 Westerhausen 6	434.704	5.939.918
IO35 Westerhausen 7	434.664	5.940.034
IO36 Westerhausen 10	434.732	5.940.032
IO37 Westerhausen 1	435.270	5.939.464

Die örtlichen Gegebenheiten sind dem Lageplan in Anhang A zu entnehmen.

4 Beurteilungsgrundlagen

4.1 Beurteilung von Schattenwurf nach den Vorgaben der WKA-Schattenwurfhinweise des LAI [2]

Zur Beurteilung von optischen Immissionen in Form von periodischem Schattenwurf nach dem Bundes-Immissionsschutzgesetz (BImSchG [1]) sind die Hinweise zur Ermittlung und Beurteilung der optischen Immissionen von Windkraftanlagen (WKA-Schattenwurfhinweise [2]), heranzuziehen.

Die Hinweise enthalten Konkretisierungen zu den Anforderungen, die sich aus § 5 Abs. 1 Nrn. 1 und 2 sowie § 22 Abs. 1 des Bundesimmissionsschutzgesetzes (BImSchG [1]) ergeben.

Der Schutz vor erheblichen Belästigungswirkungen durch periodische Lichteinwirkungen durch Windenergieanlagen ist nach Ziffer 1.3 der Schattenwurfhinweise sichergestellt, wenn die in den Hinweisen aufgeführten Vorgaben an den maßgeblichen Immissionsorten eingehalten werden.

Maßgebliche Immissionsorte sind schutzwürdige Räume, die als

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

genutzt werden. Auch direkt an Gebäuden beginnende Außenflächen, wie Terrassen oder Balkone, sind schutzwürdigen Räumen in diesem Sinne tagsüber gleichgestellt.

Der maßgebliche Immissionsort liegt gemäß Ziffer 1.3 der WKA-Schattenwurfhinweise [2] am maßgeblichen Immissionsort auf einer Bezugshöhe von 2 m über dem Grund.

Durch periodischen Schattenwurf entstehende Einwirkungen werden nicht als erheblich belästigend angesehen, wenn die astronomisch maximal mögliche Beschattungsdauer aller zu berücksichtigenden Windenergieanlagen am Immissionsort nicht mehr als 30 h pro Kalenderjahr und des Weiteren nicht mehr als 30 min pro Kalendertag beträgt.

Bei Überschreitungen der genannten Vorgaben für die astronomisch maximal mögliche Beschattungsdauer kommen technische Maßnahmen zur zeitlichen Beschränkung des Betriebes der Windenergieanlagen in Frage. Ein gängiges Mittel ist z. B. die Installation einer Abschaltautomatik.

5 Schattenwurfberechnungen

5.1 Berechnungsverfahren

Die Berechnung der optischen Immissionen erfolgt mithilfe des EDV-Programms windPro (EMD International A/S, Aalborg, Dänemark, Programmversion 4.0.531 [3]) nach den Berechnungs- und Beurteilungsgrundlagen der WKA-Schattenwurfhinweise [2].

Für die Berechnung wird ein digitales Geländemodell mit einer Auflösung von 5 m (DGM5) [4] verwendet. An dem Standort ergeben sich Höhenunterschiede von ca. 5 m. Es wurde überprüft, ob Gebäude die Sichtlinie zu einigen der Immissionsorte unterbrechen und damit zu Verringerungen der maximal möglichen Beschattungsdauer durch die WEA führen. Vorliegend wurde für keinen der untersuchten Immissionsorte eine Verringerung der Beschattungsdauer durch diesen Effekt festgestellt. Im Berechnungsmodell wird daher keine Verschattung durch Gebäude betrachtet.

Die Schattenwurfberechnungen basieren auf dem standort-, tages- und uhrzeit-abhängigen Sonnenstand. Der Berechnungszeitsprung bei der Ermittlung der Schattenwurfzeiten liegt bei 1 min [3]. Es sind tageweise Beschattungszeiten mit Anfangs- und Endzeit sowie Beschattungsdauer für alle vorliegend betrachteten Immissionsorte angegeben.

Unter Ansatz der in Abschnitt 3.1 aufgeführten Parameter der geplanten und bestehenden WEA werden die an den maßgeblichen Immissionsorten zu erwartenden astronomisch maximal möglichen Beschattungsdauern berechnet.

Hinweis:

Die vorliegend durchgeführte Berechnung dient in erster Linie zur Feststellung von zu erwartenden Beschattungsdauern an zu beurteilenden Immissionsorten und liefert in dieser Form keine konkreten Abschaltzeiten für ggf. zu installierende Abschalt-automatiken der Windenergieanlagen aufgrund von Überschreitungen der zulässigen optischen Immissionen.

5.2 Berechnungsergebnisse

Die Berechnung der optischen Immissionen erfolgte unter Ansatz der in Abschnitt 3.1 beschriebenen Parameter der Windenergieanlagen und für die in Abschnitt 3.2 aufgeführten Immissionsorte. Es wurde vorliegend die Zusatzbelastung und Gesamtbelastung des Schattenwurfs betrachtet. Die Zusatzbelastung beinhaltet die drei geplanten Neu-WEA. Die Gesamtbelastung beinhaltet darüber hinaus zwanzig weitere WEA unterschiedlicher Typen.

Die berechneten astronomisch maximal möglichen Beschattungsdauern für die Immissionsorte sind in Tabelle 3 zusammengestellt. Eine Darstellung der Berechnungsparameter und ausführliche Ergebnistabellen finden sich in Anhang B.

Tabelle 3. Ergebnisse der Schattenwurfberechnung für die untersuchten Immissionsorte.

Astronomisch maximal mögliche Beschattungsdauern:

Immissionsort	Astron. Max. mögl. Beschattungsdauer			
	Zusatzbelastung		Gesamtbelastung	
	Stunden/ Jahr	Max. Schatten- dauer/Tag	Stunden/ Jahr	Max. Schatten- dauer/Tag
	[hh:mm]	[hh:mm]	[hh:mm]	[hh:mm]
IO1 Utwarfe 1	00:00	00:00	297:19	02:15
IO2 Utwarfe 2	00:00	00:00	256:54	02:08
IO3 Utwarfe 3	00:00	00:00	242:00	02:01
IO4 Utwarfe 4	00:00	00:00	243:17	01:59
IO5 Klein Buschhausen 3	00:00	00:00	73:22	00:59
IO6 Bohnenburg 20	00:00	00:00	87:39	01:00
IO7 Sengwarder Chausseehaus	00:00	00:00	152:49	01:31
IO8 Idschenhausen 1	00:00	00:00	46:26	00:36
IO9 Idschenhausen 2	00:00	00:00	51:02	00:33
IO10 Remmelhausen 4	00:00	00:00	11:52	00:17
IO11 Westerhausen 3	36:09	00:39	70:32	00:39
IO12 Westerhausen 4	44:44	00:38	82:54	00:44
IO13 Westerhausen 11	144:36	00:57	166:53	01:04
IO14 Westerhausen 12	146:22	00:58	164:08	01:02
IO15 Westerhausen 9A	221:20	02:26	352:23	02:26
IO16 Westerhausen 9	168:28	02:10	253:47	02:10
IO17 Rüschentede 1	20:28	00:33	167:08	01:32
IO18 Langengroden 1	00:00	00:00	87:02	01:57
IO19 WA Sengwarden BP207	00:00	00:00	08:29	00:16
IO20 Langengrodener Weg 17	00:00	00:00	00:00	00:00
IO21 Am Sudring 15	00:00	00:00	00:00	00:00
IO22 Georg-Adden-Straße 55	00:00	00:00	00:00	00:00
IO23 Hooksiel	00:00	00:00	00:00	00:00
IO24 Depenhausen/Pakens 1	92:28	01:38	122:46	01:38
IO25 Tain 3	40:01	00:42	94:05	01:13
IO26 Waterpott 1	40:16	00:40	109:11	01:17
IO27 Klein Depenhausen 1	75:18	00:49	122:21	01:19
IO28 Klein Westerhausen 1	108:16	01:09	122:54	01:09
IO29 Depenhausen 1	77:36	00:47	81:42	00:47
IO30 Purkswarfe 2	00:00	00:00	12:33	00:19
IO31 Purkswarfe 3	00:00	00:00	04:08	00:11

Immissionsort	Astron. Max. mögl. Beschattungsdauer			
	Zusatzbelastung		Gesamtbelastung	
	Stunden/ Jahr	Max. Schatten- dauer/Tag	Stunden/ Jahr	Max. Schatten- dauer/Tag
	[hh:mm]	[hh:mm]	[hh:mm]	[hh:mm]
IO32 Putzwei 1	22:05	00:35	35:33	00:51
IO33 Westerhausen 5	232:06	02:02	265:31	02:02
IO34 Westerhausen 6	328:08	01:36	342:36	01:36
IO35 Westerhausen 7	259:45	01:36	275:15	01:36
IO36 Westerhausen 10	231:46	01:17	245:55	01:17
IO37 Westerhausen 1	83:41	01:14	102:47	01:14

Zusatzbelastung

Die durch die drei Neu-WEA an den maßgeblichen Immissionsorten hervorgerufenen astronomisch maximal möglichen Beschattungsdauern betragen bis zu 328 Stunden und 8 Minuten im Jahr am Immissionsort IO34; die maximale Schattendauer pro Tag beträgt bis zu 146 Minuten am Immissionsort IO15.

Die zulässigen jährlichen Immissionswerte der WEA-Schattenwurf-Leitlinie [2] von maximal 30 Stunden pro Jahr werden durch die drei Neu-WEA an den Immissionsorten IO11 bis IO16, IO24 bis IO29 und IO33 bis IO37 überschritten.

Die zulässigen täglichen Immissionswerte der WEA-Schattenwurf-Leitlinie [2] von maximal 30 Minuten pro Tag werden durch die drei Neu-WEA an den Immissionsorten IO11 bis IO17, IO24 bis IO29 und IO32 bis IO37 überschritten.

Die Immissionsorte IO 1 bis IO 10, IO18 bis IO23 sowie IO30 und IO31 sind nicht durch den Schattenwurf der drei geplanten Neu-WEA betroffen.

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Gesamtbelastung

Die durch die drei Neu-WEA und zwanzig Vorbelastungs-WEA an den maßgeblichen Immissionsorten hervorgerufenen astronomisch maximal möglichen Beschattungsdauern betragen bis zu 352 Stunden und 23 Minuten im Jahr am Immissionsort IO15; die maximale Schattendauer pro Tag beträgt bis zu 146 Minuten am Immissionsort IO15.

Die zulässigen jährlichen Immissionswerte der WEA-Schattenwurf-Leitlinie [2] von maximal 30 Stunden pro Jahr werden durch die drei Neu-WEA und zwanzig VB-WEA an den Immissionsorten IO1 bis IO9, IO11 bis IO18, IO24 bis IO29 und IO32 bis IO37 überschritten.

Die zulässigen täglichen Immissionswerte der WEA-Schattenwurf-Leitlinie [2] von maximal 30 Minuten pro Tag werden durch die drei Neu-WEA und zwanzig VB-WEA an den Immissionsorten IO1 bis IO9, IO11 bis IO18, IO24 bis IO29 und IO32 bis IO37 überschritten.

Die Immissionsorte IO20 bis IO23 sind nicht durch den Schattenwurf der vorliegend betrachteten WEA betroffen.

6 Schlussbetrachtung

Die vorliegende Untersuchung kommt zu dem Ergebnis, dass die Grenzwerte der astronomisch maximal möglichen Beschattungsdauern von 30 Minuten pro Tag und 30 Stunden pro Jahr gemäß den Vorgaben aus den LAI-Hinweisen [2] ohne Berücksichtigung einer Abschaltautomatik durch den Bau und Betrieb der drei geplanten Neu-WEA deutlich überschritten werden. Überschreitungen der genannten Grenzwerte durch die Zusatzbelastung wurden an 19 der 37 betrachteten Immissionsorte ermittelt.

Die Einhaltung der Grenzwerte der WKA-Schattenwurfhinweise [2] ist durch den Einbau einer Abschaltautomatik vor Inbetriebnahme der drei geplanten Neu-WEA sicherzustellen.

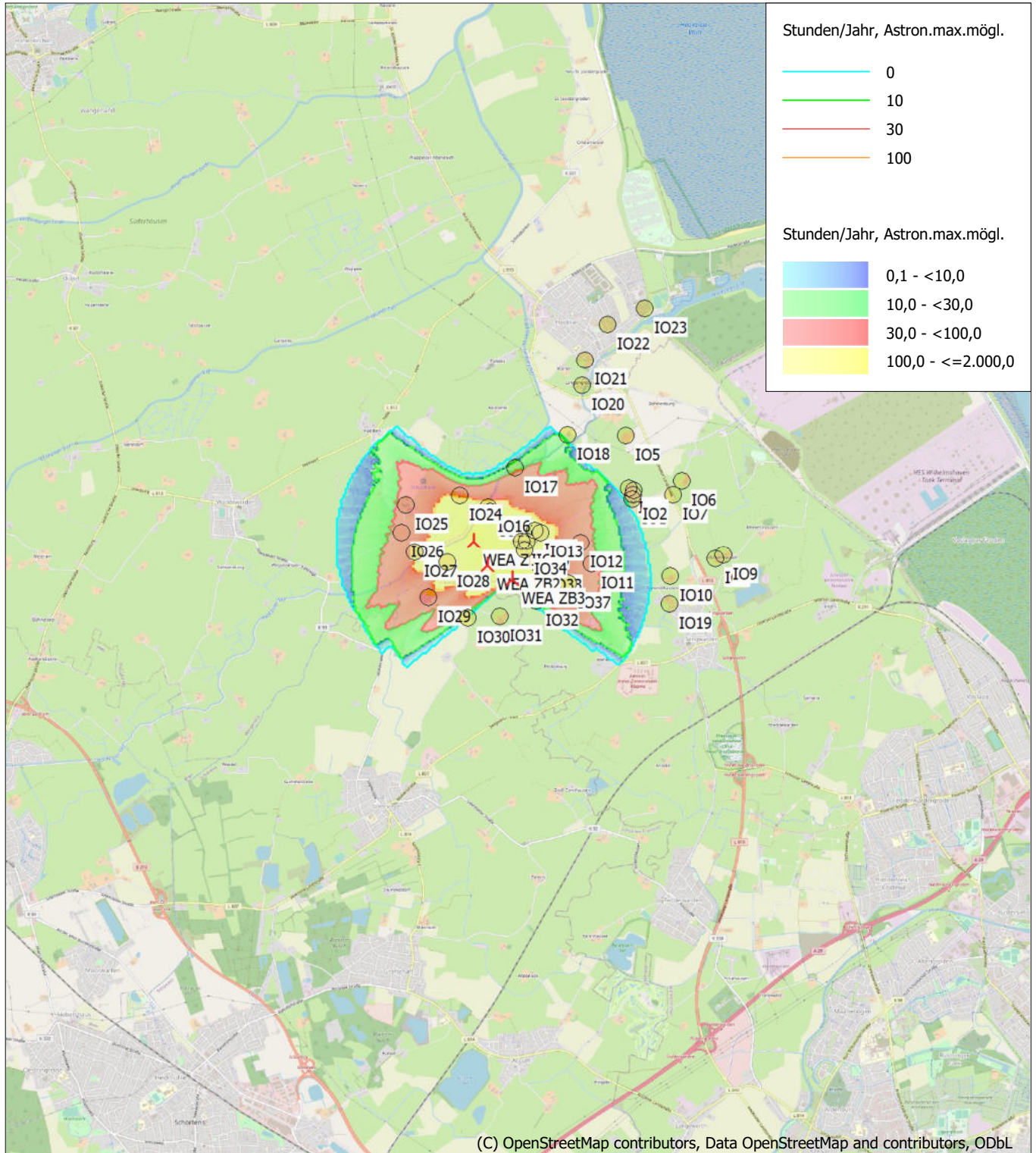
Anhang A

Lagepläne und Beschattungskarten

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SHADOW - Karte

Berechnung: M180777_02 Zusatzbelastung

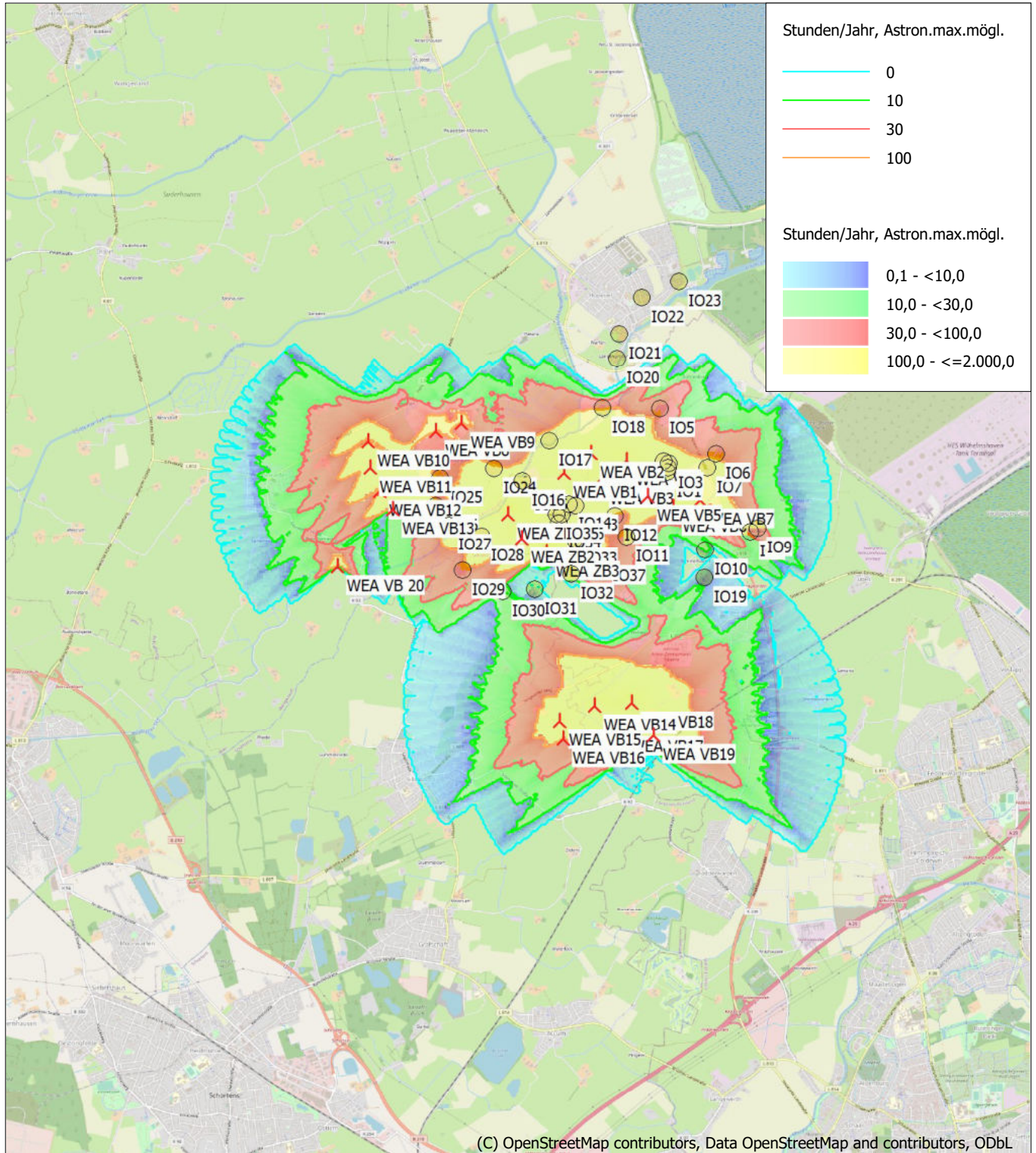


0 1 2 3 4 km

Karte: EMD OpenStreetMap , Maßstab 1:75.000, Mitte: UTM (north)-WGS84 Zone: 32 Ost: 434.700 Nord: 5.939.640
Neue WEA Schattenrezeptor
Höhe der Schattenkarte: Höhenraster-Objekt: M180777_02_EMDGrid_0.wpg (1)
Zeitschritt: 4 Minuten, Schrittweite: 14 Tag(e), Kartenauflösung: 30 m, Sichtbarkeit Auflösung: 15 m, Augenhöhe: 1,5 m

SHADOW - Karte

Berechnung: M180777_02 Gesamtbelastung



Karte: EMD OpenStreetMap , Maßstab 1:75.000, Mitte: UTM (north)-WGS84 Zone: 32 Ost: 434.250 Nord: 5.939.292
Neue WEA Schattenrezeptor
Höhe der Schattenkarte: Höhenraster-Objekt: M180777_02_EMDGrid_0.wpg (1)
Zeitschritt: 4 Minuten, Schrittweite: 14 Tag(e), Kartenauflösung: 30 m, Sichtbarkeit Auflösung: 15 m, Augenhöhe: 1,5 m

Anhang B

Berechnungsergebnisse Zusatzbelastung

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SHADOW - Hauptergebnis

Berechnung: M180777_02 Zusatzbelastung

Annahmen für Schattenwurfberechnung

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

Die dargestellten Zeiten sind die astronomisch maximal mögliche

Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

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: M180777_02_EMDGrid_0.wpg

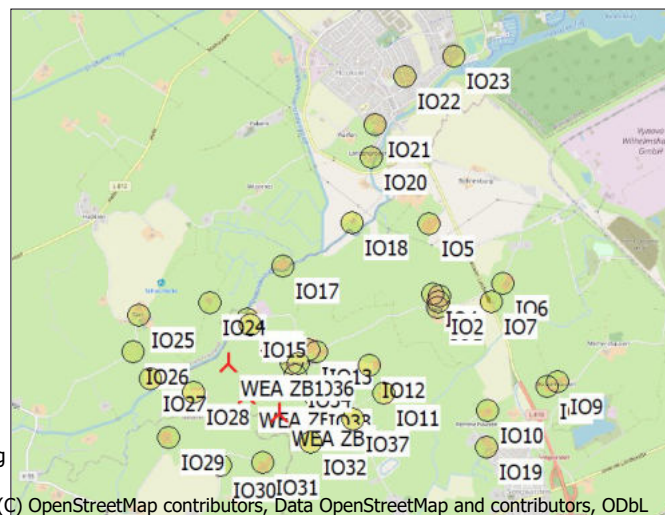
Rasterauflösung: 1,0 m

Alle Koordinatenangaben in:

UTM (north)-WGS84 Zone: 32

WEA

	Ost	Nord	Z	Beschreibung	WEA-Typ									
					Ak- tu- ell	Hersteller	Typ	Nenn- leistung	Rotor- durch- messer	NH	Beschatt.- Bereich	U/min		
			[m]					[kW]	[m]	[m]	[m]	[U/min]		
WEA ZB1	434.029	5.940.044	1,1	NORDEX N163/6.X 7000 163.0...Ja		NORDEX	N163/6.X-7.000	7.000	163,0	118,0	1.788	10,7		
WEA ZB2	434.212	5.939.722	0,7	NORDEX N163/6.X 7000 163.0...Ja		NORDEX	N163/6.X-7.000	7.000	163,0	118,0	1.788	10,7		
WEA ZB3	434.540	5.939.539	0,5	NORDEX N163/6.X 7000 163.0...Ja		NORDEX	N163/6.X-7.000	7.000	163,0	118,0	1.788	10,7		



(C) OpenStreetMap contributors, Data OpenStreetMap and contributors, ODbL

Neue WEA

Maßstab 1:75.000

Schattenrezeptor

Schattenrezeptor-Eingabe

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
					[m]	[m]	[m]	[°]		[m]
IO1	Utwarfe 1	436.131	5.940.572	3,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO10	Remmelhausen 4	436.614	5.939.542	2,9	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO11	Westerhausen 3	435.587	5.939.724	2,1	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO12	Westerhausen 4	435.445	5.939.994	2,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO13	Westerhausen 11	434.919	5.940.137	1,9	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO14	Westerhausen 12	434.838	5.940.170	3,7	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO15	Westerhausen 9A	434.262	5.940.420	1,5	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO16	Westerhausen 9	434.230	5.940.481	2,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO17	Rüschstede 1	434.591	5.941.001	2,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO18	Langengroden 1	435.289	5.941.414	1,9	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO19	WA Sengwarden BP207	436.605	5.939.173	1,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO2	Utwarfe 2	436.140	5.940.625	3,6	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO20	Langengrodener Weg 17	435.491	5.942.055	1,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO21	Am Sudring 15	435.532	5.942.394	1,9	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO22	Georg-Adden-Straße 55	435.830	5.942.859	1,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO23	Hooksiel	436.324	5.943.054	0,8	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO24	Depenhausen/Pakens 1	433.854	5.940.646	0,8	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO25	Tain 3	433.154	5.940.529	2,7	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO26	Waterpott 1	433.089	5.940.168	1,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO27	Klein Depenhausen 1	433.254	5.939.909	2,5	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO28	Klein Westerhausen 1	433.683	5.939.767	2,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO29	Depenhausen 1	433.437	5.939.318	1,6	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO3	Utwarfe 3	436.153	5.940.685	2,8	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO30	Purkswarfe 2	433.950	5.939.029	1,4	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO31	Purkswarfe 3	434.370	5.939.047	1,6	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO32	Putzwei 1	434.854	5.939.246	2,5	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO33	Westerhausen 5	434.903	5.939.704	1,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO34	Westerhausen 6	434.704	5.939.918	4,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO35	Westerhausen 7	434.664	5.940.034	4,0	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0

(Fortsetzung nächste Seite)...

SHADOW - Hauptergebnis

Berechnung: M180777_02 Zusatzbelastung

...(Fortsetzung von vorheriger Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
				[m]	[m]	[m]	[m]	[°]		[m]
IO36	Westerhausen 10	434.732	5.940.032	4,4	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO37	Westerhausen 1	435.270	5.939.464	1,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO4	Utwarfe 4	436.089	5.940.708	3,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO5	Klein Buschhausen 3	436.045	5.941.392	1,9	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO6	Bohnenburg 20	436.785	5.940.793	1,5	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO7	Sengwarder Chausseehaus	436.664	5.940.615	1,4	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO8	Idschenhausen 1	437.215	5.939.770	3,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO9	Idschenhausen 2	437.310	5.939.811	2,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0

Berechnungsergebnisse

Schattenrezeptor

astron. max. mögl. Beschattungsdauer

Nr.	Name	Stunden/Jahr [h/a]	Schattentage/Jahr [d/a]	Max.Schattendauer/Tag [h/d]
IO1	Utwarfe 1	0:00	0	0:00
IO10	Rommelhausen 4	0:00	0	0:00
IO11	Westerhausen 3	36:09	94	0:39
IO12	Westerhausen 4	44:44	114	0:38
IO13	Westerhausen 11	144:36	203	0:57
IO14	Westerhausen 12	146:22	198	0:58
IO15	Westerhausen 9A	221:20	141	2:26
IO16	Westerhausen 9	168:28	120	2:10
IO17	Rüschstede 1	20:28	46	0:33
IO18	Langengroden 1	0:00	0	0:00
IO19	WA Sengwarden BP207	0:00	0	0:00
IO2	Utwarfe 2	0:00	0	0:00
IO20	Langengrodener Weg 17	0:00	0	0:00
IO21	Am Sudring 15	0:00	0	0:00
IO22	Georg-Adden-Straße 55	0:00	0	0:00
IO23	Hooksiel	0:00	0	0:00
IO24	Depenhausen/Pakens 1	92:28	82	1:38
IO25	Tain 3	40:01	83	0:42
IO26	Waterpott 1	40:16	96	0:40
IO27	Klein Depenhausen 1	75:18	138	0:49
IO28	Klein Westerhausen 1	108:16	128	1:09
IO29	Depenhausen 1	77:36	138	0:47
IO3	Utwarfe 3	0:00	0	0:00
IO30	Purkswarfe 2	0:00	0	0:00
IO31	Purkswarfe 3	0:00	0	0:00
IO32	Putzwei 1	22:05	50	0:35
IO33	Westerhausen 5	232:06	222	2:02
IO34	Westerhausen 6	328:08	292	1:36
IO35	Westerhausen 7	259:45	249	1:36
IO36	Westerhausen 10	231:46	242	1:17
IO37	Westerhausen 1	83:41	119	1:14
IO4	Utwarfe 4	0:00	0	0:00
IO5	Klein Buschhausen 3	0:00	0	0:00
IO6	Bohnenburg 20	0:00	0	0:00
IO7	Sengwarder Chausseehaus	0:00	0	0:00
IO8	Idschenhausen 1	0:00	0	0:00
IO9	Idschenhausen 2	0:00	0	0:00

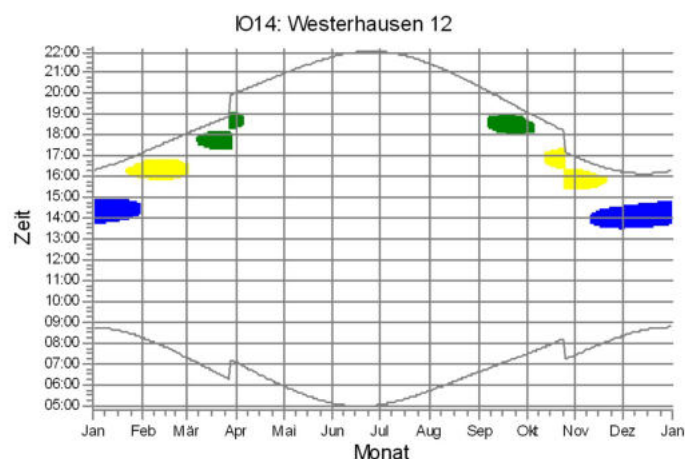
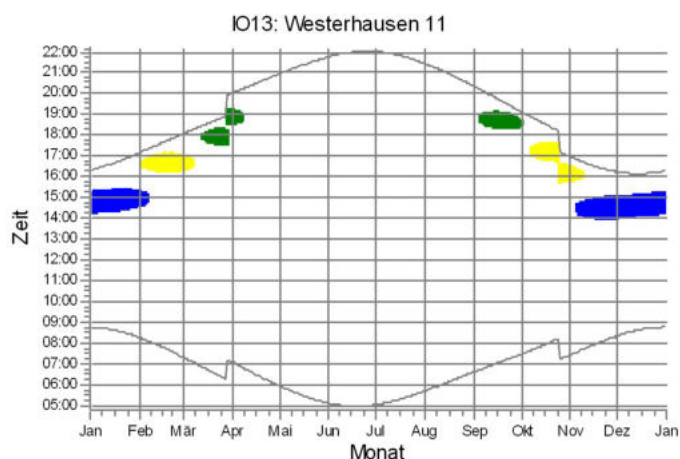
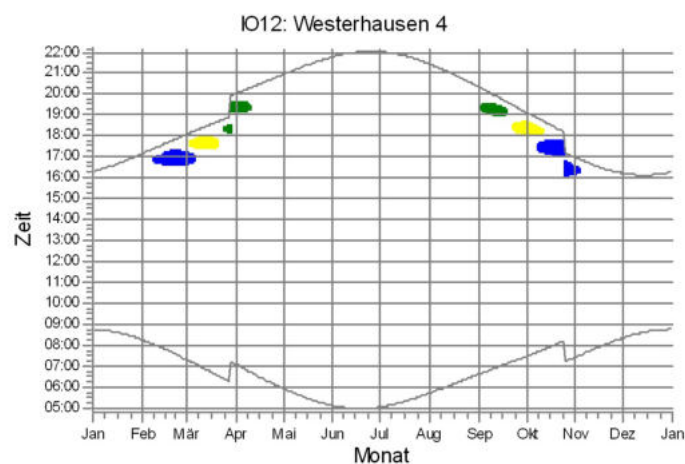
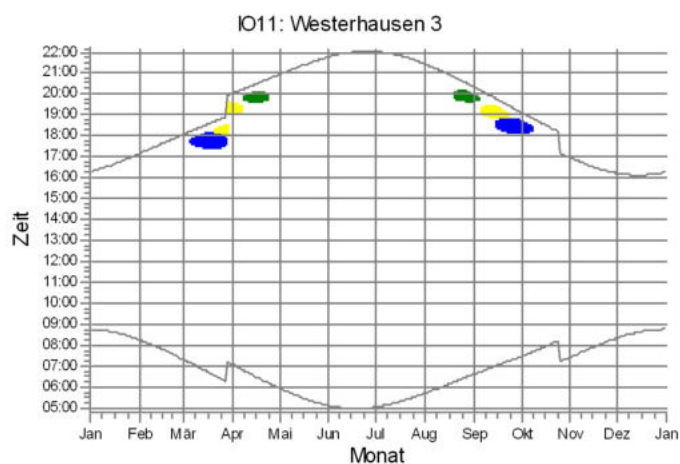
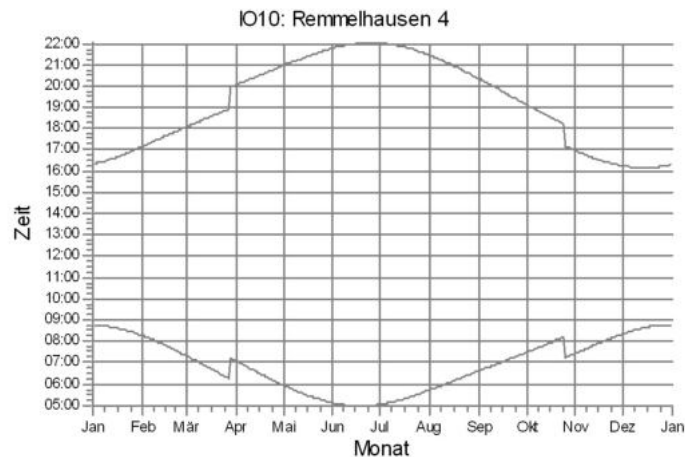
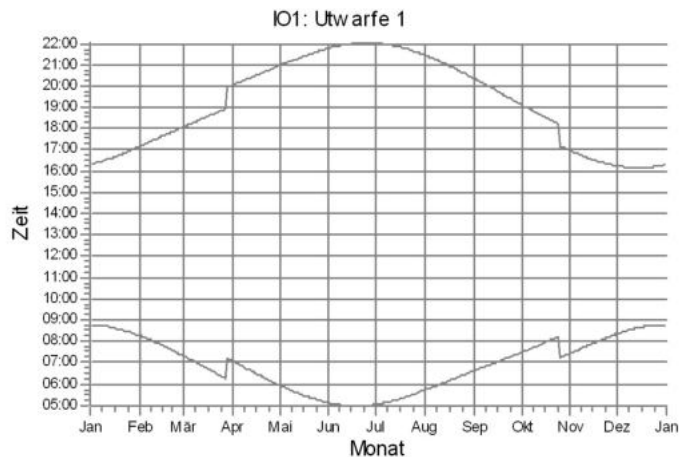
Gesamtdauer Beschattung an Rezeptoren pro WEA

Nr.	Name	Maximal [h/a]
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WEA ZB2	NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (2)	500:59
WEA ZB3	NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (3)	564:49

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.

SHADOW - Grafischer Kalender

Berechnung: M180777_02 Zusatzbelastung



WEA

- WEA ZB1: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (1)
- WEA ZB2: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (2)
- WEA ZB3: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (3)

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH

Helmut-A. Müller-Straße 1-5

DE-82152 Planegg / München

0049 89 85 602 0

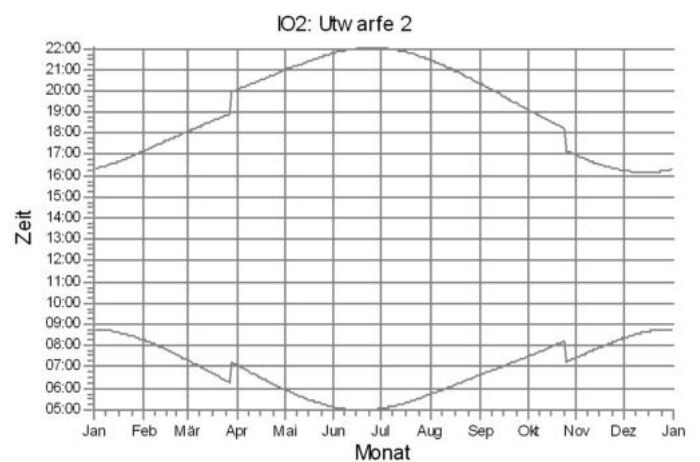
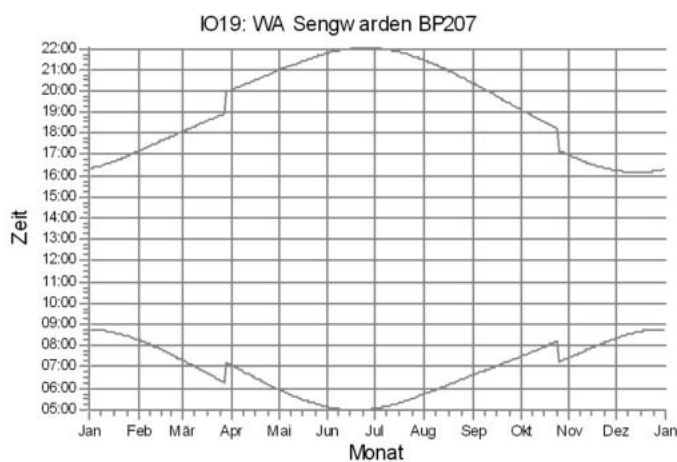
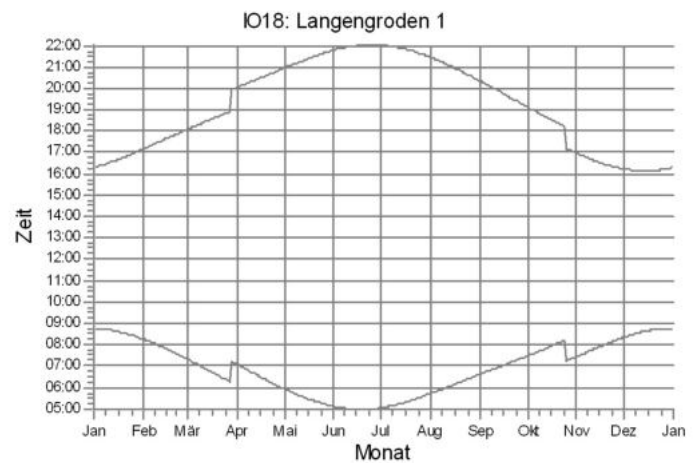
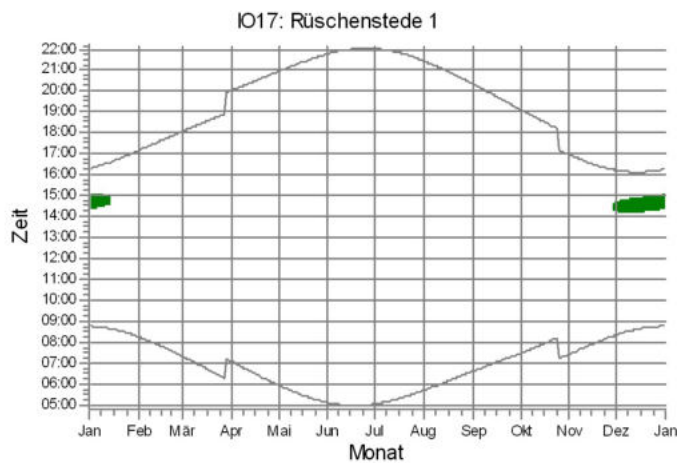
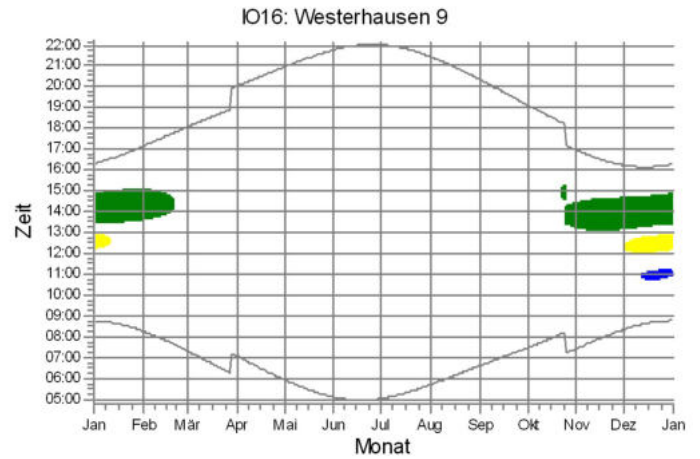
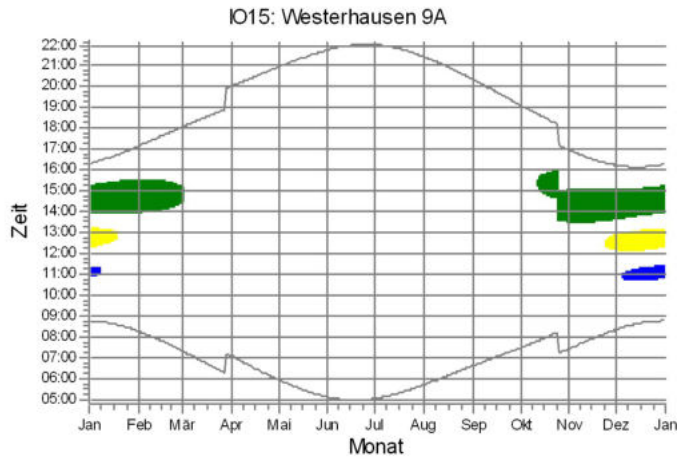
Felix Bergholz / Felix.Bergholz@mbbm-ind.com

Berechnet:

17.09.2024 15:56/4.0.531

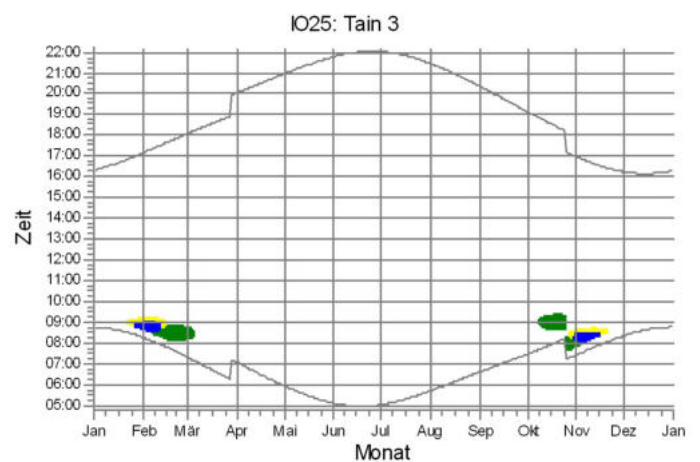
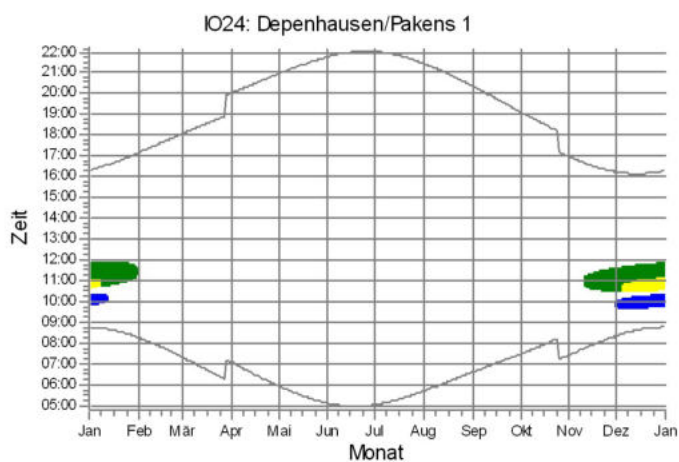
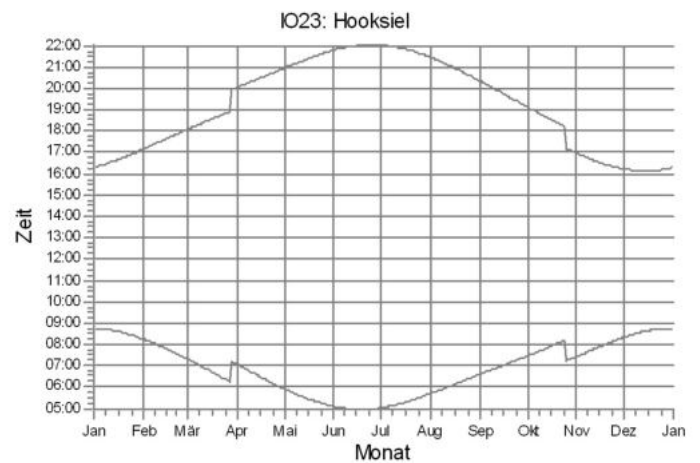
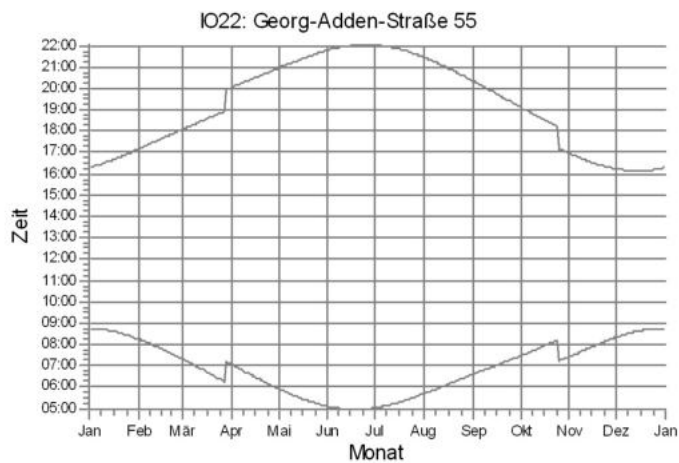
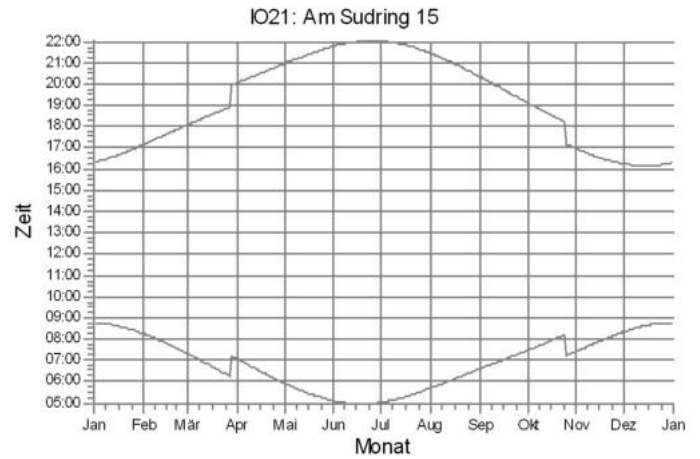
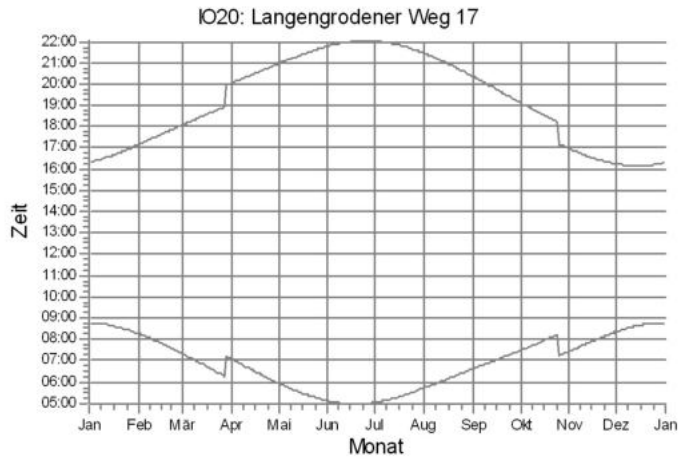
SHADOW - Grafischer Kalender

Berechnung: M180777_02 Zusatzbelastung



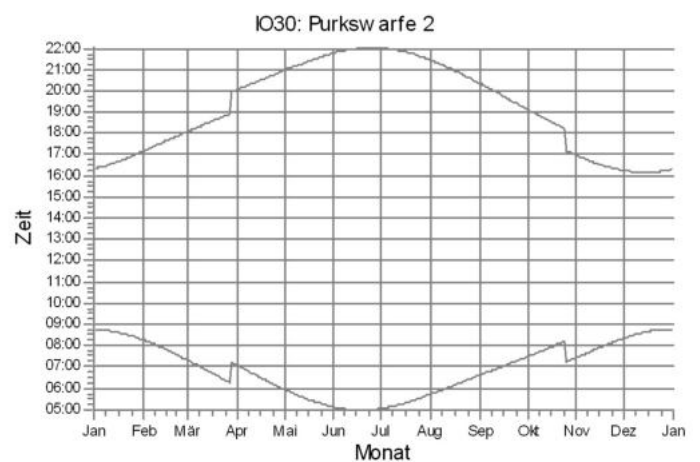
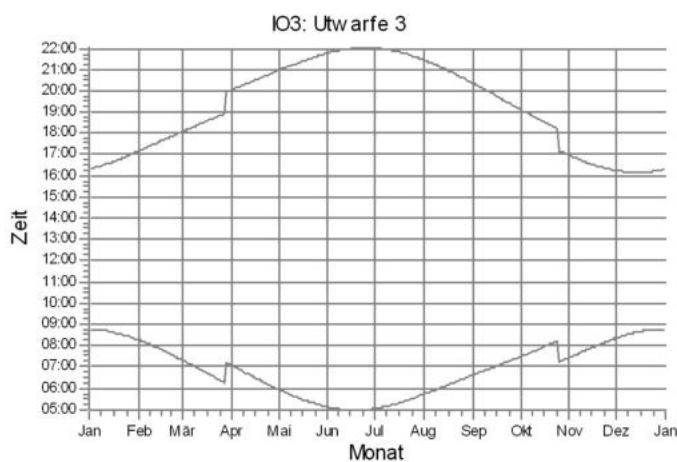
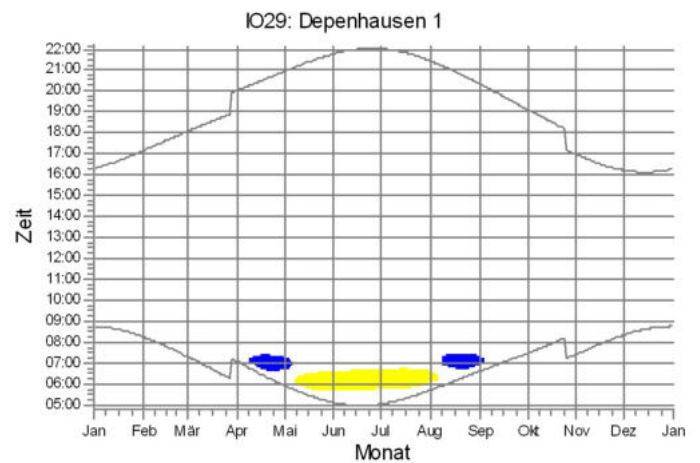
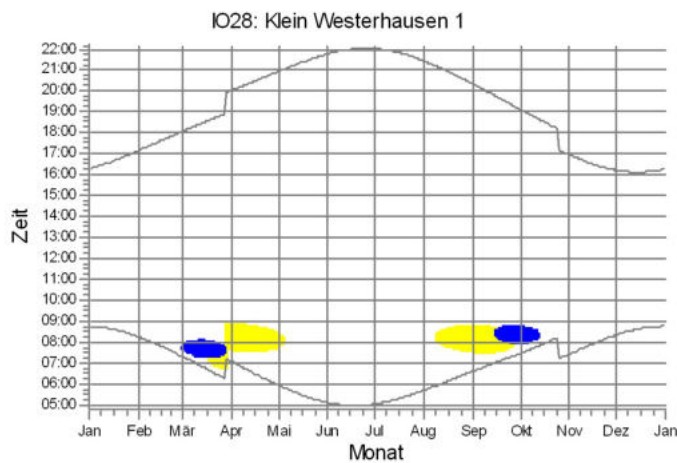
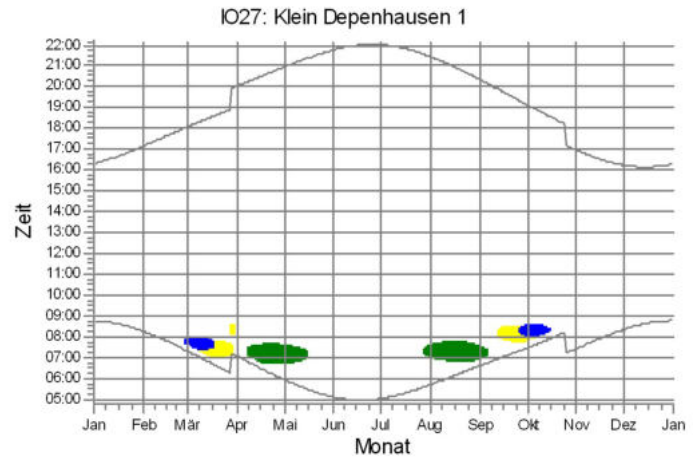
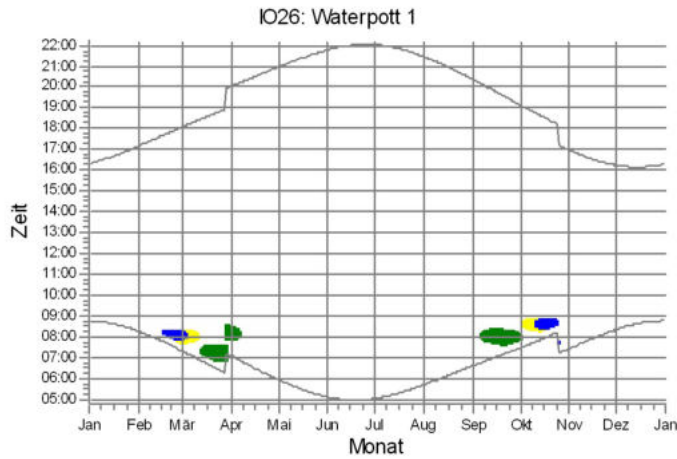
WEA

- WEA ZB1: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (1)
- WEA ZB2: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (2)
- WEA ZB3: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (3)

SHADOW - Grafischer Kalender**Berechnung:** M180777_02 Zusatzbelastung

WEA

- WEA ZB1: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (1)
- WEA ZB2: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (2)
- WEA ZB3: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (3)

SHADOW - Grafischer Kalender**Berechnung:** M180777_02 Zusatzbelastung

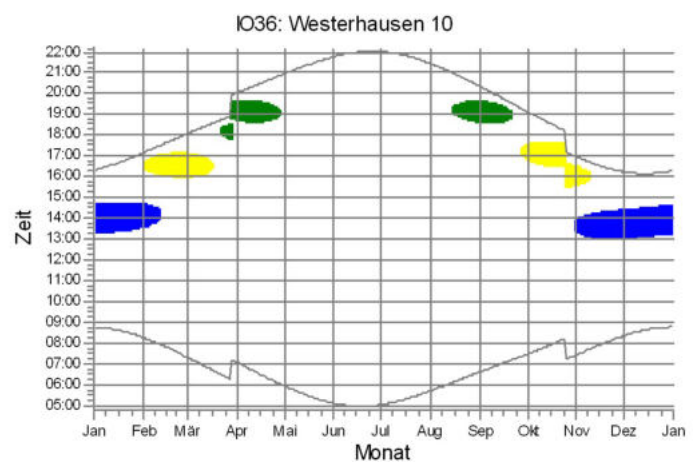
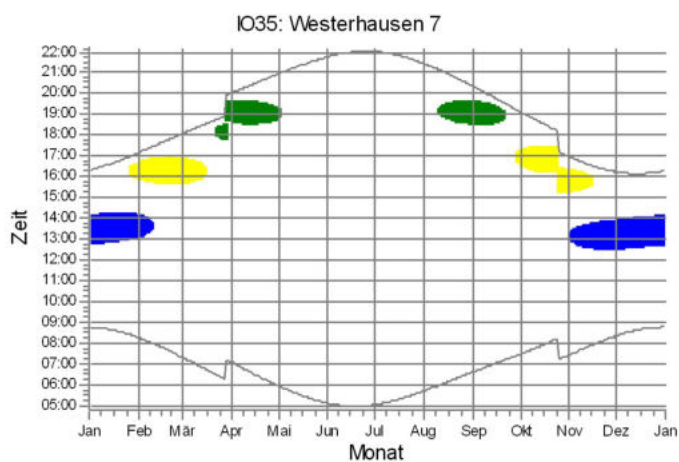
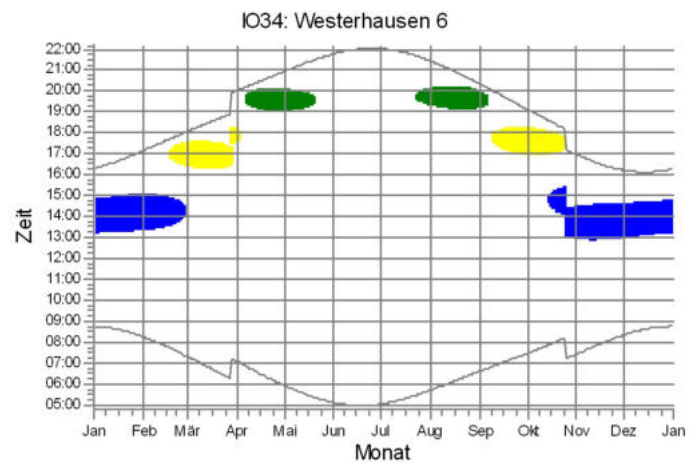
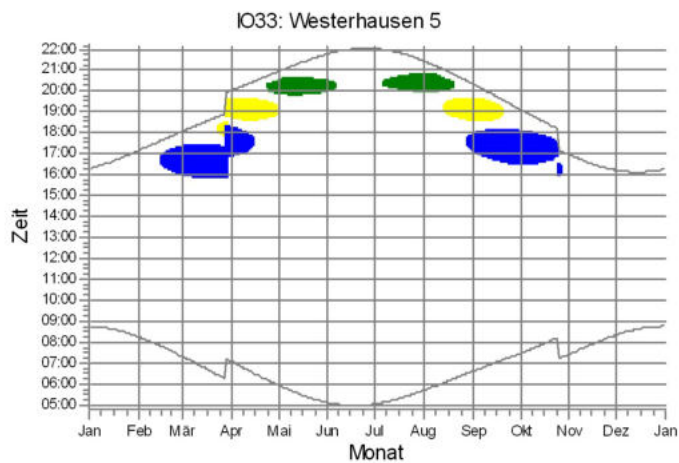
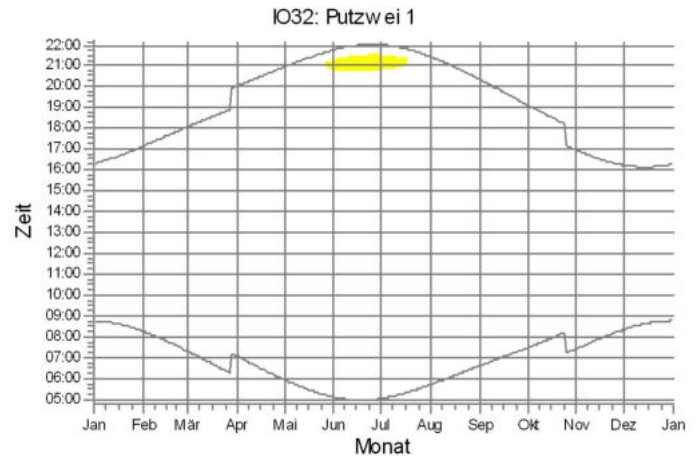
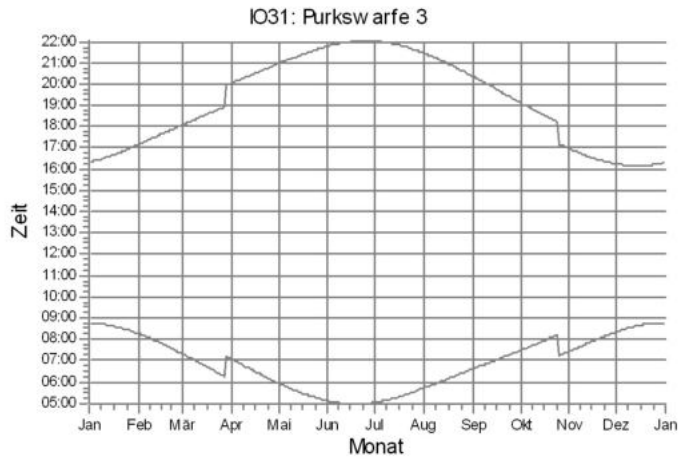
WEA



WEA ZB1: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (1)

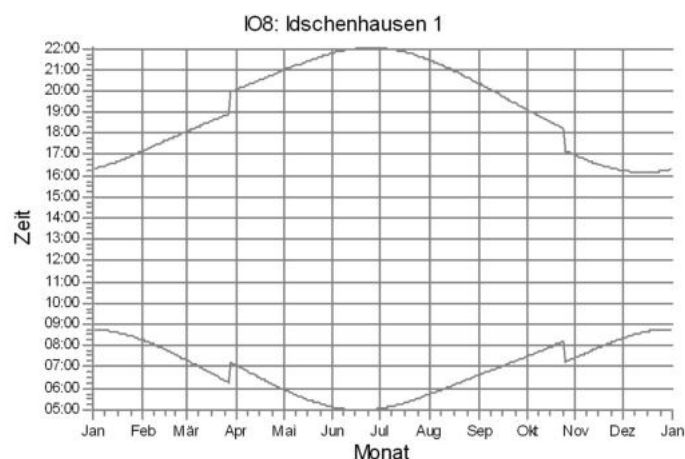
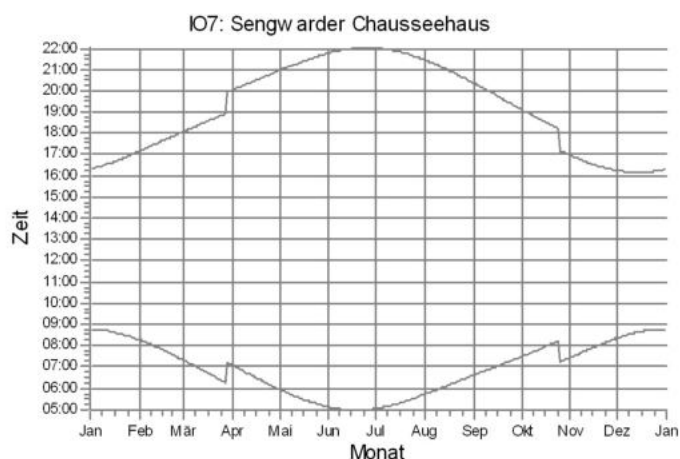
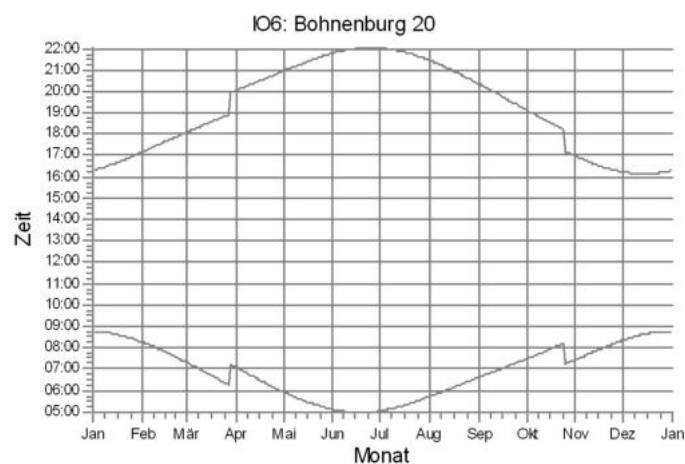
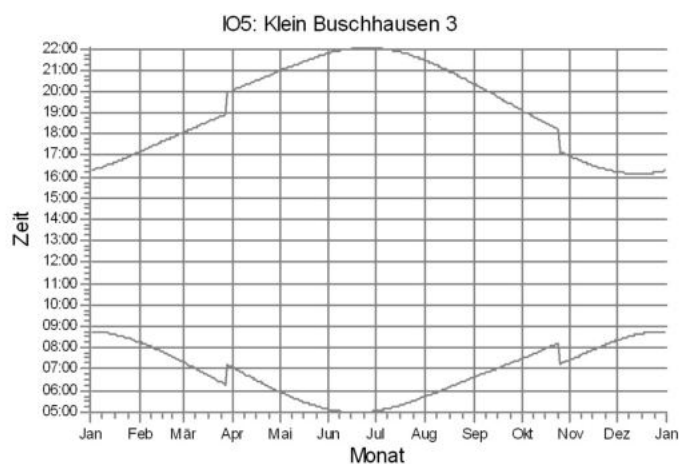
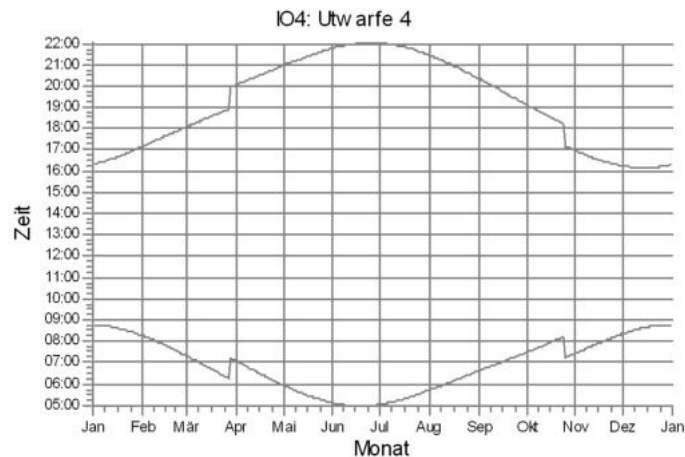
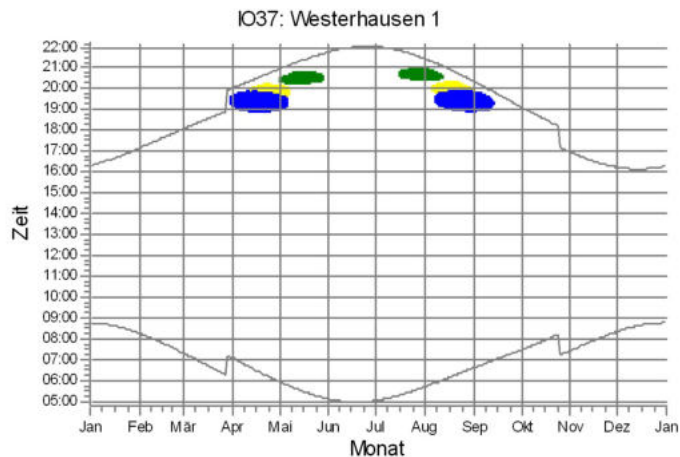
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WEA ZB3: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (3)

SHADOW - Grafischer Kalender**Berechnung:** M180777_02 Zusatzbelastung

WEA

- WEA ZB1: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (1)
- WEA ZB2: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (2)
- WEA ZB3: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (3)

SHADOW - Grafischer Kalender**Berechnung:** M180777_02 Zusatzbelastung

WEA

- WEA ZB1: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (1)
- WEA ZB2: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (2)
- WEA ZB3: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (3)

Projekt:

M180777

Lizenzierte Anwender:

Müller-BBM Industry Solutions GmbH

Helmut-A. Müller-Straße 1-5

DE-82152 Planegg / München

0049 89 85 602 0

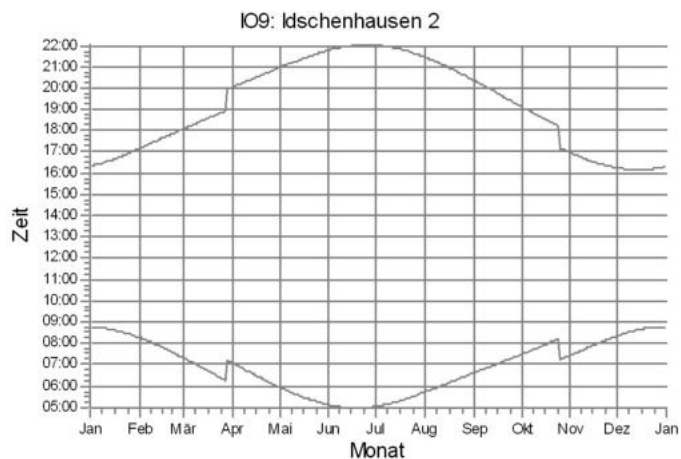
Felix Bergholz / Felix.Bergholz@mbbm-ind.com

Berechnet:

17.09.2024 15:56/4.0.531

SHADOW - Grafischer Kalender

Berechnung: M180777_02 Zusatzbelastung



WEA

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO1 - Utwarfe 1

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:44 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:44 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:26 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:08	07:37 18:55	07:36 16:48	08:28 16:10
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10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	05:11 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
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15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 21:59	05:16 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:08 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:40 18:35	06:26 20:32	05:26 21:25	04:58 22:00	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
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19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:23 21:28	04:58 22:01	05:22 21:46	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:15 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:31 16:48	07:36 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:10
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:42	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:59 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:11
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
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26	08:25 16:57	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	05:32 21:37	06:25 20:35	07:19 19:19	07:15 17:10	08:13 16:18	08:45 16:12
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28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:10 21:41	05:01 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
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31	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.Beschattung												

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) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO10 - Remmelhausen 4
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:26	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:01 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:44 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
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8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:58	05:54 21:13	06:48 20:04	07:41 18:50	07:40 16:44	08:30 16:09
9	08:42 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	05:09 21:57	05:55 21:11	06:50 20:01	07:43 18:48	07:41 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:21	06:42 20:19	05:38 21:13	05:00 21:56	05:11 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
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15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 21:59	05:17 21:51	06:06 20:59	07:00 19:46	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:08 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
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27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:16 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:10 21:41	05:01 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:53	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:17 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:45 16:16
31	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	419	493	509	511	459	382	329	260	235
astr.max.mögl.Beschattung												

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) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO11 - Westerhausen 3

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März		April		Mai	Juni
1	08:45	08:15	07:19		07:04	19:05 (WEA ZB2)	05:55	05:06
	16:18	17:09	18:04		20:02	25 19:30 (WEA ZB2)	20:57	21:47
2	08:45	08:14	07:16		07:02	19:05 (WEA ZB2)	05:53	05:05
	16:19	17:11	18:06		20:04	24 19:29 (WEA ZB2)	20:59	21:48
3	08:45	08:12	07:14		06:59	19:07 (WEA ZB2)	05:51	05:05
	16:21	17:13	18:08		20:06	22 19:29 (WEA ZB2)	21:01	21:49
4	08:45	08:10	07:12		06:57	19:07 (WEA ZB2)	05:49	05:04
	16:22	17:15	18:10		20:08	19 19:26 (WEA ZB2)	21:03	21:50
5	08:44	08:09	07:09		06:54	19:09 (WEA ZB2)	05:47	05:03
	16:23	17:17	18:12		20:10	16 19:25 (WEA ZB2)	21:04	21:51
6	08:44	08:07	07:07	17:46 (WEA ZB3)	06:52	19:11 (WEA ZB2)	05:45	05:02
	16:24	17:19	18:14	1 17:47 (WEA ZB3)	20:11	10 19:21 (WEA ZB2)	21:06	21:52
7	08:44	08:05	07:05	17:42 (WEA ZB3)	06:50		05:43	05:02
	16:26	17:21	18:16	8 17:50 (WEA ZB3)	20:13		21:08	21:53
8	08:43	08:03	07:02	17:39 (WEA ZB3)	06:47		05:41	05:01
	16:27	17:23	18:18	12 17:51 (WEA ZB3)	20:15		21:10	21:54
9	08:43	08:01	07:00	17:37 (WEA ZB3)	06:45	19:46 (WEA ZB1)	05:40	05:00
	16:28	17:25	18:20	16 17:53 (WEA ZB3)	20:17	3 19:49 (WEA ZB1)	21:11	21:55
10	08:42	07:59	06:57	17:35 (WEA ZB3)	06:42	19:45 (WEA ZB1)	05:38	05:00
	16:30	17:27	18:22	20 17:55 (WEA ZB3)	20:19	6 19:51 (WEA ZB1)	21:13	21:56
11	08:41	07:57	06:55	17:34 (WEA ZB3)	06:40	19:44 (WEA ZB1)	05:36	04:59
	16:31	17:29	18:23	23 17:57 (WEA ZB3)	20:21	10 19:54 (WEA ZB1)	21:15	21:57
12	08:40	07:55	06:53	17:32 (WEA ZB3)	06:38	19:42 (WEA ZB1)	05:34	04:59
	16:33	17:31	18:25	26 17:58 (WEA ZB3)	20:22	13 19:55 (WEA ZB1)	21:17	21:57
13	08:40	07:53	06:50	17:32 (WEA ZB3)	06:35	19:42 (WEA ZB1)	05:32	04:59
	16:35	17:33	18:27	29 18:01 (WEA ZB3)	20:24	15 19:57 (WEA ZB1)	21:18	21:58
14	08:39	07:51	06:48	17:31 (WEA ZB3)	06:33	19:41 (WEA ZB1)	05:31	04:58
	16:36	17:35	18:29	31 18:02 (WEA ZB3)	20:26	18 19:59 (WEA ZB1)	21:20	21:59
15	08:38	07:49	06:45	17:30 (WEA ZB3)	06:31	19:41 (WEA ZB1)	05:29	04:58
	16:38	17:37	18:31	35 18:05 (WEA ZB3)	20:28	20 20:01 (WEA ZB1)	21:22	21:59
16	08:37	07:47	06:43	17:30 (WEA ZB3)	06:28	19:40 (WEA ZB1)	05:27	04:58
	16:40	17:39	18:33	35 18:05 (WEA ZB3)	20:30	22 20:02 (WEA ZB1)	21:23	22:00
17	08:36	07:45	06:41	17:30 (WEA ZB3)	06:26	19:41 (WEA ZB1)	05:26	04:58
	16:41	17:41	18:35	35 18:05 (WEA ZB3)	20:32	23 20:04 (WEA ZB1)	21:25	22:00
18	08:35	07:43	06:38	17:30 (WEA ZB3)	06:24	19:41 (WEA ZB1)	05:24	04:58
	16:43	17:43	18:37	35 18:05 (WEA ZB3)	20:33	22 20:03 (WEA ZB1)	21:27	22:01
19	08:34	07:41	06:36	17:29 (WEA ZB3)	06:21	19:42 (WEA ZB1)	05:23	04:58
	16:45	17:45	18:38	35 18:04 (WEA ZB3)	20:35	21 20:03 (WEA ZB1)	21:28	22:01
20	08:33	07:39	06:33	17:30 (WEA ZB3)	06:19	19:43 (WEA ZB1)	05:21	04:58
	16:46	17:47	18:40	33 18:03 (WEA ZB3)	20:37	19 20:02 (WEA ZB1)	21:30	22:02
21	08:31	07:36	06:31	17:30 (WEA ZB3)	06:17	19:43 (WEA ZB1)	05:20	04:58
	16:48	17:49	18:42	32 18:02 (WEA ZB3)	20:39	16 19:59 (WEA ZB1)	21:31	22:02
22	08:30	07:34	06:28	17:30 (WEA ZB3)	06:15	19:45 (WEA ZB1)	05:18	04:58
	16:50	17:51	18:44	36 18:18 (WEA ZB2)	20:41	13 19:58 (WEA ZB1)	21:33	22:02
23	08:29	07:32	06:26	17:31 (WEA ZB3)	06:12	19:47 (WEA ZB1)	05:17	04:59
	16:52	17:53	18:46	38 18:19 (WEA ZB2)	20:43	8 19:55 (WEA ZB1)	21:34	22:02
24	08:28	07:30	06:23	17:32 (WEA ZB3)	06:10		05:15	04:59
	16:54	17:55	18:48	39 18:21 (WEA ZB2)	20:44		21:36	22:02
25	08:26	07:28	06:21	17:33 (WEA ZB3)	06:08		05:14	04:59
	16:56	17:57	18:49	39 18:23 (WEA ZB2)	20:46		21:37	22:02
26	08:25	07:25	06:19	17:35 (WEA ZB3)	06:06		05:13	05:00
	16:58	17:59	18:51	37 18:25 (WEA ZB2)	20:48		21:39	22:02
27	08:23	07:23	06:16	17:38 (WEA ZB3)	06:04		05:12	05:00
	16:59	18:01	18:53	35 18:27 (WEA ZB2)	20:50		21:40	22:02
28	08:22	07:21	06:14	18:05 (WEA ZB2)	06:02		05:11	05:01
	17:01	18:02	18:55	23 18:28 (WEA ZB2)	20:52		21:41	22:02
29	08:20		07:11	19:05 (WEA ZB2)	05:59		05:09	05:01
	17:03		19:57	26 19:31 (WEA ZB2)	20:54		21:43	22:02
30	08:19		07:09	19:05 (WEA ZB2)	05:57		05:08	05:02
	17:05		19:59	27 19:32 (WEA ZB2)	20:55		21:44	22:02
31	08:17		07:06	19:05 (WEA ZB2)			05:07	
	17:07		20:00	26 19:31 (WEA ZB2)			21:45	
Sonnenscheinstunden	251	274	367		419		493	509
astr.max.mögl.Beschattung				732		345		

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)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO11 - Westerhausen 3

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	July	August	September	Oktober	November	Dezember
1	05:02 22:01	05:42 21:27	06:36 20:20	19:43 (WEA ZB1) 19:52 (WEA ZB1)	07:28 18:12 (WEA ZB3)	07:26 16:57
2	05:03 22:01	05:44 21:25	06:37 20:18	19:44 (WEA ZB1) 19:50 (WEA ZB1)	07:30 19:05	07:28 16:55
3	05:04 22:01	05:45 21:23	06:39 20:16	19:44 (WEA ZB1) 19:47 (WEA ZB1)	07:32 19:02	07:30 16:53
4	05:05 22:00	05:47 21:21	06:41 20:13		07:34 19:00	07:32 16:51
5	05:06 22:00	05:49 21:19	06:43 20:11		07:36 18:58	07:34 16:50
6	05:07 21:59	05:50 21:17	06:44 20:09	19:07 (WEA ZB2)	07:37 18:55	07:36 16:48
7	05:08 21:58	05:52 21:15	06:46 20:06	19:04 (WEA ZB2) 19:20 (WEA ZB2)	07:39 18:53	07:38 16:46
8	05:09 21:58	05:54 21:13	06:48 20:04	19:02 (WEA ZB2) 19:21 (WEA ZB2)	07:41 18:50	07:40 16:44
9	05:10 21:57	05:55 21:11	06:50 20:01	19:00 (WEA ZB2) 19:22 (WEA ZB2)	07:43 18:48	07:41 16:42
10	05:11 21:56	05:57 21:09	06:51 19:59	18:59 (WEA ZB2) 19:23 (WEA ZB2)	07:45 18:46	07:43 16:41
11	05:12 21:55	05:59 21:07	06:53 19:56	18:58 (WEA ZB2) 19:23 (WEA ZB2)	07:47 18:43	07:45 16:39
12	05:13 21:54	06:01 21:05	06:55 19:54	18:56 (WEA ZB2) 19:23 (WEA ZB2)	07:48 18:41	07:47 16:37
13	05:14 21:53	06:02 21:03	06:57 19:51	18:56 (WEA ZB2) 19:23 (WEA ZB2)	07:50 18:39	07:49 16:35
14	05:15 21:52	06:04 21:01	06:58 19:49	18:56 (WEA ZB2) 19:21 (WEA ZB2)	07:52 18:36	07:51 16:34
15	05:17 21:51	06:06 20:59	07:00 19:47	18:56 (WEA ZB2) 19:19 (WEA ZB2)	07:54 18:34	07:53 16:32
16	05:18 21:50	06:08 20:57	07:02 19:44	18:27 (WEA ZB3) 19:16 (WEA ZB2)	07:56 18:32	07:55 16:31
17	05:19 21:49	06:09 20:55	07:04 19:42	18:24 (WEA ZB3) 19:14 (WEA ZB2)	07:58 18:29	07:57 16:29
18	05:21 21:48	06:11 20:53	07:05 19:39	18:22 (WEA ZB3) 19:12 (WEA ZB2)	07:59 18:27	07:58 16:28
19	05:22 21:46	06:13 20:50	07:07 19:37	18:19 (WEA ZB3) 19:08 (WEA ZB2)	08:01 18:25	08:00 16:26
20	05:23 21:45	06:15 20:48	07:09 19:34	18:17 (WEA ZB3) 19:06 (WEA ZB2)	08:03 18:23	08:02 16:25
21	05:25 21:44	06:16 20:46	07:11 19:32	18:16 (WEA ZB3) 19:04 (WEA ZB2)	08:05 18:20	08:04 16:24
22	05:26 21:42	06:18 20:44	07:12 19:29	18:15 (WEA ZB3) 19:02 (WEA ZB2)	08:07 18:18	08:06 16:23
23	05:28 21:41	06:20 20:41	07:14 19:27	18:14 (WEA ZB3) 18:47 (WEA ZB3)	08:09 18:16	08:07 16:21
24	05:29 21:40	06:22 20:39	07:16 19:24	18:13 (WEA ZB3) 18:47 (WEA ZB3)	08:11 18:14	08:09 16:20
25	05:31 21:38	06:23 20:37	07:18 19:22	18:13 (WEA ZB3) 18:47 (WEA ZB3)	07:13 17:12	08:11 16:19
26	05:32 21:37	06:25 20:35	07:19 19:19	18:12 (WEA ZB3) 18:47 (WEA ZB3)	07:15 17:10	08:13 16:18
27	05:34 21:35	06:27 20:32	07:21 19:17	18:11 (WEA ZB3) 18:46 (WEA ZB3)	07:16 17:07	08:14 16:17
28	05:35 21:33	06:29 20:30	07:23 19:15	18:11 (WEA ZB3) 18:46 (WEA ZB3)	07:18 17:05	08:16 16:16
29	05:37 21:32	06:30 20:28	07:25 19:12	18:11 (WEA ZB3) 18:44 (WEA ZB3)	07:20 17:03	08:17 16:15
30	05:39 21:30	06:32 20:25	07:27 19:10	18:11 (WEA ZB3) 18:42 (WEA ZB3)	07:22 17:01	08:19 16:14
31	05:40 21:28	06:34 20:23	19:42 (WEA ZB1) 19:54 (WEA ZB1)		07:24 16:59	
Sonnenscheinstunden	511	459	382	329	260	234
astr.max.mögl.Beschattung		209	763	120		

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO12 - Westerhausen 4

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar		März		April		Mai	Juni
1	08:45	08:16		07:19	16:41 (WEA ZB3)	07:04	19:11 (WEA ZB1)	05:55	05:06
	16:18	17:09		18:04	29 17:10 (WEA ZB3)	20:02	24 19:35 (WEA ZB1)	20:57	21:47
2	08:45	08:14		07:16	16:43 (WEA ZB3)	07:02	19:11 (WEA ZB1)	05:53	05:05
	16:19	17:11		18:06	26 17:09 (WEA ZB3)	20:04	26 19:37 (WEA ZB1)	20:59	21:48
3	08:45	08:12		07:14	16:44 (WEA ZB3)	06:59	19:12 (WEA ZB1)	05:51	05:05
	16:21	17:13		18:08	25 17:41 (WEA ZB2)	20:06	25 19:37 (WEA ZB1)	21:01	21:49
4	08:45	08:10		07:12	16:47 (WEA ZB3)	06:57	19:11 (WEA ZB1)	05:49	05:04
	16:22	17:15		18:10	25 17:43 (WEA ZB2)	20:08	25 19:36 (WEA ZB1)	21:03	21:50
5	08:44	08:09		07:09	16:50 (WEA ZB3)	06:54	19:12 (WEA ZB1)	05:47	05:03
	16:23	17:17		18:12	21 17:45 (WEA ZB2)	20:10	23 19:35 (WEA ZB1)	21:04	21:51
6	08:44	08:07		07:07	17:32 (WEA ZB2)	06:52	19:12 (WEA ZB1)	05:45	05:02
	16:24	17:19		18:14	15 17:47 (WEA ZB2)	20:11	21 19:33 (WEA ZB1)	21:06	21:52
7	08:44	08:05		07:05	17:31 (WEA ZB2)	06:50	19:14 (WEA ZB1)	05:43	05:02
	16:26	17:21		18:16	19 17:50 (WEA ZB2)	20:13	18 19:32 (WEA ZB1)	21:08	21:53
8	08:43	08:03	16:52 (WEA ZB3)	07:02	17:30 (WEA ZB2)	06:47	19:16 (WEA ZB1)	05:41	05:01
	16:27	17:23	1 16:53 (WEA ZB3)	18:18	21 17:51 (WEA ZB2)	20:15	14 19:30 (WEA ZB1)	21:10	21:54
9	08:43	08:01	16:49 (WEA ZB3)	07:00	17:30 (WEA ZB2)	06:45	19:18 (WEA ZB1)	05:40	05:00
	16:28	17:25	6 16:55 (WEA ZB3)	18:20	23 17:53 (WEA ZB2)	20:17	8 19:26 (WEA ZB1)	21:11	21:55
10	08:42	07:59	16:47 (WEA ZB3)	06:57	17:28 (WEA ZB2)	06:42		05:38	05:00
	16:30	17:27	11 16:58 (WEA ZB3)	18:22	27 17:55 (WEA ZB2)	20:19		21:13	21:56
11	08:41	07:57	16:44 (WEA ZB3)	06:55	17:29 (WEA ZB2)	06:40		05:36	04:59
	16:31	17:29	15 16:59 (WEA ZB3)	18:23	28 17:57 (WEA ZB2)	20:21		21:15	21:57
12	08:40	07:55	16:43 (WEA ZB3)	06:53	17:28 (WEA ZB2)	06:38		05:34	04:59
	16:33	17:31	18 17:01 (WEA ZB3)	18:25	29 17:57 (WEA ZB2)	20:22		21:17	21:57
13	08:40	07:53	16:42 (WEA ZB3)	06:50	17:28 (WEA ZB2)	06:35		05:32	04:59
	16:35	17:33	21 17:03 (WEA ZB3)	18:27	29 17:57 (WEA ZB2)	20:24		21:18	21:58
14	08:39	07:51	16:41 (WEA ZB3)	06:48	17:29 (WEA ZB2)	06:33		05:31	04:58
	16:36	17:35	25 17:06 (WEA ZB3)	18:29	28 17:57 (WEA ZB2)	20:26		21:20	21:59
15	08:38	07:49	16:40 (WEA ZB3)	06:45	17:29 (WEA ZB2)	06:31		05:29	04:58
	16:38	17:37	28 17:08 (WEA ZB3)	18:31	27 17:56 (WEA ZB2)	20:28		21:22	21:59
16	08:37	07:47	16:40 (WEA ZB3)	06:43	17:30 (WEA ZB2)	06:28		05:27	04:58
	16:39	17:39	30 17:10 (WEA ZB3)	18:33	25 17:55 (WEA ZB2)	20:30		21:23	22:00
17	08:36	07:45	16:39 (WEA ZB3)	06:41	17:30 (WEA ZB2)	06:26		05:26	04:58
	16:41	17:41	34 17:13 (WEA ZB3)	18:35	23 17:53 (WEA ZB2)	20:32		21:25	22:00
18	08:35	07:43	16:38 (WEA ZB3)	06:38	17:31 (WEA ZB2)	06:24		05:24	04:58
	16:43	17:43	36 17:14 (WEA ZB3)	18:37	21 17:52 (WEA ZB2)	20:33		21:27	22:01
19	08:34	07:41	16:38 (WEA ZB3)	06:36	17:33 (WEA ZB2)	06:21		05:23	04:58
	16:45	17:45	37 17:15 (WEA ZB3)	18:38	16 17:49 (WEA ZB2)	20:35		21:28	22:01
20	08:33	07:39	16:38 (WEA ZB3)	06:33	17:36 (WEA ZB2)	06:19		05:21	04:58
	16:46	17:47	37 17:15 (WEA ZB3)	18:40	11 17:47 (WEA ZB2)	20:37		21:30	22:02
21	08:32	07:36	16:38 (WEA ZB3)	06:31		06:17		05:20	04:58
	16:48	17:49	38 17:16 (WEA ZB3)	18:42		20:39		21:31	22:02
22	08:30	07:34	16:37 (WEA ZB3)	06:28		06:15		05:18	04:58
	16:50	17:51	38 17:15 (WEA ZB3)	18:44		20:41		21:33	22:02
23	08:29	07:32	16:38 (WEA ZB3)	06:26		06:12		05:17	04:59
	16:52	17:53	37 17:15 (WEA ZB3)	18:46		20:43		21:34	22:02
24	08:28	07:30	16:38 (WEA ZB3)	06:23		06:10		05:15	04:59
	16:54	17:55	37 17:15 (WEA ZB3)	18:48		20:44		21:36	22:02
25	08:26	07:28	16:38 (WEA ZB3)	06:21	18:19 (WEA ZB1)	06:08		05:14	04:59
	16:56	17:57	35 17:13 (WEA ZB3)	18:49	4 18:23 (WEA ZB1)	20:46		21:37	22:02
26	08:25	07:25	16:39 (WEA ZB3)	06:19	18:17 (WEA ZB1)	06:06		05:13	05:00
	16:58	17:59	34 17:13 (WEA ZB3)	18:51	8 18:25 (WEA ZB1)	20:48		21:39	22:02
27	08:23	07:23	16:40 (WEA ZB3)	06:16	18:16 (WEA ZB1)	06:04		05:12	05:00
	16:59	18:01	32 17:12 (WEA ZB3)	18:53	11 18:27 (WEA ZB1)	20:50		21:40	22:02
28	08:22	07:21	16:40 (WEA ZB3)	06:14	18:14 (WEA ZB1)	06:02		05:11	05:01
	17:01	18:02	31 17:11 (WEA ZB3)	18:55	14 18:28 (WEA ZB1)	20:52		21:41	22:02
29	08:20			07:11	19:14 (WEA ZB1)	05:59		05:09	05:01
	17:03			19:57	17 19:31 (WEA ZB1)	20:54		21:43	22:02
30	08:19			07:09	19:12 (WEA ZB1)	05:57		05:08	05:02
	17:05			19:59	20 19:32 (WEA ZB1)	20:55		21:44	22:02
31	08:17			07:06	19:12 (WEA ZB1)			05:07	
	17:07			20:00	22 19:34 (WEA ZB1)			21:45	
Sonnenscheinstunden	251	274		367		419		493	509
astr.max.mögl.Beschattung		581		564		184			

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO12 - Westerhausen 4

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli	August	September		Oktober		November		Dezember
1	05:02	05:42	06:36		07:28	18:08 (WEA ZB2)	07:26	16:15 (WEA ZB3)	08:21
	22:01	21:27	20:21		19:07	29 18:37 (WEA ZB2)	16:57	11 16:26 (WEA ZB3)	16:13
2	05:03	05:44	06:37		07:30	18:06 (WEA ZB2)	07:28	16:18 (WEA ZB3)	08:22
	22:01	21:25	20:18		19:05	30 18:36 (WEA ZB2)	16:55	6 16:24 (WEA ZB3)	16:13
3	05:04	05:45	06:39	19:16 (WEA ZB1)	07:32	18:06 (WEA ZB2)	07:30		08:24
	22:01	21:23	20:16	8 19:24 (WEA ZB1)	19:02	18:34 (WEA ZB2)	16:53		16:12
4	05:05	05:47	06:41	19:13 (WEA ZB1)	07:34	18:06 (WEA ZB2)	07:32		08:25
	22:00	21:21	20:13	14 19:27 (WEA ZB1)	19:00	18:31 (WEA ZB2)	16:51		16:11
5	05:06	05:49	06:43	19:11 (WEA ZB1)	07:36	18:07 (WEA ZB2)	07:34		08:26
	22:00	21:19	20:11	18 19:29 (WEA ZB1)	18:58	18:29 (WEA ZB2)	16:50		16:11
6	05:07	05:50	06:44	19:08 (WEA ZB1)	07:37	18:07 (WEA ZB2)	07:36		08:28
	21:59	21:17	20:09	21 19:29 (WEA ZB1)	18:55	18:27 (WEA ZB2)	16:48		16:10
7	05:08	05:52	06:46	19:07 (WEA ZB1)	07:39	18:08 (WEA ZB2)	07:38		08:29
	21:58	21:15	20:06	23 19:30 (WEA ZB1)	18:53	18:24 (WEA ZB2)	16:46		16:10
8	05:08	05:54	06:48	19:07 (WEA ZB1)	07:41	18:09 (WEA ZB2)	07:40		08:30
	21:58	21:13	20:04	24 19:31 (WEA ZB1)	18:50	18:22 (WEA ZB2)	16:44		16:09
9	05:10	05:55	06:50	19:05 (WEA ZB1)	07:43	17:23 (WEA ZB3)	07:42		08:32
	21:57	21:11	20:01	26 19:31 (WEA ZB1)	18:48	18:19 (WEA ZB2)	16:42		16:09
10	05:11	05:57	06:51	19:05 (WEA ZB1)	07:45	17:19 (WEA ZB3)	07:43		08:33
	21:56	21:09	19:59	26 19:31 (WEA ZB1)	18:46	18:16 (WEA ZB2)	16:41		16:09
11	05:12	05:59	06:53	19:04 (WEA ZB1)	07:47	17:17 (WEA ZB3)	07:45		08:34
	21:55	21:07	19:56	25 19:29 (WEA ZB1)	18:43	18:14 (WEA ZB2)	16:39		16:08
12	05:13	06:01	06:55	19:03 (WEA ZB1)	07:48	17:15 (WEA ZB3)	07:47		08:35
	21:54	21:05	19:54	23 19:26 (WEA ZB1)	18:41	17:42 (WEA ZB3)	16:37		16:08
13	05:14	06:02	06:57	19:03 (WEA ZB1)	07:50	17:14 (WEA ZB3)	07:49		08:36
	21:53	21:03	19:51	20 19:23 (WEA ZB1)	18:39	17:43 (WEA ZB3)	16:35		16:08
14	05:15	06:04	06:58	19:04 (WEA ZB1)	07:52	17:12 (WEA ZB3)	07:51		08:37
	21:52	21:01	19:49	17 19:21 (WEA ZB1)	18:36	17:44 (WEA ZB3)	16:34		16:08
15	05:17	06:06	07:00	19:04 (WEA ZB1)	07:54	17:11 (WEA ZB3)	07:53		08:38
	21:51	20:59	19:47	15 19:19 (WEA ZB1)	18:34	17:45 (WEA ZB3)	16:32		16:08
16	05:18	06:08	07:02	19:04 (WEA ZB1)	07:56	17:10 (WEA ZB3)	07:55		08:39
	21:50	20:57	19:44	12 19:16 (WEA ZB1)	18:32	17:45 (WEA ZB3)	16:31		16:08
17	05:19	06:09	07:04	19:05 (WEA ZB1)	07:58	17:10 (WEA ZB3)	07:57		08:40
	21:49	20:55	19:42	9 19:14 (WEA ZB1)	18:29	17:46 (WEA ZB3)	16:29		16:08
18	05:21	06:11	07:05	19:07 (WEA ZB1)	07:59	17:09 (WEA ZB3)	07:58		08:41
	21:48	20:53	19:39	5 19:12 (WEA ZB1)	18:27	17:46 (WEA ZB3)	16:28		16:09
19	05:22	06:13	07:07		08:01	17:09 (WEA ZB3)	08:00		08:41
	21:46	20:50	19:37		18:25	37 17:46 (WEA ZB3)	16:26		16:09
20	05:23	06:15	07:09		08:03	17:08 (WEA ZB3)	08:02		08:42
	21:45	20:48	19:34		18:23	38 17:46 (WEA ZB3)	16:25		16:09
21	05:25	06:16	07:11		08:05	17:08 (WEA ZB3)	08:04		08:43
	21:44	20:46	19:32		18:20	38 17:46 (WEA ZB3)	16:24		16:10
22	05:26	06:18	07:12		08:07	17:08 (WEA ZB3)	08:06		08:43
	21:42	20:44	19:29		18:18	38 17:46 (WEA ZB3)	16:23		16:10
23	05:28	06:20	07:14	18:21 (WEA ZB2)	08:09	17:08 (WEA ZB3)	08:07		08:44
	21:41	20:41	19:27	8 18:29 (WEA ZB2)	18:16	37 17:45 (WEA ZB3)	16:21		16:11
24	05:29	06:22	07:16	18:17 (WEA ZB2)	08:11	17:08 (WEA ZB3)	08:09		08:44
	21:40	20:39	19:24	15 18:32 (WEA ZB2)	18:14	36 17:44 (WEA ZB3)	16:20		16:11
25	05:31	06:23	07:18	18:15 (WEA ZB2)	07:13	16:09 (WEA ZB3)	08:11		08:44
	21:38	20:37	19:22	19 18:34 (WEA ZB2)	17:12	33 16:42 (WEA ZB3)	16:19		16:12
26	05:32	06:25	07:19	18:13 (WEA ZB2)	07:15	16:09 (WEA ZB3)	08:13		08:45
	21:37	20:35	19:20	23 18:36 (WEA ZB2)	17:10	30 16:39 (WEA ZB3)	16:18		16:13
27	05:34	06:27	07:21	18:11 (WEA ZB2)	07:17	16:10 (WEA ZB3)	08:14		08:45
	21:35	20:32	19:17	25 18:36 (WEA ZB2)	17:07	27 16:37 (WEA ZB3)	16:17		16:13
28	05:35	06:29	07:23	18:10 (WEA ZB2)	07:18	16:10 (WEA ZB3)	08:16		08:45
	21:33	20:30	19:15	26 18:36 (WEA ZB2)	17:05	25 16:35 (WEA ZB3)	16:16		16:14
29	05:37	06:30	07:25	18:09 (WEA ZB2)	07:20	16:11 (WEA ZB3)	08:17		08:45
	21:32	20:28	19:12	28 18:37 (WEA ZB2)	17:03	21 16:32 (WEA ZB3)	16:15		16:15
30	05:39	06:32	07:27	18:08 (WEA ZB2)	07:22	16:12 (WEA ZB3)	08:19		08:45
	21:30	20:25	19:10	29 18:37 (WEA ZB2)	17:01	18 16:30 (WEA ZB3)	16:14		16:16
31	05:40	06:34			07:24	16:14 (WEA ZB3)			08:45
	21:28	20:23			16:59	14 16:28 (WEA ZB3)			16:17
Sonnenscheinstunden	511	459	382		329		260		234
astr.max.mögl.Beschattung			459		879		17		

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO13 - Westerhausen 11

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar			Februar			März			April			Mai			Juni		
1	08:45		14:18 (WEA ZB3)	08:16		14:37 (WEA ZB3)	07:19		16:22 (WEA ZB2)	07:04		18:35 (WEA ZB1)	05:55		05:06			
	16:18	55	15:13 (WEA ZB3)	17:09	38	15:15 (WEA ZB3)	18:04	35	16:57 (WEA ZB2)	20:02	35	19:10 (WEA ZB1)	20:57		21:47			
2	08:45		14:18 (WEA ZB3)	08:14		14:39 (WEA ZB3)	07:16		16:24 (WEA ZB2)	07:02		18:36 (WEA ZB1)	05:53		05:05			
	16:19	56	15:14 (WEA ZB3)	17:11	37	16:39 (WEA ZB2)	18:06	32	16:56 (WEA ZB2)	20:04	33	19:09 (WEA ZB1)	20:59		21:48			
3	08:45		14:18 (WEA ZB3)	08:12		14:41 (WEA ZB3)	07:14		16:25 (WEA ZB2)	06:59		18:37 (WEA ZB1)	05:51		05:05			
	16:21	56	15:14 (WEA ZB3)	17:13	40	16:41 (WEA ZB2)	18:08	29	16:54 (WEA ZB2)	20:06	31	19:08 (WEA ZB1)	21:01		21:49			
4	08:45		14:19 (WEA ZB3)	08:10		14:44 (WEA ZB3)	07:12		16:27 (WEA ZB2)	06:57		18:38 (WEA ZB1)	05:49		05:04			
	16:22	56	15:15 (WEA ZB3)	17:15	41	16:44 (WEA ZB2)	18:10	25	16:52 (WEA ZB2)	20:08	28	19:06 (WEA ZB1)	21:03		21:50			
5	08:44		14:20 (WEA ZB3)	08:09		14:47 (WEA ZB3)	07:09		16:29 (WEA ZB2)	06:54		18:40 (WEA ZB1)	05:47		05:03			
	16:23	56	15:16 (WEA ZB3)	17:17	41	16:47 (WEA ZB2)	18:12	19	16:48 (WEA ZB2)	20:10	24	19:04 (WEA ZB1)	21:04		21:51			
6	08:44		14:20 (WEA ZB3)	08:07		14:51 (WEA ZB3)	07:07		16:34 (WEA ZB2)	06:52		18:42 (WEA ZB1)	05:45		05:02			
	16:24	56	15:16 (WEA ZB3)	17:19	37	16:49 (WEA ZB2)	18:14	10	16:44 (WEA ZB2)	20:12	20	19:02 (WEA ZB1)	21:06		21:52			
7	08:44		14:20 (WEA ZB3)	08:05		16:25 (WEA ZB2)	07:05			06:50		18:45 (WEA ZB1)	05:43		05:02			
	16:26	56	15:16 (WEA ZB3)	17:21	26	16:51 (WEA ZB2)	18:16			20:13	13	18:58 (WEA ZB1)	21:08		21:53			
8	08:43		14:21 (WEA ZB3)	08:03		16:23 (WEA ZB2)	07:02			06:47			05:42		05:01			
	16:27	56	15:17 (WEA ZB3)	17:23	30	16:53 (WEA ZB2)	18:18			20:15			21:10		21:54			
9	08:43		14:21 (WEA ZB3)	08:01		16:22 (WEA ZB2)	07:00			06:45			05:40		05:00			
	16:29	57	15:18 (WEA ZB3)	17:25	33	16:55 (WEA ZB2)	18:20			20:17			21:11		21:55			
10	08:42		14:21 (WEA ZB3)	07:59		16:22 (WEA ZB2)	06:57			06:42			05:38		05:00			
	16:30	57	15:18 (WEA ZB3)	17:27	36	16:58 (WEA ZB2)	18:22			20:19			21:13		21:56			
11	08:41		14:21 (WEA ZB3)	07:57		16:20 (WEA ZB2)	06:55			06:40			05:36		04:59			
	16:31	57	15:18 (WEA ZB3)	17:29	39	16:59 (WEA ZB2)	18:23			20:21			21:15		21:57			
12	08:41		14:22 (WEA ZB3)	07:55		16:19 (WEA ZB2)	06:53			06:38			05:34		04:59			
	16:33	56	15:18 (WEA ZB3)	17:31	42	17:01 (WEA ZB2)	18:25			20:23			21:17		21:58			
13	08:40		14:22 (WEA ZB3)	07:53		16:19 (WEA ZB2)	06:50		17:51 (WEA ZB1)	06:35			05:32		04:59			
	16:35	57	15:19 (WEA ZB3)	17:33	43	17:02 (WEA ZB2)	18:27	10	18:01 (WEA ZB1)	20:24			21:18		21:58			
14	08:39		14:23 (WEA ZB3)	07:51		16:18 (WEA ZB2)	06:48		17:48 (WEA ZB1)	06:33			05:31		04:58			
	16:36	56	15:19 (WEA ZB3)	17:35	44	17:02 (WEA ZB2)	18:29	15	18:03 (WEA ZB1)	20:26			21:20		21:59			
15	08:38		14:23 (WEA ZB3)	07:49		16:18 (WEA ZB2)	06:45		17:45 (WEA ZB1)	06:31			05:29		04:58			
	16:38	56	15:19 (WEA ZB3)	17:37	45	17:03 (WEA ZB2)	18:31	20	18:05 (WEA ZB1)	20:28			21:22		21:59			
16	08:37		14:24 (WEA ZB3)	07:47		16:18 (WEA ZB2)	06:43		17:43 (WEA ZB1)	06:28			05:27		04:58			
	16:40	56	15:20 (WEA ZB3)	17:39	45	17:03 (WEA ZB2)	18:33	24	18:07 (WEA ZB1)	20:30			21:23		22:00			
17	08:36		14:25 (WEA ZB3)	07:45		16:18 (WEA ZB2)	06:41		17:41 (WEA ZB1)	06:26			05:26		04:58			
	16:41	55	15:20 (WEA ZB3)	17:41	46	17:04 (WEA ZB2)	18:35	27	18:08 (WEA ZB1)	20:32			21:25		22:01			
18	08:35		14:24 (WEA ZB3)	07:43		16:17 (WEA ZB2)	06:38		17:40 (WEA ZB1)	06:24			05:24		04:58			
	16:43	56	15:20 (WEA ZB3)	17:43	46	17:03 (WEA ZB2)	18:37	31	18:11 (WEA ZB1)	20:34			21:27		22:01			
19	08:34		14:25 (WEA ZB3)	07:41		16:17 (WEA ZB2)	06:36		17:38 (WEA ZB1)	06:21			05:23		04:58			
	16:45	55	15:20 (WEA ZB3)	17:45	46	17:03 (WEA ZB2)	18:38	34	18:12 (WEA ZB1)	20:35			21:28		22:01			
20	08:33		14:26 (WEA ZB3)	07:39		16:17 (WEA ZB2)	06:33		17:38 (WEA ZB1)	06:19			05:21		04:58			
	16:46	55	15:21 (WEA ZB3)	17:47	47	17:04 (WEA ZB2)	18:40	36	18:14 (WEA ZB1)	20:37			21:30		22:02			
21	08:32		14:26 (WEA ZB3)	07:37		16:18 (WEA ZB2)	06:31		17:36 (WEA ZB1)	06:17			05:20		04:58			
	16:48	54	15:20 (WEA ZB3)	17:49	46	17:04 (WEA ZB2)	18:42	39	18:15 (WEA ZB1)	20:39			21:31		22:02			
22	08:30		14:27 (WEA ZB3)	07:34		16:17 (WEA ZB2)	06:28		17:36 (WEA ZB1)	06:15			05:18		04:58			
	16:50	53	15:20 (WEA ZB3)	17:51	46	17:03 (WEA ZB2)	18:44	40	18:16 (WEA ZB1)	20:41			21:33		22:02			
23	08:29		14:28 (WEA ZB3)	07:32		16:18 (WEA ZB2)	06:26		17:35 (WEA ZB1)	06:12			05:17		04:59			
	16:52	52	15:20 (WEA ZB3)	17:53	45	17:03 (WEA ZB2)	18:46	41	18:16 (WEA ZB1)	20:43			21:34		22:02			
24	08:28		14:29 (WEA ZB3)	07:30		16:18 (WEA ZB2)	06:24		17:35 (WEA ZB1)	06:10			05:15		04:59			
	16:54	51	15:20 (WEA ZB3)	17:55	44	17:02 (WEA ZB2)	18:48	41	18:16 (WEA ZB1)	20:44			21:36		22:02			
25	08:26		14:29 (WEA ZB3)	07:28		16:18 (WEA ZB2)	06:21		17:35 (WEA ZB1)	06:08			05:14		04:59			
	16:56	51	15:20 (WEA ZB3)	17:57	43	17:01 (WEA ZB2)	18:49	41	18:16 (WEA ZB1)	20:46			21:37		22:02			
26	08:25		14:31 (WEA ZB3)	07:25		16:19 (WEA ZB2)	06:19		17:34 (WEA ZB1)	06:06			05:13		05:00			
	16:58	49	15:20 (WEA ZB3)	17:59	41	17:00 (WEA ZB2)	18:51	42	18:16 (WEA ZB1)	20:48			21:39		22:02			
27	08:23		14:31 (WEA ZB3)	07:23		16:20 (WEA ZB2)	06:16		17:34 (WEA ZB1)	06:04			05:12		05:00			
	16:59	48	15:19 (WEA ZB3)	18:01	40	17:00 (WEA ZB2)	18:53	41	18:15 (WEA ZB1)	20:50			21:40		22:02			
28	08:22		14:32 (WEA ZB3)	07:21		16:20 (WEA ZB2)	06:14		17:34 (WEA ZB1)	06:02			05:11		05:01			
	17:01	46	15:18 (WEA ZB3)	18:02	38	16:58 (WEA ZB2)	18:55	40	18:14 (WEA ZB1)	20:52			21:42		22:02			
29	08:20		14:34 (WEA ZB3)				07:11		18:34 (WEA ZB1)	06:00			05:09		05:01			
	17:03	44	15:18 (WEA ZB3)				19:57	40	19:14 (WEA ZB1)	20:54			21:43		22:02			
30	08:19		14:35 (WEA ZB3)				07:09		18:34 (WEA ZB1)	05:57			05:08		05:02			
	17:05	42	15:17 (WEA ZB3)				19:59	39	19:13 (WEA ZB1)	20:55			21:44		22:02			
31	08:17		14:36 (WEA ZB3)				07:06		18:35 (WEA ZB1)				05:07					
	17:07	40	15:16 (WEA ZB3)				20:01	37	19:12 (WEA ZB1)				21:45					
Sonnenscheinstunden		251		274			367		419			493		509				
astr.max.mögl.Beschattung		1650		1145			788		184									

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

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

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO13 - Westerhausen 11 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli	August	September		Oktober		November		Dezember				
1	05:02 22:01	05:42 21:27	06:36 20:21		07:28 19:07	6	18:33 (WEA ZB1) 18:39 (WEA ZB1)	07:26 16:57	36	15:50 (WEA ZB2) 16:26 (WEA ZB2)	08:21 16:13	56	14:04 (WEA ZB3) 15:00 (WEA ZB3)
2	05:03 22:01	05:44 21:25	06:37 20:18		07:30 19:05			07:28 16:55	33	15:52 (WEA ZB2) 16:25 (WEA ZB2)	08:22 16:13	57	14:04 (WEA ZB3) 15:01 (WEA ZB3)
3	05:04 22:01	05:45 21:23	06:39 20:16		07:32 19:02			07:30 16:53	29	15:53 (WEA ZB2) 16:22 (WEA ZB2)	08:24 16:12	57	14:04 (WEA ZB3) 15:01 (WEA ZB3)
4	05:05 22:00	05:47 21:21	06:41 20:13		07:34 19:00			07:32 16:51	26	15:54 (WEA ZB2) 16:20 (WEA ZB2)	08:25 16:11	56	14:05 (WEA ZB3) 15:01 (WEA ZB3)
5	05:06 22:00	05:49 21:19	06:43 20:11	12	18:42 (WEA ZB1) 18:54 (WEA ZB1)		07:36 18:58	07:34 16:50	38	14:20 (WEA ZB3) 16:18 (WEA ZB2)	08:27 16:11	56	14:05 (WEA ZB3) 15:01 (WEA ZB3)
6	05:07 21:59	05:50 21:17	06:44 20:09	19	18:38 (WEA ZB1) 18:57 (WEA ZB1)		07:37 18:55	07:36 16:48	41	14:16 (WEA ZB3) 16:16 (WEA ZB2)	08:28 16:10	56	14:06 (WEA ZB3) 15:02 (WEA ZB3)
7	05:08 21:58	05:52 21:15	06:46 20:06	24	18:35 (WEA ZB1) 18:59 (WEA ZB1)		07:39 18:53	07:38 16:46	42	14:13 (WEA ZB3) 16:14 (WEA ZB2)	08:29 16:10	56	14:06 (WEA ZB3) 15:02 (WEA ZB3)
8	05:09 21:58	05:54 21:13	06:48 20:04	28	18:33 (WEA ZB1) 19:01 (WEA ZB1)	15	07:41 18:50	07:40 16:44	41	14:11 (WEA ZB3) 16:12 (WEA ZB2)	08:31 16:09	56	14:07 (WEA ZB3) 15:03 (WEA ZB3)
9	05:10 21:57	05:55 21:11	06:50 20:01	30	18:31 (WEA ZB1) 19:01 (WEA ZB1)	22	07:43 18:48	07:42 16:42	41	14:09 (WEA ZB3) 16:14 (WEA ZB2)	08:32 16:09	56	14:07 (WEA ZB3) 15:03 (WEA ZB3)
10	05:11 21:56	05:57 21:09	06:51 19:59	34	18:29 (WEA ZB1) 19:03 (WEA ZB1)	27	07:45 18:46	07:43 16:41	38	14:08 (WEA ZB3) 16:14 (WEA ZB2)	08:33 16:09	56	14:07 (WEA ZB3) 15:03 (WEA ZB3)
11	05:12 21:55	05:59 21:07	06:53 19:56	36	18:28 (WEA ZB1) 19:04 (WEA ZB1)	30	07:47 18:43	07:45 16:39	40	14:07 (WEA ZB3) 16:18 (WEA ZB2)	08:34 16:08	55	14:08 (WEA ZB3) 15:03 (WEA ZB3)
12	05:13 21:54	06:01 21:05	06:55 19:54	37	18:26 (WEA ZB1) 19:03 (WEA ZB1)	34	07:48 18:41	07:47 16:37	42	14:06 (WEA ZB3) 16:18 (WEA ZB2)	08:35 16:08	56	14:09 (WEA ZB3) 15:05 (WEA ZB3)
13	05:14 21:53	06:02 21:03	06:57 19:52	39	18:25 (WEA ZB1) 19:04 (WEA ZB1)	37	07:50 18:39	07:49 16:36	44	14:06 (WEA ZB3) 16:16 (WEA ZB2)	08:36 16:08	56	14:09 (WEA ZB3) 15:05 (WEA ZB3)
14	05:15 21:52	06:04 21:01	06:58 19:49	39	18:25 (WEA ZB1) 19:04 (WEA ZB1)	39	07:52 18:36	07:51 16:34	46	14:05 (WEA ZB3) 16:17 (WEA ZB2)	08:37 16:08	55	14:10 (WEA ZB3) 15:05 (WEA ZB3)
15	05:17 21:51	06:06 20:59	07:00 19:47	41	18:24 (WEA ZB1) 19:05 (WEA ZB1)	40	07:54 18:34	07:53 16:32	48	14:04 (WEA ZB3) 16:18 (WEA ZB2)	08:38 16:08	56	14:10 (WEA ZB3) 15:06 (WEA ZB3)
16	05:18 21:50	06:08 20:57	07:02 19:44	41	18:23 (WEA ZB1) 19:04 (WEA ZB1)	42	07:56 18:32	07:55 16:31	49	14:04 (WEA ZB3) 16:19 (WEA ZB2)	08:39 16:08	55	14:10 (WEA ZB3) 15:05 (WEA ZB3)
17	05:19 21:49	06:09 20:55	07:04 19:42	42	18:22 (WEA ZB1) 19:04 (WEA ZB1)	43	07:58 18:29	07:57 16:29	51	14:03 (WEA ZB3) 16:20 (WEA ZB2)	08:40 16:08	55	14:11 (WEA ZB3) 15:06 (WEA ZB3)
18	05:21 21:48	06:11 20:53	07:05 19:39	42	18:22 (WEA ZB1) 19:04 (WEA ZB1)	45	08:00 18:27	07:58 16:28	51	14:03 (WEA ZB3) 16:21 (WEA ZB2)	08:41 16:09	56	14:11 (WEA ZB3) 15:07 (WEA ZB3)
19	05:22 21:47	06:13 20:50	07:07 19:37	42	18:21 (WEA ZB1) 19:03 (WEA ZB1)	45	08:01 18:25	08:00 16:27	52	14:03 (WEA ZB3) 16:22 (WEA ZB2)	08:41 16:09	55	14:12 (WEA ZB3) 15:07 (WEA ZB3)
20	05:23 21:45	06:15 20:48	07:09 19:34	41	18:21 (WEA ZB1) 19:02 (WEA ZB1)	46	08:03 18:23	08:02 16:25	53	14:02 (WEA ZB3) 16:24 (WEA ZB2)	08:42 16:10	55	14:12 (WEA ZB3) 15:07 (WEA ZB3)
21	05:25 21:44	06:16 20:46	07:11 19:32	41	18:21 (WEA ZB1) 19:02 (WEA ZB1)	46	08:05 18:20	08:04 16:24	54	14:02 (WEA ZB3) 16:25 (WEA ZB2)	08:43 16:10	55	14:13 (WEA ZB3) 15:08 (WEA ZB3)
22	05:26 21:42	06:18 20:44	07:12 19:29	41	18:22 (WEA ZB1) 19:01 (WEA ZB1)	46	08:07 18:18	08:06 16:23	55	14:02 (WEA ZB3) 16:26 (WEA ZB2)	08:43 16:10	55	14:13 (WEA ZB3) 15:08 (WEA ZB3)
23	05:28 21:41	06:20 20:41	07:14 19:27	39	18:21 (WEA ZB1) 18:58 (WEA ZB1)	46	08:09 18:16	08:07 16:21	55	14:02 (WEA ZB3) 16:22 (WEA ZB2)	08:44 16:11	55	14:14 (WEA ZB3) 15:09 (WEA ZB3)
24	05:29 21:40	06:22 20:39	07:16 19:24	37	18:22 (WEA ZB1) 18:56 (WEA ZB1)	47	08:11 18:14	08:09 16:20	55	14:03 (WEA ZB3) 16:21 (WEA ZB2)	08:44 16:11	55	14:14 (WEA ZB3) 15:09 (WEA ZB3)
25	05:31 21:38	06:23 20:37	07:18 19:22	34	18:22 (WEA ZB1) 18:54 (WEA ZB1)	47	07:13 17:12	08:11 16:19	55	14:02 (WEA ZB3) 16:22 (WEA ZB2)	08:45 16:12	56	14:14 (WEA ZB3) 15:10 (WEA ZB3)
26	05:32 21:37	06:25 20:35	07:20 19:20	32	18:23 (WEA ZB1) 18:52 (WEA ZB1)	46	07:15 17:10	08:13 16:18	55	14:02 (WEA ZB3) 16:23 (WEA ZB2)	08:45 16:13	55	14:16 (WEA ZB3) 15:11 (WEA ZB3)
27	05:34 21:35	06:27 20:32	07:21 19:17	29	18:23 (WEA ZB1) 18:48 (WEA ZB1)	45	07:17 17:07	08:14 16:17	56	14:02 (WEA ZB3) 16:24 (WEA ZB2)	08:45 16:13	55	14:16 (WEA ZB3) 15:11 (WEA ZB3)
28	05:35 21:33	06:29 20:30	07:23 19:15	25	18:25 (WEA ZB1) 18:46 (WEA ZB1)	44	07:18 17:05	08:16 16:16	57	14:03 (WEA ZB3) 16:25 (WEA ZB2)	08:45 16:14	56	14:16 (WEA ZB3) 15:12 (WEA ZB3)
29	05:37 21:32	06:30 20:28	07:25 19:12	21	18:27 (WEA ZB1) 18:44 (WEA ZB1)	44	07:20 17:03	08:18 16:15	56	14:03 (WEA ZB3) 16:26 (WEA ZB2)	08:45 16:15	56	14:17 (WEA ZB3) 15:12 (WEA ZB3)
30	05:39 21:30	06:32 20:25	07:27 19:10	17	18:29 (WEA ZB1) 18:42 (WEA ZB1)	43	07:22 17:01	08:19 16:14	57	14:03 (WEA ZB3) 16:27 (WEA ZB2)	08:45 16:16	55	14:17 (WEA ZB3) 15:13 (WEA ZB3)
31	05:40 21:28	06:34 20:23		13	07:24 16:59	41	07:24 16:59	08:19 16:28	56	14:03 (WEA ZB3) 16:28 (WEA ZB2)	08:45 16:17	56	14:17 (WEA ZB3) 15:12 (WEA ZB3)
Sonnenscheinstunden	511	459	382		329			260			234		
astr.max.mögl.Beschattung			835		958			1392			1724		

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

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

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO14 - Westerhausen 12

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar			Februar			März			April			Mai			Juni	
1	08:45		13:48 (WEA ZB3)	08:16		16:00 (WEA ZB2)	07:19		16:16 (WEA ZB2)	07:04		18:26 (WEA ZB1)	05:55		05:06		
	16:18	57	14:45 (WEA ZB3)	17:09	37	16:37 (WEA ZB2)	18:04	10	16:26 (WEA ZB2)	20:02	33	18:59 (WEA ZB1)	20:57		21:47		
2	08:45		13:49 (WEA ZB3)	08:14		16:00 (WEA ZB2)	07:16			07:02		18:28 (WEA ZB1)	05:53		05:05		
	16:19	57	14:46 (WEA ZB3)	17:11	39	16:39 (WEA ZB2)	18:06			20:04	29	18:57 (WEA ZB1)	20:59		21:48		
3	08:45		13:48 (WEA ZB3)	08:12		15:59 (WEA ZB2)	07:14			06:59		18:30 (WEA ZB1)	05:51		05:05		
	16:21	58	14:46 (WEA ZB3)	17:13	42	16:41 (WEA ZB2)	18:08			20:06	25	18:55 (WEA ZB1)	21:01		21:49		
4	08:45		13:49 (WEA ZB3)	08:10		15:59 (WEA ZB2)	07:12			06:57		18:32 (WEA ZB1)	05:49		05:04		
	16:22	58	14:47 (WEA ZB3)	17:15	45	16:44 (WEA ZB2)	18:10			20:08	20	18:52 (WEA ZB1)	21:03		21:50		
5	08:44		13:51 (WEA ZB3)	08:09		15:59 (WEA ZB2)	07:09			06:54		18:35 (WEA ZB1)	05:47		05:03		
	16:23	56	14:47 (WEA ZB3)	17:17	45	16:44 (WEA ZB2)	18:12			20:10	13	18:48 (WEA ZB1)	21:04		21:51		
6	08:44		13:51 (WEA ZB3)	08:07		15:58 (WEA ZB2)	07:07			06:52			05:45		05:02		
	16:24	56	14:47 (WEA ZB3)	17:19	47	16:45 (WEA ZB2)	18:14			20:12			21:06		21:52		
7	08:44		13:51 (WEA ZB3)	08:05		15:58 (WEA ZB2)	07:05			06:50			05:43		05:02		
	16:26	56	14:47 (WEA ZB3)	17:21	47	16:45 (WEA ZB2)	18:16			20:13			21:08		21:53		
8	08:43		13:52 (WEA ZB3)	08:03		15:58 (WEA ZB2)	07:02		17:44 (WEA ZB1)	06:47			05:42		05:01		
	16:27	56	14:48 (WEA ZB3)	17:23	48	16:46 (WEA ZB2)	18:18	7	17:51 (WEA ZB1)	20:15			21:10		21:54		
9	08:43		13:53 (WEA ZB3)	08:01		15:57 (WEA ZB2)	07:00		17:40 (WEA ZB1)	06:45			05:40		05:00		
	16:29	55	14:48 (WEA ZB3)	17:25	49	16:46 (WEA ZB2)	18:20	13	17:53 (WEA ZB1)	20:17			21:11		21:55		
10	08:42		13:53 (WEA ZB3)	07:59		15:57 (WEA ZB2)	06:57		17:36 (WEA ZB1)	06:42			05:38		05:00		
	16:30	55	14:48 (WEA ZB3)	17:27	50	16:47 (WEA ZB2)	18:22	19	17:55 (WEA ZB1)	20:19			21:13		21:56		
11	08:41		13:54 (WEA ZB3)	07:57		15:57 (WEA ZB2)	06:55		17:34 (WEA ZB1)	06:40			05:36		04:59		
	16:31	54	14:48 (WEA ZB3)	17:29	50	16:47 (WEA ZB2)	18:23	23	17:57 (WEA ZB1)	20:21			21:15		21:57		
12	08:41		13:54 (WEA ZB3)	07:55		15:56 (WEA ZB2)	06:53		17:32 (WEA ZB1)	06:38			05:34		04:59		
	16:33	54	14:48 (WEA ZB3)	17:31	50	16:46 (WEA ZB2)	18:25	26	17:58 (WEA ZB1)	20:23			21:17		21:58		
13	08:40		13:55 (WEA ZB3)	07:53		15:57 (WEA ZB2)	06:50		17:30 (WEA ZB1)	06:35			05:32		04:59		
	16:35	53	14:48 (WEA ZB3)	17:33	49	16:46 (WEA ZB2)	18:27	31	18:01 (WEA ZB1)	20:24			21:18		21:58		
14	08:39		13:56 (WEA ZB3)	07:51		15:57 (WEA ZB2)	06:48		17:29 (WEA ZB1)	06:33			05:31		04:59		
	16:36	53	14:49 (WEA ZB3)	17:35	49	16:46 (WEA ZB2)	18:29	34	18:03 (WEA ZB1)	20:26			21:20		21:59		
15	08:38		13:56 (WEA ZB3)	07:49		15:57 (WEA ZB2)	06:45		17:28 (WEA ZB1)	06:31			05:29		04:58		
	16:38	53	14:49 (WEA ZB3)	17:37	49	16:46 (WEA ZB2)	18:31	37	18:05 (WEA ZB1)	20:28			21:22		21:59		
16	08:37		13:57 (WEA ZB3)	07:47		15:58 (WEA ZB2)	06:43		17:27 (WEA ZB1)	06:28			05:27		04:58		
	16:40	52	14:49 (WEA ZB3)	17:39	48	16:46 (WEA ZB2)	18:33	40	18:07 (WEA ZB1)	20:30			21:23		22:00		
17	08:36		13:58 (WEA ZB3)	07:45		15:58 (WEA ZB2)	06:41		17:25 (WEA ZB1)	06:26			05:26		04:58		
	16:41	51	14:49 (WEA ZB3)	17:41	48	16:46 (WEA ZB2)	18:35	43	18:08 (WEA ZB1)	20:32			21:25		22:01		
18	08:35		13:59 (WEA ZB3)	07:43		15:58 (WEA ZB2)	06:38		17:25 (WEA ZB1)	06:24			05:24		04:58		
	16:43	49	14:48 (WEA ZB3)	17:43	47	16:45 (WEA ZB2)	18:37	44	18:09 (WEA ZB1)	20:34			21:27		22:01		
19	08:34		14:00 (WEA ZB3)	07:41		15:58 (WEA ZB2)	06:36		17:24 (WEA ZB1)	06:21			05:23		04:58		
	16:45	48	14:48 (WEA ZB3)	17:45	47	16:45 (WEA ZB2)	18:38	44	18:08 (WEA ZB1)	20:35			21:28		22:01		
20	08:33		14:01 (WEA ZB3)	07:39		15:59 (WEA ZB2)	06:33		17:24 (WEA ZB1)	06:19			05:21		04:58		
	16:46	47	14:48 (WEA ZB3)	17:47	45	16:44 (WEA ZB2)	18:40	45	18:09 (WEA ZB1)	20:37			21:30		22:02		
21	08:32		14:02 (WEA ZB3)	07:37		16:00 (WEA ZB2)	06:31		17:23 (WEA ZB1)	06:17			05:20		04:58		
	16:48	45	14:47 (WEA ZB3)	17:49	44	16:44 (WEA ZB2)	18:42	45	18:08 (WEA ZB1)	20:39			21:31		22:02		
22	08:30		14:03 (WEA ZB3)	07:34		16:00 (WEA ZB2)	06:28		17:23 (WEA ZB1)	06:15			05:18		04:58		
	16:50	44	14:47 (WEA ZB3)	17:51	42	16:42 (WEA ZB2)	18:44	45	18:08 (WEA ZB1)	20:41			21:33		22:02		
23	08:29		14:04 (WEA ZB3)	07:32		16:02 (WEA ZB2)	06:26		17:22 (WEA ZB1)	06:12			05:17		04:59		
	16:52	43	16:18 (WEA ZB2)	17:53	39	16:41 (WEA ZB2)	18:46	45	18:07 (WEA ZB1)	20:43			21:34		22:02		
24	08:28		14:06 (WEA ZB3)	07:30		16:03 (WEA ZB2)	06:24		17:22 (WEA ZB1)	06:10			05:15		04:59		
	16:54	49	16:21 (WEA ZB2)	17:55	37	16:40 (WEA ZB2)	18:48	45	18:07 (WEA ZB1)	20:44			21:36		22:02		
25	08:26		14:07 (WEA ZB3)	07:28		16:04 (WEA ZB2)	06:21		17:23 (WEA ZB1)	06:08			05:14		04:59		
	16:56	50	16:22 (WEA ZB2)	17:57	34	16:38 (WEA ZB2)	18:49	44	18:07 (WEA ZB1)	20:46			21:37		22:02		
26	08:25		14:09 (WEA ZB3)	07:25		16:06 (WEA ZB2)	06:19		17:22 (WEA ZB1)	06:06			05:13		05:00		
	16:58	52	16:25 (WEA ZB2)	17:59	30	16:36 (WEA ZB2)	18:51	44	18:06 (WEA ZB1)	20:48			21:39		22:02		
27	08:23		14:11 (WEA ZB3)	07:23		16:09 (WEA ZB2)	06:16		17:23 (WEA ZB1)	06:04			05:12		05:00		
	16:59	52	16:27 (WEA ZB2)	18:01	25	16:34 (WEA ZB2)	18:53	43	18:06 (WEA ZB1)	20:50			21:40		22:02		
28	08:22		14:13 (WEA ZB3)	07:21		16:11 (WEA ZB2)	06:14		17:23 (WEA ZB1)	06:02			05:11		05:01		
	17:01	52	16:29 (WEA ZB2)	18:02	20	16:31 (WEA ZB2)	18:55	41	18:04 (WEA ZB1)	20:52			21:42		22:02		
29	08:20		14:17 (WEA ZB3)				07:11		18:24 (WEA ZB1)	06:00			05:09		05:01		
	17:03	49	16:31 (WEA ZB2)				19:57	40	19:04 (WEA ZB1)	20:54			21:43		22:02		
30	08:19		14:20 (WEA ZB3)				07:09		18:24 (WEA ZB1)	05:57			05:08		05:02		
	17:05	46	16:33 (WEA ZB2)				19:59	38	19:02 (WEA ZB1)	20:55			21:44		22:02		
31	08:17		16:01 (WEA ZB2)				07:06		18:25 (WEA ZB1)				05:07				
	17:07	34	16:35 (WEA ZB2)				20:01	36	19:01 (WEA ZB1)				21:45				
Sonnenscheinstunden	251			274			367			419			493		509		
astr.max.mögl.Beschattung		1594			1202			882			120						

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

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

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO14 - Westerhausen 12 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli	August	September		Oktober		November		Dezember				
1	05:02 22:01	05:42 21:27	06:36 20:21		07:28 19:07	28	18:11 (WEA ZB1) 18:39 (WEA ZB1)	07:26 16:57	49	15:26 (WEA ZB2) 16:15 (WEA ZB2)	08:21 16:13	54	13:36 (WEA ZB3) 14:30 (WEA ZB3)
2	05:03 22:01	05:44 21:25	06:37 20:18		07:30 19:05	25	18:11 (WEA ZB1) 18:36 (WEA ZB1)	07:28 16:55	49	15:27 (WEA ZB2) 16:16 (WEA ZB2)	08:22 16:13	55	13:36 (WEA ZB3) 14:31 (WEA ZB3)
3	05:04 22:01	05:45 21:23	06:39 20:16		07:32 19:02	21	18:13 (WEA ZB1) 18:34 (WEA ZB1)	07:30 16:53	48	15:27 (WEA ZB2) 16:15 (WEA ZB2)	08:24 16:12	55	13:36 (WEA ZB3) 14:31 (WEA ZB3)
4	05:05 22:00	05:47 21:21	06:41 20:13		07:34 19:00	16	18:15 (WEA ZB1) 18:31 (WEA ZB1)	07:32 16:51	47	15:28 (WEA ZB2) 16:15 (WEA ZB2)	08:25 16:11	56	13:36 (WEA ZB3) 14:32 (WEA ZB3)
5	05:06 22:00	05:49 21:19	06:43 20:11		07:36 18:58	10	18:19 (WEA ZB1) 18:29 (WEA ZB1)	07:34 16:50	46	15:28 (WEA ZB2) 16:14 (WEA ZB2)	08:27 16:11	56	13:36 (WEA ZB3) 14:32 (WEA ZB3)
6	05:07 21:59	05:50 21:17	06:44 20:09		07:37 18:55			07:36 16:48	45	15:29 (WEA ZB2) 16:14 (WEA ZB2)	08:28 16:10	56	13:37 (WEA ZB3) 14:33 (WEA ZB3)
7	05:08 21:58	05:52 21:15	06:46 20:06	12	18:31 (WEA ZB1) 18:43 (WEA ZB1)			07:39 18:53	44	15:29 (WEA ZB2) 16:13 (WEA ZB2)	08:29 16:10	57	13:37 (WEA ZB3) 14:34 (WEA ZB3)
8	05:09 21:58	05:54 21:13	06:48 20:04	20	18:27 (WEA ZB1) 18:47 (WEA ZB1)			07:41 18:50	42	15:30 (WEA ZB2) 16:12 (WEA ZB2)	08:31 16:09	57	13:38 (WEA ZB3) 14:35 (WEA ZB3)
9	05:10 21:57	05:55 21:11	06:50 20:01	25	18:23 (WEA ZB1) 18:48 (WEA ZB1)			07:43 18:48	40	15:30 (WEA ZB2) 16:10 (WEA ZB2)	08:32 16:09	57	13:38 (WEA ZB3) 14:35 (WEA ZB3)
10	05:11 21:56	05:57 21:09	06:51 19:59	29	18:21 (WEA ZB1) 18:50 (WEA ZB1)			07:45 18:46	37	15:31 (WEA ZB2) 16:08 (WEA ZB2)	08:33 16:09	57	13:38 (WEA ZB3) 14:35 (WEA ZB3)
11	05:12 21:55	05:59 21:07	06:53 19:56	33	18:19 (WEA ZB1) 18:52 (WEA ZB1)			07:47 18:43	34	15:32 (WEA ZB2) 16:06 (WEA ZB2)	08:34 16:08	57	13:38 (WEA ZB3) 14:35 (WEA ZB3)
12	05:13 21:54	06:01 21:05	06:55 19:54	35	18:17 (WEA ZB1) 18:52 (WEA ZB1)			07:48 18:41	46	15:33 (WEA ZB2) 16:04 (WEA ZB2)	08:35 16:08	58	13:39 (WEA ZB3) 14:37 (WEA ZB3)
13	05:14 21:53	06:02 21:03	06:57 19:52	38	18:15 (WEA ZB1) 18:53 (WEA ZB1)	15	16:47 (WEA ZB2) 17:02 (WEA ZB2)	07:50 16:36	50	13:48 (WEA ZB3) 16:03 (WEA ZB2)	08:36 16:08	58	13:39 (WEA ZB3) 14:37 (WEA ZB3)
14	05:15 21:52	06:04 21:01	06:58 19:49	40	18:14 (WEA ZB1) 18:54 (WEA ZB1)	22	16:43 (WEA ZB2) 17:05 (WEA ZB2)	07:51 16:34	51	13:46 (WEA ZB3) 16:01 (WEA ZB2)	08:37 16:08	58	13:40 (WEA ZB3) 14:38 (WEA ZB3)
15	05:17 21:51	06:06 20:59	07:00 19:47	41	18:13 (WEA ZB1) 18:54 (WEA ZB1)	27	16:40 (WEA ZB2) 17:07 (WEA ZB2)	07:53 16:32	52	13:44 (WEA ZB3) 16:00 (WEA ZB2)	08:38 16:08	58	13:40 (WEA ZB3) 14:38 (WEA ZB3)
16	05:18 21:50	06:08 20:57	07:02 19:44	42	18:12 (WEA ZB1) 18:54 (WEA ZB1)	31	16:38 (WEA ZB2) 17:09 (WEA ZB2)	07:55 16:31	52	13:42 (WEA ZB3) 15:58 (WEA ZB2)	08:39 16:08	58	13:40 (WEA ZB3) 14:38 (WEA ZB3)
17	05:19 21:49	06:09 20:55	07:04 19:42	43	18:11 (WEA ZB1) 18:54 (WEA ZB1)	35	16:36 (WEA ZB2) 17:11 (WEA ZB2)	07:57 16:29	50	13:41 (WEA ZB3) 15:56 (WEA ZB2)	08:40 16:08	58	13:40 (WEA ZB3) 14:38 (WEA ZB3)
18	05:21 21:48	06:11 20:53	07:05 19:39	45	18:10 (WEA ZB1) 18:55 (WEA ZB1)	38	16:34 (WEA ZB2) 17:12 (WEA ZB2)	07:58 16:28	49	13:40 (WEA ZB3) 15:55 (WEA ZB2)	08:41 16:09	58	13:41 (WEA ZB3) 14:39 (WEA ZB3)
19	05:22 21:47	06:13 20:50	07:07 19:37	45	18:09 (WEA ZB1) 18:54 (WEA ZB1)	40	16:33 (WEA ZB2) 17:13 (WEA ZB2)	08:00 16:27	43	13:39 (WEA ZB3) 15:53 (WEA ZB2)	08:41 16:09	58	13:42 (WEA ZB3) 14:40 (WEA ZB3)
20	05:23 21:45	06:15 20:48	07:09 19:34	45	18:09 (WEA ZB1) 18:54 (WEA ZB1)	42	16:31 (WEA ZB2) 17:13 (WEA ZB2)	08:02 16:25	44	13:38 (WEA ZB3) 14:22 (WEA ZB3)	08:42 16:09	58	13:42 (WEA ZB3) 14:40 (WEA ZB3)
21	05:25 21:44	06:16 20:46	07:11 19:32	46	18:08 (WEA ZB1) 18:54 (WEA ZB1)	44	16:30 (WEA ZB2) 17:14 (WEA ZB2)	08:04 16:24	45	13:38 (WEA ZB3) 14:23 (WEA ZB3)	08:43 16:10	58	13:43 (WEA ZB3) 14:41 (WEA ZB3)
22	05:26 21:42	06:18 20:44	07:12 19:29	46	18:08 (WEA ZB1) 18:54 (WEA ZB1)	46	16:29 (WEA ZB2) 17:15 (WEA ZB2)	08:06 16:23	47	13:37 (WEA ZB3) 14:24 (WEA ZB3)	08:43 16:10	58	13:43 (WEA ZB3) 14:41 (WEA ZB3)
23	05:28 21:41	06:20 20:41	07:14 19:27	46	18:07 (WEA ZB1) 18:52 (WEA ZB1)	46	16:29 (WEA ZB2) 17:15 (WEA ZB2)	08:07 16:21	48	13:37 (WEA ZB3) 14:25 (WEA ZB3)	08:44 16:11	58	13:44 (WEA ZB3) 14:42 (WEA ZB3)
24	05:29 21:40	06:22 20:39	07:16 19:24	45	18:07 (WEA ZB1) 18:52 (WEA ZB1)	47	16:28 (WEA ZB2) 17:15 (WEA ZB2)	08:09 16:20	49	13:37 (WEA ZB3) 14:26 (WEA ZB3)	08:44 16:11	58	13:44 (WEA ZB3) 14:42 (WEA ZB3)
25	05:31 21:38	06:23 20:37	07:18 19:22	44	18:08 (WEA ZB1) 18:52 (WEA ZB1)	49	16:27 (WEA ZB2) 15:27 (WEA ZB2)	08:11 16:19	50	13:36 (WEA ZB3) 14:26 (WEA ZB3)	08:45 16:12	58	13:44 (WEA ZB3) 14:42 (WEA ZB3)
26	05:32 21:37	06:25 20:35	07:20 19:20	43	18:08 (WEA ZB1) 18:51 (WEA ZB1)	49	15:27 (WEA ZB2) 16:16 (WEA ZB2)	08:13 16:18	51	13:36 (WEA ZB3) 14:27 (WEA ZB3)	08:45 16:13	58	13:45 (WEA ZB3) 14:43 (WEA ZB3)
27	05:34 21:35	06:27 20:32	07:21 19:17	41	18:07 (WEA ZB1) 18:48 (WEA ZB1)	49	15:27 (WEA ZB2) 16:16 (WEA ZB2)	08:14 16:17	52	13:36 (WEA ZB3) 14:28 (WEA ZB3)	08:45 16:13	58	13:46 (WEA ZB3) 14:44 (WEA ZB3)
28	05:35 21:33	06:29 20:30	07:23 19:15	38	18:08 (WEA ZB1) 18:46 (WEA ZB1)	50	15:26 (WEA ZB2) 16:16 (WEA ZB2)	08:16 16:16	53	13:36 (WEA ZB3) 14:29 (WEA ZB3)	08:45 16:14	58	13:46 (WEA ZB3) 14:44 (WEA ZB3)
29	05:37 21:32	06:30 20:28	07:25 19:12	35	18:09 (WEA ZB1) 18:44 (WEA ZB1)	50	15:26 (WEA ZB2) 16:16 (WEA ZB2)	08:18 16:15	54	13:36 (WEA ZB3) 14:30 (WEA ZB3)	08:45 16:15	57	13:47 (WEA ZB3) 14:44 (WEA ZB3)
30	05:39 21:30	06:32 20:25	07:27 19:10	32	18:10 (WEA ZB1) 18:42 (WEA ZB1)	50	15:26 (WEA ZB2) 16:16 (WEA ZB2)	08:19 16:14	54	13:35 (WEA ZB3) 14:29 (WEA ZB3)	08:45 16:16	58	13:47 (WEA ZB3) 14:45 (WEA ZB3)
31	05:40 21:28	06:34 20:23			07:24 16:59	49	15:26 (WEA ZB2) 16:15 (WEA ZB2)			08:45 16:17		58	13:47 (WEA ZB3) 14:45 (WEA ZB3)
Sonnenscheinstunden	511	459	382		329				260		234		
astr.max.mögl.Beschattung			908		879				1421		1776		

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

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

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO15 - Westerhausen 9A

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:45 16:18 138	10:57 (WEA ZB3) 08:16 15:11 (WEA ZB1) 17:09 10:59 (WEA ZB3) 08:14 15:12 (WEA ZB1) 17:11 11:00 (WEA ZB3) 08:12 15:13 (WEA ZB1) 17:13 11:01 (WEA ZB3) 08:10 15:13 (WEA ZB1) 17:15 11:04 (WEA ZB3) 08:09 15:14 (WEA ZB1) 17:17 11:06 (WEA ZB3) 08:07 15:15 (WEA ZB1) 17:19 12:27 (WEA ZB2) 08:05 15:15 (WEA ZB1) 17:21 12:29 (WEA ZB2) 08:03 15:17 (WEA ZB1) 17:23 12:30 (WEA ZB2) 08:01 15:17 (WEA ZB1) 17:25 12:31 (WEA ZB2) 07:59 15:18 (WEA ZB1) 17:27 12:32 (WEA ZB2) 07:57 15:18 (WEA ZB1) 17:29 12:33 (WEA ZB2) 07:55 15:19 (WEA ZB1) 17:31 12:35 (WEA ZB2) 07:53 15:20 (WEA ZB1) 17:33 12:37 (WEA ZB2) 07:51 15:20 (WEA ZB1) 17:35 12:39 (WEA ZB2) 07:49 15:21 (WEA ZB1) 17:37 12:42 (WEA ZB2) 07:47 15:22 (WEA ZB1) 17:39 12:46 (WEA ZB2) 07:45 15:23 (WEA ZB1) 17:41 14:01 (WEA ZB1) 07:43 15:23 (WEA ZB1) 17:43 14:02 (WEA ZB1) 07:41 15:24 (WEA ZB1) 17:45 14:02 (WEA ZB1) 07:39 15:25 (WEA ZB1) 17:47 14:02 (WEA ZB1) 07:37 15:25 (WEA ZB1) 17:49 14:02 (WEA ZB1) 07:34 15:26 (WEA ZB1) 17:51 14:02 (WEA ZB1) 07:32 15:26 (WEA ZB1) 17:53 14:02 (WEA ZB1) 07:30 15:27 (WEA ZB1) 17:55 14:02 (WEA ZB1) 07:28 15:27 (WEA ZB1) 17:57 14:03 (WEA ZB1) 07:25 15:28 (WEA ZB1) 17:59 14:02 (WEA ZB1) 07:23 15:28 (WEA ZB1) 18:01 14:02 (WEA ZB1) 07:21 15:28 (WEA ZB1) 18:03 14:03 (WEA ZB1) 07:11 15:29 (WEA ZB1) 19:57 14:03 (WEA ZB1) 07:09 15:29 (WEA ZB1) 19:59 14:03 (WEA ZB1) 07:06 15:29 (WEA ZB1) 20:01	07:19 18:04 07:16 18:06 07:14 18:08 07:12 18:10 07:09 18:12 07:07 18:14 07:05 18:16 07:02 18:18 07:00 18:20 18:22 06:55 18:24 06:53 18:25 06:50 18:27 06:48 18:29 06:45 18:31 06:43 18:33 06:41 18:35 06:38 18:37 06:36 18:38 06:33 18:40 06:31 18:42 06:28 18:44 06:26 18:46 06:24 18:48 06:21 18:50 06:19 18:51 06:16 18:53 06:14 18:55 07:11 19:57 07:09 19:59 07:06 20:01	14:38 (WEA ZB1) 07:04 15:01 (WEA ZB1) 20:02 07:02 20:05 06:59 20:06 06:57 20:08 06:54 20:10 06:52 20:12 06:50 20:13 06:47 20:15 06:45 20:17 06:42 20:19 06:40 20:21 06:38 20:23 06:35 20:24 06:33 20:26 06:31 20:28 06:28 20:30 06:26 20:32 06:24 20:34 06:21 20:35 06:19 20:37 06:17 20:39 06:15 20:41 06:13 20:43 06:10 20:45 06:08 20:46 06:06 20:48 06:04 20:50 06:02 20:52 06:00 20:54 05:57 20:55	05:55 20:57 05:53 20:59 05:51 21:01 05:49 21:03 05:47 21:04 05:45 21:06 05:43 21:08 05:42 21:10 05:40 21:11 05:38 21:13 05:36 21:15 05:34 21:17 05:32 21:18 05:31 21:20 05:29 21:22 05:27 21:23 05:26 21:25 05:24 21:27 05:23 21:28 05:21 21:30 05:20 21:31 05:18 21:33 05:17 21:34 05:16 21:36 05:14 21:37 05:13 21:39 05:12 21:40 05:11 21:42 05:09 21:43 05:08 21:44 05:07 21:45	05:06 21:47 05:05 21:48 05:05 21:49 05:04 21:50 05:03 21:51 05:02 21:52 05:02 21:53 05:01 21:54 05:00 21:55 05:00 21:57 04:59 21:58 04:59 21:59 04:58 22:00 04:58 22:01 04:58 22:01 04:58 22:02 04:58 22:02 04:59 22:02 05:00 22:02 05:00 22:02 05:01 22:02 05:01 22:02
Sonnenscheinstunden	251	274	367	419	493	509
astr.max.mögl.Beschattung	3155	2020	23			

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO15 - Westerhausen 9A

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Jul	August	September	Oktober		November		Dezember	
1	05:03	05:42	06:36	07:28		07:26	13:35 (WEA ZB1)	08:21	12:14 (WEA ZB2)
	22:01	21:27	20:21	19:07		16:57	14:58 (WEA ZB1)	16:13	15:00 (WEA ZB1)
2	05:03	05:44	06:37	07:30		07:28	13:35 (WEA ZB1)	08:22	12:14 (WEA ZB2)
	22:01	21:25	20:18	19:05		16:55	14:59 (WEA ZB1)	16:13	15:01 (WEA ZB1)
3	05:04	05:45	06:39	07:32		07:30	13:35 (WEA ZB1)	08:24	12:13 (WEA ZB2)
	22:01	21:23	20:16	19:03		16:53	14:59 (WEA ZB1)	16:12	15:00 (WEA ZB1)
4	05:05	05:47	06:41	07:34		07:32	13:35 (WEA ZB1)	08:25	12:13 (WEA ZB2)
	22:00	21:21	20:13	19:00		16:51	14:59 (WEA ZB1)	16:11	15:01 (WEA ZB1)
5	05:06	05:49	06:43	07:36		07:34	13:34 (WEA ZB1)	08:27	12:12 (WEA ZB2)
	22:00	21:19	20:11	18:58		16:50	15:00 (WEA ZB1)	16:11	15:00 (WEA ZB1)
6	05:07	05:50	06:44	07:37		07:36	13:34 (WEA ZB1)	08:28	10:53 (WEA ZB3)
	21:59	21:17	20:09	18:55		16:48	15:00 (WEA ZB1)	16:10	15:01 (WEA ZB1)
7	05:08	05:52	06:46	07:39		07:38	13:34 (WEA ZB1)	08:29	10:50 (WEA ZB3)
	21:58	21:15	20:06	18:53		16:46	15:00 (WEA ZB1)	16:10	15:00 (WEA ZB1)
8	05:09	05:54	06:48	07:41		07:40	13:34 (WEA ZB1)	08:31	10:50 (WEA ZB3)
	21:58	21:14	20:04	18:50		16:44	15:00 (WEA ZB1)	16:09	15:01 (WEA ZB1)
9	05:10	05:55	06:50	07:43		07:42	13:34 (WEA ZB1)	08:32	10:49 (WEA ZB3)
	21:57	21:12	20:01	18:48		16:42	15:00 (WEA ZB1)	16:09	15:01 (WEA ZB1)
10	05:11	05:57	06:51	07:45		07:44	13:34 (WEA ZB1)	08:33	10:48 (WEA ZB3)
	21:56	21:10	19:59	18:46		16:41	15:00 (WEA ZB1)	16:09	15:01 (WEA ZB1)
11	05:12	05:59	06:53	07:47		07:45	13:34 (WEA ZB1)	08:34	10:47 (WEA ZB3)
	21:55	21:07	19:56	18:43		16:39	15:00 (WEA ZB1)	16:08	15:01 (WEA ZB1)
12	05:13	06:01	06:55	07:48		07:47	13:35 (WEA ZB1)	08:35	10:48 (WEA ZB3)
	21:54	21:05	19:54	18:41	15	15:30 (WEA ZB1)	16:37	16:08	15:02 (WEA ZB1)
13	05:14	06:02	06:57	07:50		15:08 (WEA ZB1)	16:37	16:08	15:02 (WEA ZB1)
	21:53	21:03	19:52	18:39	28	15:36 (WEA ZB1)	16:36	16:08	15:02 (WEA ZB1)
14	05:15	06:04	06:58	07:52		15:04 (WEA ZB1)	16:37	16:08	15:02 (WEA ZB1)
	21:52	21:01	19:49	18:36	36	15:40 (WEA ZB1)	16:34	16:08	15:02 (WEA ZB1)
15	05:17	06:06	07:00	07:54		15:00 (WEA ZB1)	16:37	16:08	15:02 (WEA ZB1)
	21:51	20:59	19:47	18:34	42	15:42 (WEA ZB1)	16:32	16:08	15:03 (WEA ZB1)
16	05:18	06:08	07:02	07:56		14:57 (WEA ZB1)	16:32	16:08	15:03 (WEA ZB1)
	21:50	20:57	19:44	18:32	48	15:45 (WEA ZB1)	16:31	16:08	15:03 (WEA ZB1)
17	05:19	06:09	07:04	07:58		14:54 (WEA ZB1)	16:31	16:08	15:03 (WEA ZB1)
	21:49	20:55	19:42	18:29	52	15:46 (WEA ZB1)	16:29	16:08	15:03 (WEA ZB1)
18	05:21	06:11	07:05	08:00		14:52 (WEA ZB1)	16:29	16:08	15:03 (WEA ZB1)
	21:48	20:53	19:39	18:27	56	15:48 (WEA ZB1)	16:28	16:09	15:03 (WEA ZB1)
19	05:22	06:13	07:07	08:01		14:50 (WEA ZB1)	16:28	16:09	15:03 (WEA ZB1)
	21:47	20:50	19:37	18:25	59	15:49 (WEA ZB1)	16:27	16:09	15:04 (WEA ZB1)
20	05:23	06:15	07:09	08:03		14:48 (WEA ZB1)	16:27	16:09	15:04 (WEA ZB1)
	21:45	20:48	19:34	18:23	63	15:51 (WEA ZB1)	16:25	16:09	15:04 (WEA ZB1)
21	05:25	06:16	07:11	08:05		14:46 (WEA ZB1)	16:25	16:09	15:04 (WEA ZB1)
	21:44	20:46	19:32	18:20	66	15:52 (WEA ZB1)	16:24	16:10	15:05 (WEA ZB1)
22	05:26	06:18	07:12	08:07		14:45 (WEA ZB1)	16:24	16:10	15:05 (WEA ZB1)
	21:43	20:44	19:29	18:18	68	15:53 (WEA ZB1)	16:23	16:10	15:04 (WEA ZB1)
23	05:28	06:20	07:14	08:09		14:43 (WEA ZB1)	16:23	16:10	15:04 (WEA ZB1)
	21:41	20:42	19:27	18:16	71	15:54 (WEA ZB1)	16:21	16:11	15:06 (WEA ZB1)
24	05:29	06:22	07:16	08:11		14:42 (WEA ZB1)	16:21	16:11	15:06 (WEA ZB1)
	21:40	20:39	19:24	18:14	72	15:54 (WEA ZB1)	16:20	16:11	15:06 (WEA ZB1)
25	05:31	06:23	07:18	07:13		13:41 (WEA ZB1)	16:20	16:11	15:06 (WEA ZB1)
	21:38	20:37	19:22	17:12	74	14:55 (WEA ZB1)	16:19	16:12	15:06 (WEA ZB1)
26	05:32	06:25	07:20	07:15		13:40 (WEA ZB1)	16:19	16:12	15:06 (WEA ZB1)
	21:37	20:35	19:20	17:10	76	14:56 (WEA ZB1)	16:18	16:13	15:07 (WEA ZB1)
27	05:34	06:27	07:21	07:17		13:39 (WEA ZB1)	16:18	16:13	15:07 (WEA ZB1)
	21:35	20:32	19:17	17:08	77	14:56 (WEA ZB1)	16:17	16:13	15:08 (WEA ZB1)
28	05:35	06:29	07:23	07:19		13:38 (WEA ZB1)	16:17	16:13	15:08 (WEA ZB1)
	21:33	20:30	19:15	17:05	78	14:56 (WEA ZB1)	16:16	16:14	15:08 (WEA ZB1)
29	05:37	06:30	07:25	07:20		13:37 (WEA ZB1)	16:16	16:14	15:08 (WEA ZB1)
	21:32	20:28	19:12	17:03	80	14:57 (WEA ZB1)	16:15	16:15	15:09 (WEA ZB1)
30	05:39	06:32	07:27	07:22		13:36 (WEA ZB1)	16:15	16:15	15:09 (WEA ZB1)
	21:30	20:25	19:10	17:01	81	14:57 (WEA ZB1)	16:14	16:16	15:10 (WEA ZB1)
31	05:40	06:34		07:24		13:35 (WEA ZB1)		16:16	15:10 (WEA ZB1)
	21:28	20:23		16:59	83	14:58 (WEA ZB1)		16:17	15:11 (WEA ZB1)
Sonnenscheinstunden	511	459	382	329		260		234	
astr.max.mögl.Beschattung				1225		2651		4206	

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)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO16 - Westerhausen 9

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:45 16:18 110	12:17 (WEA ZB2) 14:48 (WEA ZB1) 17:09	08:16 17:09 76	13:42 (WEA ZB1) 14:58 (WEA ZB1) 18:04	07:19 20:02 20:57	05:55 20:57 21:47
2	08:45 16:19 109	12:18 (WEA ZB2) 14:49 (WEA ZB1) 17:11	08:14 17:11 76	13:42 (WEA ZB1) 14:58 (WEA ZB1) 18:06	07:16 20:04 20:59	05:53 20:59 21:48
3	08:45 16:21 108	12:19 (WEA ZB2) 14:50 (WEA ZB1) 17:13	08:12 17:13 74	13:44 (WEA ZB1) 14:58 (WEA ZB1) 18:08	07:14 20:06 21:01	05:51 21:01 21:49
4	08:45 16:22 106	12:20 (WEA ZB2) 14:50 (WEA ZB1) 17:15	08:10 17:15 74	13:44 (WEA ZB1) 14:58 (WEA ZB1) 18:10	07:12 20:08 21:03	05:49 21:03 21:50
5	08:45 16:23 105	12:22 (WEA ZB2) 14:51 (WEA ZB1) 17:17	08:09 17:17 72	13:45 (WEA ZB1) 14:57 (WEA ZB1) 18:12	07:09 20:10 21:04	05:47 21:04 21:51
6	08:44 16:24 103	12:23 (WEA ZB2) 14:51 (WEA ZB1) 17:19	08:07 17:19 71	13:46 (WEA ZB1) 14:57 (WEA ZB1) 18:14	07:07 20:12 21:06	05:45 21:06 21:52
7	08:44 16:26 101	12:24 (WEA ZB2) 14:51 (WEA ZB1) 17:21	08:05 17:21 69	13:47 (WEA ZB1) 14:56 (WEA ZB1) 18:16	07:05 20:13 21:08	05:43 21:08 21:53
8	08:43 16:27 98	12:27 (WEA ZB2) 14:53 (WEA ZB1) 17:23	08:03 17:23 67	13:48 (WEA ZB1) 14:55 (WEA ZB1) 18:18	07:02 20:15 21:10	05:42 21:10 21:54
9	08:43 16:29 95	12:29 (WEA ZB2) 14:53 (WEA ZB1) 17:25	08:01 17:25 65	13:49 (WEA ZB1) 14:54 (WEA ZB1) 18:20	07:00 20:17 21:11	05:40 21:11 21:55
10	08:42 16:30 87	12:33 (WEA ZB2) 14:53 (WEA ZB1) 17:27	07:59 17:27 62	13:51 (WEA ZB1) 14:53 (WEA ZB1) 18:22	06:57 20:19 21:13	05:38 21:13 21:56
11	08:41 16:32 80	13:34 (WEA ZB1) 14:54 (WEA ZB1) 17:29	07:57 17:29 60	13:52 (WEA ZB1) 14:52 (WEA ZB1) 18:24	06:55 20:21 21:15	05:36 21:15 21:57
12	08:41 16:33 80	13:34 (WEA ZB1) 14:54 (WEA ZB1) 17:31	07:55 17:31 57	13:53 (WEA ZB1) 14:50 (WEA ZB1) 18:25	06:53 20:23 21:17	05:34 21:17 21:58
13	08:40 16:35 81	13:34 (WEA ZB1) 14:55 (WEA ZB1) 17:33	07:53 17:33 54	13:55 (WEA ZB1) 14:49 (WEA ZB1) 18:27	06:50 20:24 21:18	05:32 21:18 21:58
14	08:39 16:36 81	13:34 (WEA ZB1) 14:55 (WEA ZB1) 17:35	07:51 17:35 51	13:57 (WEA ZB1) 14:48 (WEA ZB1) 18:29	06:48 20:26 21:20	05:31 21:20 21:59
15	08:38 16:38 81	13:35 (WEA ZB1) 14:56 (WEA ZB1) 17:37	07:49 17:37 47	13:59 (WEA ZB1) 14:46 (WEA ZB1) 18:31	06:45 20:28 21:22	05:29 21:22 22:00
16	08:37 16:40 81	13:35 (WEA ZB1) 14:56 (WEA ZB1) 17:39	07:47 17:39 42	14:02 (WEA ZB1) 14:44 (WEA ZB1) 18:33	06:43 20:30 21:23	05:27 21:23 22:00
17	08:36 16:41 81	13:36 (WEA ZB1) 14:57 (WEA ZB1) 17:41	07:45 17:41 36	14:05 (WEA ZB1) 14:41 (WEA ZB1) 18:35	06:41 20:32 21:25	05:26 21:25 22:01
18	08:35 16:43 82	13:35 (WEA ZB1) 14:57 (WEA ZB1) 17:43	07:43 17:43 29	14:08 (WEA ZB1) 14:37 (WEA ZB1) 18:37	06:38 20:34 21:27	05:24 21:27 22:01
19	08:34 16:45 81	13:36 (WEA ZB1) 14:57 (WEA ZB1) 17:45	07:41 17:45 18	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:36 20:35 21:28	05:23 21:28 22:01
20	08:33 16:47 81	13:37 (WEA ZB1) 14:58 (WEA ZB1) 17:47	07:39 17:47 18	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:33 20:37 21:30	05:21 21:30 22:02
21	08:32 16:48 82	13:36 (WEA ZB1) 14:58 (WEA ZB1) 17:49	07:37 17:49 18	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:31 20:39 21:31	05:20 21:31 22:02
22	08:30 16:50 81	13:37 (WEA ZB1) 14:58 (WEA ZB1) 17:51	07:34 17:51 18	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:28 20:41 21:33	05:18 21:33 22:02
23	08:29 16:52 81	13:37 (WEA ZB1) 14:58 (WEA ZB1) 17:53	07:32 17:53 18	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:26 20:43 21:34	05:17 21:34 22:02
24	08:28 16:54 81	13:38 (WEA ZB1) 14:59 (WEA ZB1) 17:55	07:30 17:55 18	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:24 20:45 21:36	05:16 21:36 22:02
25	08:26 16:56 80	13:38 (WEA ZB1) 14:58 (WEA ZB1) 17:57	07:28 17:57 18	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:21 20:46 21:37	05:14 21:37 22:02
26	08:25 16:58 80	13:39 (WEA ZB1) 14:59 (WEA ZB1) 17:59	07:25 17:59 18	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:19 20:48 21:39	05:13 21:39 22:02
27	08:23 16:59 80	13:39 (WEA ZB1) 14:59 (WEA ZB1) 18:01	07:23 18:01 18	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:16 20:50 21:40	05:12 21:40 22:02
28	08:22 17:01 79	13:39 (WEA ZB1) 14:58 (WEA ZB1) 18:03	07:21 18:03 18	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:14 20:52 21:42	05:11 21:42 22:02
29	08:20 17:03 79	13:40 (WEA ZB1) 14:59 (WEA ZB1) 18:05	07:19 18:05 18	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:11 20:54 21:43	05:09 21:43 22:02
30	08:19 17:05 78	13:41 (WEA ZB1) 14:59 (WEA ZB1) 18:07	07:17 18:07 18	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:09 20:55 21:44	05:08 21:44 22:02
31	08:17 17:07 77	13:41 (WEA ZB1) 14:58 (WEA ZB1) 18:09	07:15 18:09 18	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:07 20:57 21:45	05:07 21:45 22:02
Sonnenscheinstunden		251	274	367	419	509
astr.max.mögl.Beschattung		2709	1100			

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)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO16 - Westerhausen 9

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli	August	September	Oktober		November		Dezember		
1	05:03	05:42	06:36	07:28		07:26	13:19 (WEA ZB1)	08:21	13:16 (WEA ZB1)	
	22:01	21:27	20:21	19:07		16:57	63 14:22 (WEA ZB1)	16:13	80 14:36 (WEA ZB1)	
2	05:03	05:44	06:37	07:30		07:28	13:19 (WEA ZB1)	08:22	12:17 (WEA ZB2)	
	22:01	21:25	20:18	19:05		16:55	65 14:24 (WEA ZB1)	16:13	86 14:36 (WEA ZB1)	
3	05:04	05:45	06:39	07:32		07:30	13:18 (WEA ZB1)	08:24	12:13 (WEA ZB2)	
	22:01	21:23	20:16	19:03		16:53	67 14:25 (WEA ZB1)	16:12	93 14:36 (WEA ZB1)	
4	05:05	05:47	06:41	07:34		07:32	13:17 (WEA ZB1)	08:25	12:11 (WEA ZB2)	
	22:00	21:21	20:13	19:00		16:51	69 14:26 (WEA ZB1)	16:11	98 14:37 (WEA ZB1)	
5	05:06	05:49	06:43	07:36		07:34	13:16 (WEA ZB1)	08:27	12:10 (WEA ZB2)	
	22:00	21:19	20:11	18:58		16:50	70 14:26 (WEA ZB1)	16:11	101 14:37 (WEA ZB1)	
6	05:07	05:50	06:44	07:37		07:36	13:15 (WEA ZB1)	08:28	12:09 (WEA ZB2)	
	21:59	21:17	20:09	18:55		16:48	72 14:27 (WEA ZB1)	16:10	103 14:37 (WEA ZB1)	
7	05:08	05:52	06:46	07:39		07:38	13:14 (WEA ZB1)	08:29	12:08 (WEA ZB2)	
	21:58	21:15	20:06	18:53		16:46	73 14:27 (WEA ZB1)	16:10	105 14:37 (WEA ZB1)	
8	05:09	05:54	06:48	07:41		07:40	13:13 (WEA ZB1)	08:31	12:08 (WEA ZB2)	
	21:58	21:14	20:04	18:50		16:44	75 14:28 (WEA ZB1)	16:09	106 14:38 (WEA ZB1)	
9	05:10	05:55	06:50	07:43		07:42	13:13 (WEA ZB1)	08:32	12:08 (WEA ZB2)	
	21:57	21:12	20:01	18:48		16:42	75 14:28 (WEA ZB1)	16:09	107 14:38 (WEA ZB1)	
10	05:11	05:57	06:51	07:45		07:44	13:12 (WEA ZB1)	08:33	12:07 (WEA ZB2)	
	21:56	21:10	19:59	18:46		16:41	77 14:29 (WEA ZB1)	16:09	109 14:38 (WEA ZB1)	
11	05:12	05:59	06:53	07:47		07:45	13:12 (WEA ZB1)	08:34	12:07 (WEA ZB2)	
	21:55	21:07	19:56	18:43		16:39	77 14:29 (WEA ZB1)	16:08	110 14:38 (WEA ZB1)	
12	05:13	06:01	06:55	07:48		07:47	13:13 (WEA ZB1)	08:35	12:08 (WEA ZB2)	
	21:54	21:05	19:54	18:41		16:37	78 14:31 (WEA ZB1)	16:08	109 14:39 (WEA ZB1)	
13	05:14	06:02	06:57	07:50		07:49	13:12 (WEA ZB1)	08:36	10:53 (WEA ZB3)	
	21:53	21:03	19:52	18:39		16:36	79 14:31 (WEA ZB1)	16:08	116 14:40 (WEA ZB1)	
14	05:15	06:04	06:58	07:52		07:51	13:12 (WEA ZB1)	08:37	10:52 (WEA ZB3)	
	21:52	21:01	19:49	18:36		16:34	79 14:31 (WEA ZB1)	16:08	120 14:40 (WEA ZB1)	
15	05:17	06:06	07:00	07:54		07:53	13:12 (WEA ZB1)	08:38	10:51 (WEA ZB3)	
	21:51	20:59	19:47	18:34		16:32	80 14:32 (WEA ZB1)	16:08	123 14:40 (WEA ZB1)	
16	05:18	06:08	07:02	07:56		07:55	13:12 (WEA ZB1)	08:39	10:51 (WEA ZB3)	
	21:50	20:57	19:44	18:32		16:31	80 14:32 (WEA ZB1)	16:08	126 14:41 (WEA ZB1)	
17	05:19	06:09	07:04	07:58		07:57	13:12 (WEA ZB1)	08:40	10:50 (WEA ZB3)	
	21:49	20:55	19:42	18:29		16:29	80 14:32 (WEA ZB1)	16:08	128 14:41 (WEA ZB1)	
18	05:21	06:11	07:05	08:00		07:59	13:12 (WEA ZB1)	08:41	10:50 (WEA ZB3)	
	21:48	20:53	19:39	18:27		16:28	81 14:33 (WEA ZB1)	16:09	127 14:41 (WEA ZB1)	
19	05:22	06:13	07:07	08:01		08:00	13:12 (WEA ZB1)	08:41	10:51 (WEA ZB3)	
	21:47	20:50	19:37	18:25		16:27	81 14:33 (WEA ZB1)	16:09	128 14:42 (WEA ZB1)	
20	05:23	06:15	07:09	08:03		08:02	13:12 (WEA ZB1)	08:42	10:51 (WEA ZB3)	
	21:45	20:48	19:34	18:23		16:25	81 14:33 (WEA ZB1)	16:09	129 14:42 (WEA ZB1)	
21	05:25	06:16	07:11	08:05		08:04	13:12 (WEA ZB1)	08:43	10:51 (WEA ZB3)	
	21:44	20:46	19:32	18:20		16:24	82 14:34 (WEA ZB1)	16:10	130 14:43 (WEA ZB1)	
22	05:26	06:18	07:12	08:07		08:06	13:13 (WEA ZB1)	08:43	10:51 (WEA ZB3)	
	21:43	20:44	19:29	18:18		16:23	81 14:34 (WEA ZB1)	16:10	130 14:43 (WEA ZB1)	
23	05:28	06:20	07:14	08:09		08:07	13:13 (WEA ZB1)	08:44	10:52 (WEA ZB3)	
	21:41	20:42	19:27	18:16	22	15:04 (WEA ZB1)	16:21	81 14:34 (WEA ZB1)	16:11	130 14:44 (WEA ZB1)
24	05:29	06:22	07:16	08:11		14:37 (WEA ZB1)	08:09	13:13 (WEA ZB1)	08:44	10:53 (WEA ZB3)
	21:40	20:39	19:24	18:14	32	15:09 (WEA ZB1)	16:20	82 14:35 (WEA ZB1)	16:11	128 14:44 (WEA ZB1)
25	05:31	06:23	07:18	07:13		13:33 (WEA ZB1)	08:11	13:13 (WEA ZB1)	08:45	10:53 (WEA ZB3)
	21:38	20:37	19:22	17:12	38	14:11 (WEA ZB1)	16:19	81 14:34 (WEA ZB1)	16:12	128 14:44 (WEA ZB1)
26	05:32	06:25	07:20	07:15		13:30 (WEA ZB1)	08:13	13:13 (WEA ZB1)	08:45	10:55 (WEA ZB3)
	21:37	20:35	19:20	17:10	44	14:14 (WEA ZB1)	16:18	81 14:34 (WEA ZB1)	16:13	127 14:45 (WEA ZB1)
27	05:34	06:27	07:21	07:17		13:28 (WEA ZB1)	08:14	13:14 (WEA ZB1)	08:45	10:56 (WEA ZB3)
	21:35	20:32	19:17	17:08	48	14:16 (WEA ZB1)	16:17	81 14:35 (WEA ZB1)	16:13	126 14:46 (WEA ZB1)
28	05:35	06:29	07:23	07:19		13:26 (WEA ZB1)	08:16	13:14 (WEA ZB1)	08:45	10:57 (WEA ZB3)
	21:33	20:30	19:15	17:05	51	14:17 (WEA ZB1)	16:16	81 14:35 (WEA ZB1)	16:14	124 14:46 (WEA ZB1)
29	05:37	06:30	07:25	07:20		13:24 (WEA ZB1)	08:18	13:15 (WEA ZB1)	08:45	10:58 (WEA ZB3)
	21:32	20:28	19:12	17:03	55	14:19 (WEA ZB1)	16:15	81 14:36 (WEA ZB1)	16:15	122 14:47 (WEA ZB1)
30	05:39	06:32	07:27	07:22		13:22 (WEA ZB1)	08:19	13:15 (WEA ZB1)	08:46	11:00 (WEA ZB3)
	21:30	20:25	19:10	17:01	58	14:20 (WEA ZB1)	16:14	80 14:35 (WEA ZB1)	16:16	118 14:47 (WEA ZB1)
31	05:40	06:34		07:24		13:20 (WEA ZB1)			08:46	12:16 (WEA ZB2)
	21:28	20:23		16:59	61	14:21 (WEA ZB1)			16:17	110 14:48 (WEA ZB1)
Sonnenscheinstunden	511	459	382	329		260			234	
astr.max.mögl.Beschattung				409		2313			3577	

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 15:56/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO17 - Rüschenstede 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45	14:27 (WEA ZB1)	08:16	07:19	07:04	05:55	05:06	05:02	05:42	06:36	07:28	07:26
2	16:18	14:57 (WEA ZB1)	17:09	18:04	20:02	20:57	21:47	22:01	21:27	20:21	19:07	16:57
3	08:45	14:28 (WEA ZB1)	08:14	07:16	07:02	05:53	05:05	05:03	05:44	06:37	07:30	07:28
4	16:19	14:58 (WEA ZB1)	17:11	18:06	20:04	20:59	21:48	22:01	21:25	20:18	19:05	16:55
5	08:45	14:30 (WEA ZB1)	08:12	07:14	06:59	05:51	05:05	05:04	05:45	06:39	07:32	07:30
6	16:21	14:58 (WEA ZB1)	17:13	18:08	20:06	21:01	21:49	22:01	21:23	20:16	19:02	16:53
7	08:45	14:30 (WEA ZB1)	08:10	07:12	06:57	05:49	05:04	05:05	05:47	06:41	07:34	07:32
8	16:22	14:58 (WEA ZB1)	17:15	18:10	20:08	21:03	21:50	22:00	21:21	20:13	19:00	16:51
9	08:45	14:31 (WEA ZB1)	08:09	07:09	06:54	05:47	05:03	05:06	05:49	06:43	07:36	07:34
10	16:23	14:58 (WEA ZB1)	17:17	18:12	20:10	21:04	21:51	22:00	21:19	20:11	18:58	16:50
11	08:44	14:32 (WEA ZB1)	08:07	07:07	06:52	05:45	05:02	05:07	05:50	06:44	07:37	07:36
12	16:24	14:58 (WEA ZB1)	17:19	18:14	20:12	21:06	21:52	21:59	21:17	20:09	18:55	16:48
13	08:44	14:33 (WEA ZB1)	08:05	07:05	06:50	05:43	05:02	05:08	05:52	06:46	07:39	07:38
14	16:26	14:57 (WEA ZB1)	17:21	18:16	20:13	21:08	21:53	21:58	21:15	20:06	18:53	16:46
15	08:43	14:34 (WEA ZB1)	08:03	07:02	06:47	05:41	05:01	05:08	05:54	06:48	07:41	07:40
16	16:27	14:58 (WEA ZB1)	17:23	18:18	20:15	21:10	21:54	21:58	21:14	20:04	18:50	16:44
17	08:43	14:35 (WEA ZB1)	08:01	07:00	06:45	05:40	05:00	05:10	05:55	06:50	07:43	07:42
18	16:28	14:57 (WEA ZB1)	17:25	18:20	20:17	21:11	21:55	21:57	21:12	20:01	18:48	16:42
19	08:42	14:37 (WEA ZB1)	07:59	06:57	06:42	05:38	05:00	05:11	05:57	06:51	07:45	07:44
20	16:30	14:56 (WEA ZB1)	17:27	18:22	20:19	21:13	21:56	21:56	21:10	19:59	18:46	16:41
21	08:41	14:38 (WEA ZB1)	07:57	06:55	06:40	05:36	04:59	05:12	05:59	06:53	07:47	07:45
22	16:31	14:55 (WEA ZB1)	17:29	18:23	20:21	21:15	21:57	21:55	21:07	19:56	18:43	16:39
23	08:41	14:40 (WEA ZB1)	07:55	06:53	06:38	05:34	04:59	05:13	06:01	06:55	07:48	07:47
24	16:33	14:54 (WEA ZB1)	17:31	18:25	20:23	21:17	21:58	21:54	21:05	19:54	18:41	16:37
25	08:40	14:42 (WEA ZB1)	07:53	06:50	06:35	05:32	04:59	05:14	06:02	06:57	07:50	07:49
26	16:35	14:52 (WEA ZB1)	17:33	18:27	20:24	21:18	21:58	21:53	21:03	19:52	18:39	16:36
27	08:39	14:43 (WEA ZB1)	07:51	06:48	06:33	05:31	04:58	05:15	06:04	06:58	07:52	07:51
28	16:36	17:35	18:29	20:26	21:20	21:59	21:52	21:01	19:49	18:36	16:34	16:34
29	08:38	14:44 (WEA ZB1)	07:49	06:45	06:31	05:29	04:58	05:17	06:06	07:00	07:54	07:53
30	16:38	17:37	18:31	20:28	21:22	22:00	21:51	21:59	19:47	18:34	16:32	16:32
31	08:37	14:45 (WEA ZB1)	07:47	06:43	06:28	05:27	04:58	05:18	06:08	07:02	07:56	07:55
32	16:40	17:39	18:33	20:30	21:23	22:00	21:50	20:57	19:44	18:32	16:31	16:31
33	08:36	14:46 (WEA ZB1)	07:45	06:41	06:26	05:26	04:58	05:19	06:09	07:04	07:58	07:57
34	16:41	17:41	18:35	20:32	21:25	22:01	21:49	20:55	19:42	18:29	16:29	16:29
35	08:35	14:47 (WEA ZB1)	07:43	06:38	06:24	05:24	04:58	05:21	06:11	07:05	08:00	07:59
36	16:43	17:43	18:37	20:34	21:27	22:01	21:48	20:53	19:39	18:27	16:28	16:28
37	08:34	14:48 (WEA ZB1)	07:41	06:36	06:21	05:23	04:58	05:22	06:13	07:07	08:01	08:00
38	16:45	17:45	18:38	20:35	21:28	22:01	21:47	20:50	19:37	18:25	16:27	16:27
39	08:33	14:49 (WEA ZB1)	07:39	06:33	06:19	05:21	04:58	05:23	06:15	07:09	08:03	08:02
40	16:46	17:47	18:40	20:37	21:30	22:02	21:45	20:48	19:34	18:23	16:25	16:25
41	08:32	14:50 (WEA ZB1)	07:37	06:31	06:17	05:20	04:58	05:25	06:16	07:11	08:05	08:04
42	16:48	17:49	18:42	20:39	21:31	22:02	21:44	20:46	19:32	18:20	16:24	16:24
43	08:30	14:51 (WEA ZB1)	07:34	06:28	06:15	05:18	04:58	05:26	06:18	07:12	08:07	08:06
44	16:50	17:51	18:44	20:41	21:33	22:02	21:43	20:44	19:29	18:18	16:23	16:23
45	08:29	14:52 (WEA ZB1)	07:32	06:26	06:12	05:17	04:59	05:28	06:20	07:14	08:09	08:07
46	16:52	17:53	18:46	20:43	21:34	22:02	21:41	20:42	19:27	18:16	16:21	16:21
47	08:28	14:53 (WEA ZB1)	07:30	06:24	06:10	05:15	04:59	05:29	06:22	07:16	08:11	08:09
48	16:54	17:55	18:48	20:45	21:36	22:02	21:40	20:39	19:24	18:14	16:20	16:20
49	08:26	14:54 (WEA ZB1)	07:28	06:21	06:08	05:14	04:59	05:31	06:23	07:18	08:13	08:11
50	16:56	17:57	18:50	20:46	21:37	22:02	21:38	20:37	19:22	18:12	16:19	16:19
51	08:25	14:55 (WEA ZB1)	07:25	06:19	06:06	05:13	05:00	05:32	06:25	07:20	08:15	08:13
52	16:58	17:59	18:51	20:48	21:39	22:02	21:37	20:35	19:20	18:10	16:18	16:18
53	08:23	14:56 (WEA ZB1)	07:23	06:16	06:04	05:12	05:00	05:34	06:27	07:21	08:17	08:14
54	16:59	18:01	18:53	20:50	21:40	22:02	21:35	20:32	19:17	18:07	16:17	16:17
55	08:22	14:57 (WEA ZB1)	07:21	06:14	06:02	05:11	05:01	05:35	06:29	07:23	08:19	08:16
56	17:01	18:02	18:55	20:52	21:42	22:02	21:33	20:30	19:15	18:05	16:16	16:16
57	08:20	14:58 (WEA ZB1)	07:11	06:00	05:09	05:01	05:37	06:30	07:25	08:20	09:15	09:14
58	17:03	18:04	18:57	20:54	21:43	22:02	21:32	20:28	19:12	18:02	16:15	16:15
59	08:19	14:59 (WEA ZB1)	07:09	05:57	05:08	05:02	05:39	06:32	07:27	08:22	09:19	09:18
60	17:05	18:05	18:59	20:55	21:44	22:02	21:30	20:25	19:10	18:00	16:14	16:14
61	08:17	14:59 (WEA ZB1)	07:06	05:54	05:07	05:01	05:40	06:34	07:29	08:24	09:21	09:20
62	17:07	18:07	19:01	20:51	21:46	22:02	21:28	20:23	19:08	18:00	16:13	16:13
63	Sonnenscheinstunden	251	274	420	493	509	511	459	382	329	260	234
64	astr.max.mögl.Beschattung	299	367	420	493	509	511	459	382	329	260	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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO18 - Langengroden 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:44 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:45 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:27 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:12	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:09	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:26	08:05 17:21	07:05 18:16	06:50 20:13	05:43 21:08	05:02 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:58	05:54 21:13	06:48 20:04	07:41 18:50	07:40 16:44	08:31 16:09
9	08:43 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	05:09 21:57	05:55 21:12	06:50 20:01	07:43 18:48	07:42 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	05:11 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:47 18:43	07:45 16:39	08:34 16:08
12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:23	05:34 21:17	04:59 21:58	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:35	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 22:00	05:16 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:08 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:41 18:35	06:26 20:32	05:26 21:25	04:58 22:01	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:37	06:24 20:34	05:24 21:27	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	08:00 18:27	07:58 16:28	08:41 16:09
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:23 21:28	04:58 22:01	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:15 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:37 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:10
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:43	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:23	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:59 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:11
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:45 16:12
26	08:25 16:57	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	05:32 21:37	06:25 20:35	07:20 19:20	07:15 17:10	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:17 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:10 21:42	05:01 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:18 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:45 16:16
31	08:17 17:07		07:06 20:01		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.Beschattung												

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) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO19 - WA Sengwarden BP207

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:26	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:44 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:21	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:05 21:49	05:04 22:00	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:11 18:10	06:57 20:08	05:49 21:02	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:44 16:23	08:08 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 21:59	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:26 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11	05:45 21:06	05:02 21:52	05:07 21:59	05:50 21:17	06:44 20:08	07:37 18:55	07:36 16:48	08:28 16:10
7	08:43 16:26	08:05 17:21	07:04 18:16	06:49 20:13	05:43 21:08	05:02 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:57	05:54 21:13	06:48 20:04	07:41 18:50	07:39 16:44	08:30 16:09
9	08:42 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	05:10 21:57	05:55 21:11	06:50 20:01	07:43 18:48	07:41 16:42	08:32 16:09
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31	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	419	493	509	511	459	382	329	260	235
astr.max.mögl.Beschattung												

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)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO2 - Utwarfe 2

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
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27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:16 17:07	08:14 16:17	08:45 16:13
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31	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.Beschattung												

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) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO20 - Langengrodener Weg 17
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
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Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.Beschattung												

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) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO21 - Am Sudring 15

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:45 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:27 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:12	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:09	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:26	08:05 17:21	07:05 18:16	06:49 20:13	05:43 21:08	05:01 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:58	05:54 21:14	06:48 20:04	07:41 18:50	07:40 16:44	08:31 16:09
9	08:43 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	05:09 21:57	05:55 21:12	06:50 20:01	07:43 18:48	07:42 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	05:10 21:56	05:57 21:10	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:47 18:43	07:45 16:39	08:34 16:08
12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:23	05:34 21:17	04:59 21:58	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:34	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 22:00	05:16 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:07 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:41 18:35	06:26 20:32	05:26 21:25	04:58 22:01	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:37	06:24 20:34	05:24 21:27	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	08:00 18:27	07:59 16:28	08:41 16:08
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:22 21:28	04:58 22:01	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:15 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:37 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:09
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27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:17 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:10 21:42	05:00 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:18 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:46 16:16
31	08:17 17:07		07:06 20:00		05:07 21:46		05:40 21:28	06:34 20:23		07:24 16:59		08:46 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
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Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO22 - Georg-Adden-Straße 55
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
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17	08:36 16:41	07:45 17:41	06:41 18:35	06:26 20:32	05:26 21:25	04:58 22:01	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:37	06:24 20:34	05:24 21:27	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	07:59 18:27	07:59 16:28	08:41 16:08
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:22 21:28	04:58 22:01	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:14 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:37 17:49	06:31 18:42	06:17 20:39	05:19 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:09
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:43	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:58 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:08 16:21	08:44 16:10
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:45 16:12
26	08:25 16:57	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	04:59 22:02	05:32 21:37	06:25 20:35	07:19 19:19	07:15 17:09	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:17 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:01 20:52	05:10 21:42	05:00 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:18 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:38 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:46 16:16
31	08:17 17:07		07:06 20:00		05:07 21:46		05:40 21:28	06:34 20:23		07:24 16:59		08:46 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
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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) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO23 - Hooksiel

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:01 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:12
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:45 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:05 22:00	05:48 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:27 16:10
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:09	07:37 18:55	07:36 16:48	08:28 16:10
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9	08:43 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:39 21:11	05:00 21:55	05:09 21:57	05:55 21:11	06:50 20:01	07:43 18:48	07:42 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:21	06:42 20:19	05:38 21:13	05:00 21:56	05:10 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:08
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:46 18:43	07:45 16:39	08:34 16:08
12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:22	05:34 21:17	04:59 21:58	05:13 21:54	06:00 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
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15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 22:00	05:16 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:07 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:40 18:35	06:26 20:32	05:26 21:25	04:58 22:01	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:36	06:24 20:33	05:24 21:27	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	07:59 18:27	07:58 16:28	08:41 16:08
19	08:34 16:44	07:41 17:45	06:36 18:38	06:21 20:35	05:22 21:28	04:58 22:01	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:14 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:36 17:49	06:31 18:42	06:17 20:39	05:19 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:09
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:43	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:58 22:02	05:27 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:10
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:21 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:55	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:45 16:12
26	08:25 16:57	07:25 17:58	06:19 18:51	06:06 20:48	05:13 21:39	04:59 22:02	05:32 21:37	06:25 20:35	07:19 19:19	07:15 17:09	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:11 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:17 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:01 20:52	05:10 21:42	05:00 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:18 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:38 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:46 16:16
31	08:17 17:07		07:06 20:00		05:07 21:46		05:40 21:28	06:34 20:23		07:24 16:59		08:46 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.Beschattung												

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) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 15:56/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO24 - Depenhausen/Pakens 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember	
1	08:45	09:52 (WEA ZB3)	08:16	07:19	07:04	05:55	05:06	05:03	05:42	06:36	07:29	07:26	08:21	09:47 (WEA ZB3)
2	08:45	09:53 (WEA ZB3)	08:14	07:16	07:02	05:53	05:05	05:03	05:44	06:37	07:30	07:28	08:22	09:46 (WEA ZB3)
3	08:45	09:55 (WEA ZB3)	08:12	07:14	06:59	05:51	05:05	05:04	05:45	06:39	07:32	07:30	08:24	09:44 (WEA ZB3)
4	08:45	09:55 (WEA ZB3)	08:10	07:12	06:57	05:49	05:04	05:05	05:47	06:41	07:34	07:32	08:25	09:44 (WEA ZB3)
5	08:45	09:56 (WEA ZB3)	08:09	07:09	06:54	05:47	05:03	05:06	05:49	06:43	07:36	07:34	08:27	09:43 (WEA ZB3)
6	08:44	09:57 (WEA ZB3)	08:07	07:07	06:52	05:45	05:02	05:07	05:50	06:44	07:38	07:36	08:28	09:43 (WEA ZB3)
7	08:44	09:58 (WEA ZB3)	08:05	07:05	06:50	05:43	05:02	05:08	05:52	06:46	07:39	07:38	08:29	09:43 (WEA ZB3)
8	08:43	10:00 (WEA ZB3)	08:03	07:02	06:47	05:42	05:01	05:09	05:54	06:48	07:41	07:40	08:31	09:43 (WEA ZB3)
9	08:43	10:01 (WEA ZB3)	08:01	07:00	06:45	05:40	05:00	05:10	05:56	06:50	07:43	07:42	08:32	09:43 (WEA ZB3)
10	08:42	10:03 (WEA ZB3)	07:59	06:58	06:42	05:38	05:00	05:11	05:57	06:51	07:45	07:44	08:33	09:43 (WEA ZB3)
11	08:41	10:05 (WEA ZB3)	07:57	06:55	06:40	05:36	05:00	05:12	05:59	06:53	07:47	07:45	08:34	09:42 (WEA ZB3)
12	08:41	10:51 (WEA ZB1)	07:55	06:53	06:38	05:34	04:59	05:13	06:01	06:55	07:48	07:47	08:35	09:43 (WEA ZB3)
13	08:40	10:52 (WEA ZB1)	07:53	06:50	06:35	05:32	04:58	05:14	06:02	06:57	07:50	07:49	08:36	09:44 (WEA ZB1)
14	08:39	10:53 (WEA ZB1)	07:51	06:48	06:33	05:31	04:58	05:15	06:04	06:58	07:52	07:51	08:37	09:44 (WEA ZB1)
15	08:38	10:54 (WEA ZB1)	07:49	06:45	06:31	05:29	04:58	05:17	06:06	07:00	07:54	07:53	08:38	09:44 (WEA ZB1)
16	08:37	10:55 (WEA ZB1)	07:47	06:43	06:28	05:27	04:58	05:18	06:08	07:02	07:56	07:55	08:39	09:45 (WEA ZB1)
17	08:36	10:56 (WEA ZB1)	07:45	06:41	06:26	05:26	04:58	05:19	06:09	07:04	07:58	07:57	08:40	09:44 (WEA ZB1)
18	08:35	10:57 (WEA ZB1)	07:43	06:38	06:24	05:24	04:58	05:21	06:11	07:05	08:00	07:59	08:41	09:45 (WEA ZB1)
19	08:34	10:58 (WEA ZB1)	07:41	06:36	06:22	05:23	04:58	05:22	06:13	07:07	08:01	08:00	08:42	09:45 (WEA ZB1)
20	08:33	10:59 (WEA ZB1)	07:39	06:33	06:19	05:21	04:58	05:23	06:15	07:09	08:03	08:02	08:43	09:46 (WEA ZB1)
21	08:32	11:00 (WEA ZB1)	07:37	06:31	06:17	05:20	04:58	05:25	06:16	07:11	08:05	08:04	08:44	09:46 (WEA ZB1)
22	08:30	11:01 (WEA ZB1)	07:34	06:28	06:15	05:18	04:58	05:26	06:18	07:13	08:07	08:06	08:45	09:46 (WEA ZB1)
23	08:29	11:02 (WEA ZB1)	07:32	06:26	06:13	05:17	04:59	05:28	06:20	07:14	08:09	08:08	08:46	09:47 (WEA ZB1)
24	08:28	11:03 (WEA ZB1)	07:30	06:24	06:10	05:16	04:59	05:29	06:22	07:16	08:11	08:09	08:47	09:47 (WEA ZB1)
25	08:26	11:04 (WEA ZB1)	07:28	06:21	06:08	05:14	04:59	05:31	06:23	07:18	08:13	08:11	08:48	09:48 (WEA ZB1)
26	08:25	11:05 (WEA ZB1)	07:25	06:19	06:06	05:13	05:00	05:32	06:25	07:20	08:15	08:13	08:49	09:49 (WEA ZB1)
27	08:24	11:06 (WEA ZB1)	07:23	06:16	06:04	05:12	05:00	05:34	06:27	07:21	08:16	08:14	08:50	09:49 (WEA ZB1)
28	08:22	11:07 (WEA ZB1)	07:21	06:14	06:02	05:11	05:01	05:35	06:29	07:23	08:17	08:16	08:51	09:50 (WEA ZB1)
29	08:20	11:08 (WEA ZB1)	07:19	06:12	06:00	05:09	05:01	05:37	06:30	07:25	08:19	08:18	08:52	09:51 (WEA ZB1)
30	08:19	11:09 (WEA ZB1)	07:17	06:10	05:58	05:07	05:00	05:39	06:32	07:27	08:21	08:19	08:53	09:51 (WEA ZB1)
31	08:17	11:10 (WEA ZB1)	07:15	06:08	05:56	05:05	05:00	05:40	06:34	07:29	08:23	08:21	08:54	09:52 (WEA ZB1)
32	08:15	11:11 (WEA ZB1)	07:13	06:06	05:54	05:03	05:00	05:41	06:35	07:30	08:24	08:22	08:55	09:52 (WEA ZB1)
33	08:14	11:12 (WEA ZB1)	07:11	06:04	05:52	05:01	05:00	05:42	06:36	07:31	08:25	08:23	08:56	09:53 (WEA ZB1)
34	08:13	11:13 (WEA ZB1)	07:09	06:02	05:50	05:00	05:00	05:43	06:37	07:32	08:26	08:24	08:57	09:54 (WEA ZB1)
35	08:12	11:14 (WEA ZB1)	07:07	06:00	05:48	04:58	05:00	05:44	06:38	07:33	08:27	08:25	08:58	09:55 (WEA ZB1)
36	08:11	11:15 (WEA ZB1)	07:05	05:58	05:46	04:56	05:00	05:45	06:39	07:34	08:28	08:26	08:59	09:56 (WEA ZB1)
37	08:10	11:16 (WEA ZB1)	07:03	05:56	05:44	04:54	05:00	05:46	06:40	07:35	08:29	08:27	09:00	09:57 (WEA ZB1)
38	08:09	11:17 (WEA ZB1)	07:01	05:54	05:42	04:52	05:00	05:47	06:41	07:36	08:30	08:28	09:01	09:58 (WEA ZB1)
39	08:08	11:18 (WEA ZB1)	06:59	05:52	05:40	04:50	05:00	05:48	06:42	07:37	08:31	08:29	09:02	09:59 (WEA ZB1)
40	08:07	11:19 (WEA ZB1)	06:57	05:50	05:38	04:48	05:00	05:49	06:43	07:38	08:32	08:30	09:03	10:00 (WEA ZB1)
41	08:06	11:20 (WEA ZB1)	06:55	05:48	05:36	04:46	05:00	05:50	06:44	07:39	08:33	08:31	09:04	10:01 (WEA ZB1)
42	08:05	11:21 (WEA ZB1)	06:53	05:46	05:34	04:44	05:00	05:51	06:45	07:40	08:34	08:32	09:05	10:02 (WEA ZB1)
43	08:04	11:22 (WEA ZB1)	06:51	05:44	05:32	04:42	05:00	05:52	06:46	07:41	08:35	08:33	09:06	10:03 (WEA ZB1)
44	08:03	11:23 (WEA ZB1)	06:49	05:42	05:30	04:40	05:00	05:53	06:47	07:42	08:36	08:34	09:07	10:04 (WEA ZB1)
45	08:02	11:24 (WEA ZB1)	06:47	05:40	05:28	04:38	05:00	05:54	06:48	07:43	08:37	08:35	09:08	10:05 (WEA ZB1)
46	08:01	11:25 (WEA ZB1)	06:45	05:38	05:26	04:36	05:00	05:55	06:49	07:44	08:38	08:36	09:09	10:06 (WEA ZB1)
47	08:00	11:26 (WEA ZB1)	06:43	05:36	05:24	04:34	05:00	05:56	06:50	07:45	08:39	08:37	09:10	10:07 (WEA ZB1)
48	07:59	11:27 (WEA ZB1)	06:41	05:34	05:22	04:32	05:00	05:57	06:51	07:46	08:40	08:38	09:11	10:08 (WEA ZB1)
49	07:58	11:28 (WEA ZB1)	06:39	05:32	05:20	04:30	05:00	05:58	06:52	07:47	08:41	08:39	09:12	10:09 (WEA ZB1)
50	07:57	11:29 (WEA ZB1)	06:37	05:30	05:18	04:28	05:00	05:59	06:53	07:48	08:42	08:40	09:13	10:10 (WEA ZB1)
51	07:56	11:30 (WEA ZB1)	06:35	05:28	05:16	04:26	05:00	06:00	06:54	07:49	08:43	08:41	09:14	10:11 (WEA ZB1)
52	07:55	11:31 (WEA ZB1)	06:33	05:26	05:14	04:24	05:00	06:01	06:55	07:50	08:44	08:42	09:15	10:12 (WEA ZB1)
53	07:54	11:32 (WEA ZB1)	06:31	05:24	05:12	04:22	05:00	06:02	06:56	07:51	08:45	08:43	09:16	10:13 (WEA ZB1)
54	07:53	11:33 (WEA ZB1)	06:29	05:22	05:10	04:20	05:00	06:03	06:57	07:52	08:46	08:44	09:17	10:14 (WEA ZB1)
55	07:52	11:34 (WEA ZB1)	06:27	05:20	05:08	04:18	05:00	06:04	06:58	07:53	08:47	08:45	09:18	10:15 (WEA ZB1)
56	07:51	11:35 (WEA ZB1)	06:25	05:18	05:06	04:16	05:00	06:05	06:59	07:54	08:48	08:46	09:19	10:16 (WEA ZB1)
57	07:50	11:36 (WEA ZB1)	06:23	05:16	05:04	04:14	05:00	06:06	07:00	07:55	08:49	08:47	09:20	10:17 (WEA ZB1)
58	07:49	11:37 (WEA ZB1)	06:21	05:14	05:02	04:12	05:00	06:07	07:01	07:56	08:50	08:48	09:21	10:18 (WEA ZB1)
59	07:48	11:38 (WEA ZB1)	06:19	05:12	05:00	04:10	05:00	06:08	07:02	07:57	08:51	08:49	09:22	10:19 (WEA ZB1)
60	07:47	11:39 (WEA ZB1)	06:17	05:10	04:58	04:08	05:00	06:09	07:03	07:58	08:52	08:50	09:23	10:20 (WEA ZB1)
61	07:46	11:40 (WEA ZB1)	06:15	05:08	04:56	04:06	05:00	06:10	07:04	07:59	08:53	08:51	09:24	10:21 (WEA ZB1)
62	07:45	11:41 (WEA ZB1)	06:13	05:06	04:54	04:04	05:00	06:11	07:05	08:00	08:54	08:52	09:25	10:22 (WEA ZB1)
63	07:44	11:42 (WEA ZB1)	06:11	05:04	04:52	04:02	05:00	06:12	07:06	08:01	08:55	08:53	09:26	10:23 (WEA ZB1)
64	07:43	11:43 (WEA ZB1)	06:09	05:02	04:50	04:00	05:00	06:13	07:07	08:02	08:56	08:54	09:27	10:24 (WEA ZB1)
65	07:42	11:44 (WEA ZB1)	06:07	05:00	04:48	03:58	05:00	06:14	07:08	08:03	08:57	08:55	09:28	10:25 (WEA ZB1)
66	07:41	11:45 (WEA ZB1)	06:05	04:58	04:46	03:56	05:00	06:15	07:09	08:04	08:58	08:56	09:29	10:26 (WEA ZB1)
67	07:40	11:46 (WEA ZB1)	06:03	04:56	04:44	03:54	05:00	06:16	07:10	08:05	08:59	08:57	09:30	10:27 (WEA ZB1)
68	07:39	11:47 (WEA ZB1)	06:01	04:54	04:42	03:52	05:00	06:17	07:11	08:06	09:00	08:58	09:31	10:28 (WEA ZB1)
69	07:38	11:48 (WEA ZB1)	05:59	04:52	04:40	03:50	05:00	06:18	07:12	08:07	09:01	08:59	09:32	10:29 (WEA ZB1)
70	07:37	11:49 (WEA ZB1)	05:57	04:50	04:38	03:48	05:00	06:19	07:13	08:08	09:02	09:00	09:33	10:30 (WEA ZB1)
71	07:36	11:50 (WEA ZB1)	05:55	04:48	04:36	03:46	05:00	06:20	07:14	08:09	09:03	09:01	09:34	10:31 (WEA ZB1)
72	07:35	11:51 (WEA ZB1)	05:53	04:46	04:34	03:44	05:00	06:21	07:15	08:10	09:04	09:02	09:35	10:3

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO25 - Tain 3

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar		Februar		März		April		Mai		Juni	
1	08:46		08:16	08:43 (WEA ZB3)	07:19	08:14 (WEA ZB1)	07:04	05:55	05:06			
	16:18		17:09	25 09:08 (WEA ZB2)	18:05	27 08:41 (WEA ZB1)	20:02	20:57	21:47			
2	08:45		08:14	08:41 (WEA ZB3)	07:16	08:16 (WEA ZB1)	07:02	05:53	05:06			
	16:20		17:11	28 09:09 (WEA ZB2)	18:06	24 08:40 (WEA ZB1)	20:04	20:59	21:48			
3	08:45		08:12	08:40 (WEA ZB3)	07:14	08:17 (WEA ZB1)	06:59	05:51	05:05			
	16:21		17:13	30 09:10 (WEA ZB2)	18:08	20 08:37 (WEA ZB1)	20:06	21:01	21:49			
4	08:45		08:11	08:38 (WEA ZB3)	07:12	08:21 (WEA ZB1)	06:57	05:49	05:04			
	16:22		17:15	32 09:10 (WEA ZB2)	18:10	13 08:34 (WEA ZB1)	20:08	21:03	21:50			
5	08:45		08:09	08:36 (WEA ZB3)	07:09		06:54	05:47	05:03			
	16:23		17:17	34 09:10 (WEA ZB2)	18:12		20:10	21:04	21:51			
6	08:44		08:07	08:36 (WEA ZB3)	07:07		06:52	05:45	05:02			
	16:24		17:19	33 09:09 (WEA ZB2)	18:14		20:12	21:06	21:52			
7	08:44		08:05	08:32 (WEA ZB1)	07:05		06:50	05:44	05:02			
	16:26		17:21	35 09:09 (WEA ZB2)	18:16		20:13	21:08	21:53			
8	08:43		08:03	08:30 (WEA ZB1)	07:02		06:47	05:42	05:01			
	16:27		17:23	39 09:09 (WEA ZB2)	18:18		20:15	21:10	21:54			
9	08:43		08:01	08:28 (WEA ZB1)	07:00		06:45	05:40	05:01			
	16:29		17:25	40 09:08 (WEA ZB2)	18:20		20:17	21:12	21:55			
10	08:42		07:59	08:26 (WEA ZB1)	06:58		06:42	05:38	05:00			
	16:30		17:27	41 09:07 (WEA ZB2)	18:22		20:19	21:13	21:56			
11	08:41		07:57	08:24 (WEA ZB1)	06:55		06:40	05:36	05:00			
	16:32		17:29	42 09:06 (WEA ZB2)	18:24		20:21	21:15	21:57			
12	08:41		07:55	08:22 (WEA ZB1)	06:53		06:38	05:34	04:59			
	16:33		17:31	41 09:05 (WEA ZB2)	18:25		20:23	21:17	21:58			
13	08:40		07:53	08:19 (WEA ZB1)	06:50		06:35	05:33	04:59			
	16:35		17:33	40 09:02 (WEA ZB2)	18:27		20:24	21:18	21:58			
14	08:39		07:51	08:17 (WEA ZB1)	06:48		06:33	05:31	04:59			
	16:36		17:35	35 08:58 (WEA ZB2)	18:29		20:26	21:20	21:59			
15	08:38		07:49	08:15 (WEA ZB1)	06:46		06:31	05:29	04:58			
	16:38		17:37	32 08:47 (WEA ZB1)	18:31		20:28	21:22	22:00			
16	08:37		07:47	08:13 (WEA ZB1)	06:43		06:28	05:27	04:58			
	16:40		17:39	35 08:48 (WEA ZB1)	18:33		20:30	21:23	22:00			
17	08:36		07:45	08:11 (WEA ZB1)	06:41		06:26	05:26	04:58			
	16:41		17:41	37 08:48 (WEA ZB1)	18:35		20:32	21:25	22:01			
18	08:35		07:43	08:10 (WEA ZB1)	06:38		06:24	05:24	04:58			
	16:43		17:43	38 08:48 (WEA ZB1)	18:37		20:34	21:27	22:01			
19	08:34		07:41	08:10 (WEA ZB1)	06:36		06:22	05:23	04:58			
	16:45		17:45	38 08:48 (WEA ZB1)	18:39		20:35	21:28	22:01			
20	08:33		07:39	08:10 (WEA ZB1)	06:33		06:19	05:21	04:58			
	16:47		17:47	38 08:48 (WEA ZB1)	18:40		20:37	21:30	22:02			
21	08:32		07:37	08:11 (WEA ZB1)	06:31		06:17	05:20	04:58			
	16:48		17:49	37 08:48 (WEA ZB1)	18:42		20:39	21:31	22:02			
22	08:30		07:34	08:10 (WEA ZB1)	06:28		06:15	05:18	04:58			
	16:50		17:51	38 08:48 (WEA ZB1)	18:44		20:41	21:33	22:02			
23	08:29	08:58 (WEA ZB2)	07:32	08:10 (WEA ZB1)	06:26		06:13	05:17	04:59			
	16:52	2 09:00 (WEA ZB2)	17:53	37 08:47 (WEA ZB1)	18:46		20:43	21:34	22:02			
24	08:28	08:57 (WEA ZB2)	07:30	08:11 (WEA ZB1)	06:24		06:10	05:16	04:59			
	16:54	5 09:02 (WEA ZB2)	17:55	36 08:47 (WEA ZB1)	18:48		20:45	21:36	22:02			
25	08:26	08:55 (WEA ZB2)	07:28	08:12 (WEA ZB1)	06:21		06:08	05:14	04:59			
	16:56	8 09:03 (WEA ZB2)	17:57	35 08:47 (WEA ZB1)	18:50		20:46	21:37	22:03			
26	08:25	08:54 (WEA ZB2)	07:26	08:11 (WEA ZB1)	06:19		06:06	05:13	05:00			
	16:58	11 09:05 (WEA ZB2)	17:59	34 08:45 (WEA ZB1)	18:51		20:48	21:39	22:02			
27	08:24	08:52 (WEA ZB3)	07:23	08:13 (WEA ZB1)	06:16		06:04	05:12	05:00			
	17:00	13 09:05 (WEA ZB2)	18:01	32 08:45 (WEA ZB1)	18:53		20:50	21:40	22:02			
28	08:22	08:50 (WEA ZB3)	07:21	08:13 (WEA ZB1)	06:14		06:02	05:11	05:01			
	17:01	16 09:06 (WEA ZB2)	18:03	30 08:43 (WEA ZB1)	18:55		20:52	21:42	22:02			
29	08:21	08:49 (WEA ZB3)			07:11		06:00	05:10	05:01			
	17:03	18 09:07 (WEA ZB2)			19:57		20:54	21:43	22:02			
30	08:19	08:47 (WEA ZB3)			07:09		05:58	05:08	05:02			
	17:05	21 09:08 (WEA ZB2)			19:59		20:55	21:44	22:02			
31	08:17	08:45 (WEA ZB3)			07:07			05:07				
	17:07	23 09:08 (WEA ZB2)			20:01			21:46				
Sonnenscheinstunden	251		274		367		419	493	509			
astr.max.mögl.Beschattung	117		992		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)

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO25 - Tain 3

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Jul	August	September	Oktober		November	Dezember
1	05:03	05:42	06:36	07:29		07:26	07:56 (WEA ZB1) 08:21
	22:02	21:27	20:21	19:07		16:57	08:37 (WEA ZB2) 16:13
2	05:03	05:44	06:38	07:30		07:28	07:58 (WEA ZB1) 08:22
	22:01	21:25	20:18	19:05		16:55	08:38 (WEA ZB2) 16:13
3	05:04	05:45	06:39	07:32		07:30	08:00 (WEA ZB1) 08:24
	22:01	21:23	20:16	19:03		16:53	08:38 (WEA ZB2) 16:12
4	05:05	05:47	06:41	07:34		07:32	08:02 (WEA ZB1) 08:25
	22:00	21:21	20:13	19:00		16:52	08:39 (WEA ZB2) 16:11
5	05:06	05:49	06:43	07:36		07:34	08:05 (WEA ZB3) 08:27
	22:00	21:19	20:11	18:58		16:50	08:39 (WEA ZB2) 16:11
6	05:07	05:50	06:45	07:38		07:36	08:06 (WEA ZB3) 08:28
	21:59	21:17	20:09	18:55		16:48	08:39 (WEA ZB2) 16:10
7	05:08	05:52	06:46	07:39		07:38	08:08 (WEA ZB3) 08:29
	21:58	21:16	20:06	18:53		16:46	08:39 (WEA ZB2) 16:10
8	05:09	05:54	06:48	07:41		07:40	08:10 (WEA ZB3) 08:31
	21:58	21:14	20:04	18:51		16:44	08:39 (WEA ZB2) 16:09
9	05:10	05:56	06:50	07:43		07:42	08:12 (WEA ZB3) 08:32
	21:57	21:12	20:01	18:48	7	08:59 (WEA ZB1) 07:42	08:39 (WEA ZB2) 16:09
	05:11	05:57	06:52	07:45		08:53 (WEA ZB1) 07:44	08:14 (WEA ZB3) 08:33
10	21:56	21:10	19:59	18:46	16	09:09 (WEA ZB1) 16:41	08:39 (WEA ZB2) 16:09
	05:12	05:59	06:53	07:47		08:50 (WEA ZB1) 07:45	08:17 (WEA ZB3) 08:34
	21:55	21:08	19:57	18:43	22	09:12 (WEA ZB1) 16:39	08:40 (WEA ZB2) 16:09
12	05:13	06:01	06:55	07:48		08:48 (WEA ZB1) 07:47	08:19 (WEA ZB3) 08:35
	21:54	21:06	19:54	18:41	26	09:14 (WEA ZB1) 16:37	08:40 (WEA ZB2) 16:08
13	05:14	06:02	06:57	07:50		08:47 (WEA ZB1) 07:49	08:21 (WEA ZB3) 08:36
	21:53	21:03	19:52	18:39	28	09:15 (WEA ZB1) 16:36	08:39 (WEA ZB2) 16:08
	05:15	06:04	06:59	07:52		08:45 (WEA ZB1) 07:51	08:23 (WEA ZB3) 08:37
	21:52	21:01	19:49	18:36	31	09:16 (WEA ZB1) 16:34	08:39 (WEA ZB2) 16:08
15	05:17	06:06	07:00	07:54		08:44 (WEA ZB1) 07:53	08:25 (WEA ZB2) 08:38
	21:51	20:59	19:47	18:34	33	09:17 (WEA ZB1) 16:32	08:38 (WEA ZB2) 16:08
16	05:18	06:08	07:02	07:56		08:43 (WEA ZB1) 07:55	08:27 (WEA ZB2) 08:39
	21:50	20:57	19:44	18:32	35	09:18 (WEA ZB1) 16:31	08:38 (WEA ZB2) 16:08
	05:19	06:09	07:04	07:58		08:43 (WEA ZB1) 07:57	08:29 (WEA ZB2) 08:40
	21:49	20:55	19:42	18:30	35	09:18 (WEA ZB1) 16:29	08:37 (WEA ZB2) 16:08
18	05:21	06:11	07:06	08:00		08:42 (WEA ZB1) 07:59	08:31 (WEA ZB2) 08:41
	21:48	20:53	19:39	18:27	37	09:19 (WEA ZB1) 16:28	08:36 (WEA ZB2) 16:09
19	05:22	06:13	07:07	08:01		08:41 (WEA ZB1) 08:00	08:33 (WEA ZB2) 08:42
	21:47	20:51	19:37	18:25	38	09:19 (WEA ZB1) 16:27	08:35 (WEA ZB2) 16:09
	05:23	06:15	07:09	08:03		08:41 (WEA ZB1) 08:02	08:42
	21:45	20:48	19:34	18:23	38	09:19 (WEA ZB1) 16:25	16:09
21	05:25	06:16	07:11	08:05		08:41 (WEA ZB1) 08:04	08:43
	21:44	20:46	19:32	18:21	38	09:19 (WEA ZB1) 16:24	16:10
22	05:26	06:18	07:13	08:07		08:41 (WEA ZB1) 08:06	08:43
	21:43	20:44	19:29	18:18	38	09:19 (WEA ZB1) 16:23	16:10
23	05:28	06:20	07:14	08:09		08:41 (WEA ZB1) 08:08	08:44
	21:41	20:42	19:27	18:16	37	09:18 (WEA ZB1) 16:21	16:11
24	05:29	06:22	07:16	08:11		08:41 (WEA ZB1) 08:09	08:44
	21:40	20:39	19:25	18:14	37	09:18 (WEA ZB1) 16:20	16:11
25	05:31	06:23	07:18	08:13		07:41 (WEA ZB1) 08:11	08:45
	21:38	20:37	19:22	17:12	37	08:18 (WEA ZB1) 16:19	16:12
26	05:32	06:25	07:20	08:15		07:43 (WEA ZB1) 08:13	08:45
	21:37	20:35	19:20	17:10	34	08:17 (WEA ZB1) 16:18	16:13
27	05:34	06:27	07:21	08:17		07:45 (WEA ZB1) 08:14	08:45
	21:35	20:32	19:17	17:08	31	08:16 (WEA ZB1) 16:17	16:13
28	05:36	06:29	07:23	08:19		07:47 (WEA ZB1) 08:16	08:45
	21:33	20:30	19:15	17:05	37	08:29 (WEA ZB2) 16:16	16:14
29	05:37	06:31	07:25	08:21		07:49 (WEA ZB1) 08:18	08:46
	21:32	20:28	19:12	17:03	40	08:32 (WEA ZB2) 16:15	16:15
30	05:39	06:32	07:27	08:22		07:51 (WEA ZB1) 08:19	08:46
	21:30	20:25	19:10	17:01	42	08:34 (WEA ZB2) 16:14	16:16
31	05:40	06:34		07:24		07:53 (WEA ZB1)	08:46
	21:28	20:23		16:59	42	08:35 (WEA ZB2)	16:17
Sonnenscheinstunden	511	459	382	329		260	234
astr.max.mögl.Beschattung				759		449	

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)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO26 - Waterpott 1

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:46 16:18	08:16 17:09	07:19 18:05	07:45 (WEA ZB2) 20:02	07:54 (WEA ZB1) 20:57	05:55 21:47
2	08:45 16:20	08:14 17:11	07:16 18:06	07:46 (WEA ZB2) 20:04	07:55 (WEA ZB1) 20:59	05:53 21:48
3	08:45 16:21	08:12 17:13	07:14 18:08	07:45 (WEA ZB2) 20:06	07:56 (WEA ZB1) 21:01	05:51 21:49
4	08:45 16:22	08:11 17:15	07:12 18:10	07:46 (WEA ZB2) 20:08	07:57 (WEA ZB1) 21:03	05:49 21:50
5	08:45 16:23	08:09 17:17	07:09 18:12	07:47 (WEA ZB2) 20:10	08:00 (WEA ZB1) 21:04	05:47 21:51
6	08:44 16:24	08:07 17:19	07:07 18:14	07:47 (WEA ZB2) 20:12	08:16 (WEA ZB1) 21:06	05:45 21:52
7	08:44 16:26	08:05 17:21	07:05 18:16	07:48 (WEA ZB2) 20:13	08:05 (WEA ZB1) 21:08	05:44 21:53
8	08:43 16:27	08:03 17:23	07:02 18:18	07:49 (WEA ZB2) 20:15	08:12 (WEA ZB1) 21:10	05:42 21:54
9	08:43 16:29	08:01 17:25	07:00 18:20	07:51 (WEA ZB2) 20:17	08:08 (WEA ZB1) 21:12	05:40 21:55
10	08:42 16:30	07:59 17:27	06:58 18:22	07:53 (WEA ZB2) 20:19	08:04 (WEA ZB1) 21:13	05:38 21:56
11	08:41 16:32	07:57 17:29	06:55 18:24	08:04 (WEA ZB2) 20:21	08:00 (WEA ZB1) 21:15	05:36 21:57
12	08:41 16:33	07:55 17:31	06:53 18:25	08:04 (WEA ZB2) 20:23	08:00 (WEA ZB1) 21:17	05:34 21:58
13	08:40 16:35	07:53 17:33	06:50 18:27	07:14 (WEA ZB1) 20:24	08:00 (WEA ZB1) 21:18	05:33 21:58
14	08:39 16:36	07:51 17:35	06:48 18:29	07:23 (WEA ZB1) 20:26	08:00 (WEA ZB1) 21:20	05:31 21:59
15	08:38 16:38	07:49 17:37	06:46 18:31	07:12 (WEA ZB1) 20:28	08:00 (WEA ZB1) 21:22	05:29 22:00
16	08:37 16:40	07:47 17:39	06:43 18:33	07:09 (WEA ZB1) 20:30	08:00 (WEA ZB1) 21:23	05:27 22:00
17	08:36 16:41	07:45 17:41	06:41 18:35	07:28 (WEA ZB1) 20:32	08:00 (WEA ZB1) 21:25	05:26 22:01
18	08:35 16:43	07:43 17:43	06:38 18:37	07:30 (WEA ZB1) 20:34	08:00 (WEA ZB1) 21:27	05:24 22:01
19	08:34 16:45	07:41 17:45	06:36 18:39	07:02 (WEA ZB1) 20:36	08:00 (WEA ZB1) 21:29	05:23 22:01
20	08:33 16:47	07:39 17:47	06:33 18:40	06:59 (WEA ZB1) 20:38	08:00 (WEA ZB1) 21:31	05:22 22:02
21	08:32 16:48	07:37 17:49	06:31 18:42	07:31 (WEA ZB1) 20:40	08:00 (WEA ZB1) 21:33	05:21 22:02
22	08:30 16:50	07:34 17:51	06:29 18:44	07:32 (WEA ZB1) 20:42	08:00 (WEA ZB1) 21:35	05:19 22:03
23	08:29 16:52	07:32 17:53	06:26 18:46	07:32 (WEA ZB1) 20:44	08:00 (WEA ZB1) 21:37	05:17 22:04
24	08:28 16:54	07:30 17:55	06:24 18:48	07:33 (WEA ZB1) 20:46	08:00 (WEA ZB1) 21:39	05:16 22:05
25	08:26 16:56	07:28 17:57	06:21 18:50	07:32 (WEA ZB1) 20:48	08:00 (WEA ZB1) 21:41	05:15 22:06
26	08:25 16:58	07:26 17:59	06:19 18:51	07:32 (WEA ZB1) 20:50	08:00 (WEA ZB1) 21:43	05:14 22:07
27	08:24 17:00	07:23 18:01	06:16 18:53	07:31 (WEA ZB1) 20:52	08:00 (WEA ZB1) 21:45	05:13 22:08
28	08:22 17:01	07:21 18:03	06:14 18:55	07:31 (WEA ZB1) 20:54	08:00 (WEA ZB1) 21:47	05:12 22:09
29	08:20 17:03		07:11 19:57	07:32 (WEA ZB1) 20:56	08:00 (WEA ZB1) 21:49	05:11 22:10
30	08:19 17:05		07:09 19:59	07:33 (WEA ZB1) 20:58	08:00 (WEA ZB1) 21:51	05:10 22:11
31	08:17 17:07		07:07 20:01	07:53 (WEA ZB1) 21:00	08:00 (WEA ZB1) 21:53	05:09 22:12
Sonnenscheinstunden	251	274	367	419	493	509
astr.max.mögl.Beschattung		215	851	132		

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO26 - Waterpott 1

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Jul	August	September		Oktober		November	Dezember
1	05:03	05:42	06:36		07:29	07:55 (WEA ZB1)	07:26	08:21
	22:02	21:27	20:21		19:07	5 08:00 (WEA ZB1)	16:57	16:14
2	05:03	05:44	06:38		07:30		07:28	08:22
	22:01	21:25	20:18		19:05		16:55	16:13
3	05:04	05:45	06:39		07:32	08:33 (WEA ZB2)	07:30	08:24
	22:01	21:23	20:16		19:03	7 08:40 (WEA ZB2)	16:53	16:12
4	05:05	05:47	06:41		07:34	08:29 (WEA ZB2)	07:32	08:25
	22:00	21:21	20:13		19:00	15 08:44 (WEA ZB2)	16:52	16:11
5	05:06	05:49	06:43		07:36	08:26 (WEA ZB2)	07:34	08:27
	22:00	21:19	20:11		18:58	20 08:46 (WEA ZB2)	16:50	16:11
6	05:07	05:50	06:45	08:01 (WEA ZB1)	07:38	08:25 (WEA ZB2)	07:36	08:28
	21:59	21:17	20:09	5 08:06 (WEA ZB1)	18:55	23 08:48 (WEA ZB2)	16:48	16:10
7	05:08	05:52	06:46	07:55 (WEA ZB1)	07:39	08:23 (WEA ZB2)	07:38	08:29
	21:58	21:16	20:06	16 08:11 (WEA ZB1)	18:53	26 08:49 (WEA ZB2)	16:46	16:10
8	05:09	05:54	06:48	07:53 (WEA ZB1)	07:41	08:22 (WEA ZB2)	07:40	08:31
	21:58	21:14	20:04	21 08:14 (WEA ZB1)	18:51	27 08:49 (WEA ZB2)	16:44	16:09
9	05:10	05:56	06:50	07:50 (WEA ZB1)	07:43	08:21 (WEA ZB2)	07:42	08:32
	21:57	21:12	20:01	25 08:15 (WEA ZB1)	18:48	29 08:50 (WEA ZB2)	16:42	16:09
10	05:11	05:57	06:52	07:48 (WEA ZB1)	07:45	08:20 (WEA ZB2)	07:44	08:33
	21:56	21:10	19:59	29 08:17 (WEA ZB1)	18:46	29 08:49 (WEA ZB2)	16:41	16:09
11	05:12	05:59	06:53	07:47 (WEA ZB1)	07:47	08:19 (WEA ZB2)	07:45	08:34
	21:55	21:08	19:57	31 08:18 (WEA ZB1)	18:43	31 08:50 (WEA ZB2)	16:39	16:09
12	05:13	06:01	06:55	07:46 (WEA ZB1)	07:48	08:19 (WEA ZB2)	07:47	08:35
	21:54	21:05	19:54	33 08:19 (WEA ZB1)	18:41	31 08:50 (WEA ZB2)	16:37	16:08
13	05:14	06:02	06:57	07:44 (WEA ZB1)	07:50	08:18 (WEA ZB2)	07:49	08:36
	21:53	21:03	19:52	35 08:19 (WEA ZB1)	18:39	32 08:50 (WEA ZB2)	16:36	16:08
14	05:15	06:04	06:59	07:43 (WEA ZB1)	07:52	08:19 (WEA ZB2)	07:51	08:37
	21:52	21:01	19:49	36 08:19 (WEA ZB1)	18:36	30 08:49 (WEA ZB2)	16:34	16:08
15	05:17	06:06	07:00	07:42 (WEA ZB1)	07:54	08:21 (WEA ZB2)	07:53	08:38
	21:51	20:59	19:47	38 08:20 (WEA ZB1)	18:34	28 08:49 (WEA ZB2)	16:32	16:08
16	05:18	06:08	07:02	07:41 (WEA ZB1)	07:56	08:23 (WEA ZB2)	07:55	08:39
	21:50	20:57	19:44	38 08:19 (WEA ZB1)	18:32	25 08:48 (WEA ZB3)	16:31	16:08
17	05:19	06:09	07:04	07:41 (WEA ZB1)	07:58	08:25 (WEA ZB3)	07:57	08:40
	21:49	20:55	19:42	39 08:20 (WEA ZB1)	18:30	23 08:48 (WEA ZB3)	16:29	16:09
18	05:21	06:11	07:06	07:40 (WEA ZB1)	08:00	08:27 (WEA ZB3)	07:59	08:41
	21:48	20:53	19:39	40 08:20 (WEA ZB1)	18:27	21 08:48 (WEA ZB3)	16:28	16:09
19	05:22	06:13	07:07	07:40 (WEA ZB1)	08:01	08:29 (WEA ZB3)	08:00	08:42
	21:47	20:51	19:37	40 08:20 (WEA ZB1)	18:25	19 08:48 (WEA ZB3)	16:27	16:09
20	05:23	06:15	07:09	07:39 (WEA ZB1)	08:03	08:31 (WEA ZB3)	08:02	08:42
	21:45	20:48	19:34	39 08:18 (WEA ZB1)	18:23	17 08:48 (WEA ZB3)	16:25	16:09
21	05:25	06:16	07:11	07:39 (WEA ZB1)	08:05	08:33 (WEA ZB3)	08:04	08:43
	21:44	20:46	19:32	39 08:18 (WEA ZB1)	18:21	14 08:47 (WEA ZB3)	16:24	16:10
22	05:26	06:18	07:13	07:40 (WEA ZB1)	08:07	08:35 (WEA ZB3)	08:06	08:43
	21:43	20:44	19:29	38 08:18 (WEA ZB1)	18:18	11 08:46 (WEA ZB3)	16:23	16:10
23	05:28	06:20	07:14	07:41 (WEA ZB1)	08:09	08:37 (WEA ZB3)	08:08	08:44
	21:41	20:42	19:27	36 08:17 (WEA ZB1)	18:16	9 08:46 (WEA ZB3)	16:21	16:11
24	05:29	06:22	07:16	07:42 (WEA ZB1)	08:11	08:39 (WEA ZB3)	08:09	08:44
	21:40	20:39	19:25	33 08:15 (WEA ZB1)	18:14	5 08:44 (WEA ZB3)	16:20	16:11
25	05:31	06:23	07:18	07:44 (WEA ZB1)	07:13	07:41 (WEA ZB3)	08:11	08:45
	21:38	20:37	19:22	30 08:14 (WEA ZB1)	17:12	2 07:43 (WEA ZB3)	16:19	16:12
26	05:32	06:25	07:20	07:46 (WEA ZB1)	07:15		08:13	08:45
	21:37	20:35	19:20	27 08:13 (WEA ZB1)	17:10		16:18	16:13
27	05:34	06:27	07:21	07:48 (WEA ZB1)	07:17		08:14	08:45
	21:35	20:32	19:17	24 08:12 (WEA ZB1)	17:08		16:17	16:13
28	05:36	06:29	07:23	07:49 (WEA ZB1)	07:19		08:16	08:45
	21:33	20:30	19:15	20 08:09 (WEA ZB1)	17:06		16:16	16:14
29	05:37	06:31	07:25	07:51 (WEA ZB1)	07:20		08:18	08:45
	21:32	20:28	19:12	16 08:07 (WEA ZB1)	17:03		16:15	16:15
30	05:39	06:32	07:27	07:53 (WEA ZB1)	07:22		08:19	08:46
	21:30	20:25	19:10	11 08:04 (WEA ZB1)	17:01		16:14	16:16
31	05:40	06:34			07:24			08:46
	21:28	20:23			16:59			16:17
Sonnenscheinstunden	511	459	382		329		260	234
astr.max.mögl.Beschattung			739		479			

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)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO27 - Klein Depenhauen 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:45	08:16	07:19	07:43 (WEA ZB3)	07:04	05:55
	16:18	17:09	18:05	8 07:51 (WEA ZB3)	20:02	06:47 (WEA ZB1)
2	08:45	08:14	07:16	07:41 (WEA ZB3)	07:02	05:53
	16:20	17:11	18:06	11 07:52 (WEA ZB3)	20:04	06:47 (WEA ZB1)
3	08:45	08:12	07:14	07:38 (WEA ZB3)	06:59	05:51
	16:21	17:13	18:08	15 07:53 (WEA ZB3)	20:06	06:48 (WEA ZB1)
4	08:45	08:10	07:12	07:36 (WEA ZB3)	06:57	05:49
	16:22	17:15	18:10	18 07:54 (WEA ZB3)	20:08	06:48 (WEA ZB1)
5	08:45	08:09	07:09	07:34 (WEA ZB3)	06:54	05:47
	16:23	17:17	18:12	20 07:54 (WEA ZB3)	20:10	06:48 (WEA ZB1)
6	08:44	08:07	07:07	07:31 (WEA ZB3)	06:52	05:45
	16:24	17:19	18:14	23 07:54 (WEA ZB3)	20:12	06:50 (WEA ZB1)
7	08:44	08:05	07:05	07:29 (WEA ZB3)	06:50	05:44
	16:26	17:21	18:16	25 07:54 (WEA ZB3)	20:13	06:51 (WEA ZB1)
8	08:43	08:03	07:02	07:26 (WEA ZB3)	06:47	05:42
	16:27	17:23	18:18	28 07:54 (WEA ZB3)	20:15	06:51 (WEA ZB1)
9	08:43	08:01	07:00	07:24 (WEA ZB2)	06:45	05:40
	16:29	17:25	18:20	30 07:54 (WEA ZB3)	20:17	06:52 (WEA ZB1)
10	08:42	07:59	06:58	07:21 (WEA ZB2)	06:43	05:38
	16:30	17:27	18:22	31 07:52 (WEA ZB3)	20:19	06:54 (WEA ZB1)
11	08:41	07:57	06:55	07:19 (WEA ZB2)	06:40	05:36
	16:32	17:29	18:24	33 07:52 (WEA ZB3)	20:21	06:55 (WEA ZB1)
12	08:41	07:55	06:53	07:17 (WEA ZB3)	06:38	05:34
	16:33	17:31	18:25	34 07:51 (WEA ZB3)	20:23	06:56 (WEA ZB1)
13	08:40	07:53	06:50	07:14 (WEA ZB3)	06:35	05:33
	16:35	17:33	18:27	36 07:50 (WEA ZB3)	20:24	06:59 (WEA ZB1)
14	08:39	07:51	06:48	07:12 (WEA ZB2)	06:33	05:31
	16:36	17:35	18:29	36 07:48 (WEA ZB3)	20:26	06:57 (WEA ZB1)
15	08:38	07:49	06:46	07:09 (WEA ZB2)	06:31	05:29
	16:38	17:37	18:31	37 07:46 (WEA ZB3)	20:28	06:55 (WEA ZB1)
16	08:37	07:47	06:43	07:07 (WEA ZB2)	06:28	05:27
	16:40	17:39	18:33	37 07:44 (WEA ZB2)	20:30	06:52 (WEA ZB1)
17	08:36	07:45	06:41	07:06 (WEA ZB2)	06:26	05:26
	16:41	17:41	18:35	38 07:44 (WEA ZB2)	20:32	06:50 (WEA ZB1)
18	08:35	07:43	06:38	07:06 (WEA ZB2)	06:24	05:24
	16:43	17:43	18:37	38 07:44 (WEA ZB2)	20:34	06:50 (WEA ZB1)
19	08:34	07:41	06:36	07:05 (WEA ZB2)	06:22	05:23
	16:45	17:45	18:39	38 07:43 (WEA ZB2)	20:35	06:49 (WEA ZB1)
20	08:33	07:39	06:33	07:05 (WEA ZB2)	06:19	05:21
	16:47	17:47	18:40	38 07:43 (WEA ZB2)	20:37	06:49 (WEA ZB1)
21	08:32	07:37	06:31	07:05 (WEA ZB2)	06:17	05:20
	16:48	17:49	18:42	37 07:42 (WEA ZB2)	20:39	06:47 (WEA ZB1)
22	08:30	07:34	06:28	07:05 (WEA ZB2)	06:15	05:18
	16:50	17:51	18:44	37 07:42 (WEA ZB2)	20:41	06:47 (WEA ZB1)
23	08:29	07:32	06:26	07:06 (WEA ZB2)	06:13	05:17
	16:52	17:53	18:46	36 07:42 (WEA ZB2)	20:43	06:47 (WEA ZB1)
24	08:28	07:30	06:24	07:06 (WEA ZB2)	06:10	05:16
	16:54	17:55	18:48	34 07:40 (WEA ZB2)	20:45	06:47 (WEA ZB1)
25	08:26	07:28	06:21	07:07 (WEA ZB2)	06:08	05:14
	16:56	17:57	18:50	32 07:39 (WEA ZB2)	20:46	06:46 (WEA ZB1)
26	08:25	07:26	06:19	07:07 (WEA ZB2)	06:06	05:13
	16:58	17:59	18:51	30 07:37 (WEA ZB2)	20:48	06:46 (WEA ZB1)
27	08:24	07:23	06:16	07:08 (WEA ZB2)	06:04	05:12
	17:00	18:01	18:53	28 07:36 (WEA ZB2)	20:50	06:46 (WEA ZB1)
28	08:22	07:21	06:14	07:09 (WEA ZB2)	06:02	05:11
	17:01	18:03	3 07:48 (WEA ZB3)	24 07:33 (WEA ZB2)	20:52	06:46 (WEA ZB1)
29	08:20		07:11	08:11 (WEA ZB2)	06:00	05:10
	17:03		19:57	20 08:31 (WEA ZB2)	20:54	06:47 (WEA ZB1)
30	08:19		07:09	08:14 (WEA ZB2)	05:58	05:08
	17:05		19:59	13 08:27 (WEA ZB2)	20:55	06:47 (WEA ZB1)
31	08:17		07:07			05:07
	17:07		20:01			21:46
Sonnenscheinstunden	251	274	367	419	493	509
astr.max.mögl.Beschattung		3	865	909	465	

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO27 - Klein Depenhäusen 1

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember	
1	05:03 22:01	05:42 21:27	24	07:06 (WEA ZB1) 07:30 (WEA ZB1)	06:36 20:21	25	07:03 (WEA ZB1) 07:28 (WEA ZB1)	07:29 19:07	35	07:55 (WEA ZB2) 08:30 (WEA ZB3)	07:26 16:57
2	05:03 22:01	05:44 21:25	27	07:05 (WEA ZB1) 07:32 (WEA ZB1)	06:38 20:18	21	07:05 (WEA ZB1) 07:26 (WEA ZB1)	07:30 19:05	34	07:57 (WEA ZB2) 08:31 (WEA ZB3)	07:28 16:55
3	05:04 22:01	05:45 21:23	30	07:04 (WEA ZB1) 07:34 (WEA ZB1)	06:39 20:16	16	07:06 (WEA ZB1) 07:22 (WEA ZB1)	07:32 19:03	32	07:58 (WEA ZB2) 08:30 (WEA ZB3)	07:30 16:53
4	05:05 22:00	05:47 21:21	33	07:02 (WEA ZB1) 07:35 (WEA ZB1)	06:41 20:13	10	07:08 (WEA ZB1) 07:18 (WEA ZB1)	07:34 19:00	30	08:00 (WEA ZB2) 08:30 (WEA ZB3)	07:32 16:52
5	05:06 22:00	05:49 21:19	36	07:01 (WEA ZB1) 07:37 (WEA ZB1)	06:43 20:11			07:36 18:58	28	08:02 (WEA ZB3) 08:30 (WEA ZB3)	07:34 16:50
6	05:07 21:59	05:50 21:17	37	07:00 (WEA ZB1) 07:37 (WEA ZB1)	06:45 20:09			07:38 18:55	26	08:04 (WEA ZB3) 08:30 (WEA ZB3)	07:36 16:48
7	05:08 21:58	05:52 21:16	39	06:59 (WEA ZB1) 07:38 (WEA ZB1)	06:46 20:06			07:39 18:53	24	08:06 (WEA ZB3) 08:30 (WEA ZB3)	07:38 16:46
8	05:09 21:58	05:54 21:14	40	06:58 (WEA ZB1) 07:38 (WEA ZB1)	06:48 20:04			07:41 18:51	22	08:08 (WEA ZB3) 08:30 (WEA ZB3)	07:40 16:44
9	05:10 21:57	05:56 21:12	42	06:57 (WEA ZB1) 07:39 (WEA ZB1)	06:50 20:01			07:43 18:48		08:10 (WEA ZB3) 08:29 (WEA ZB3)	07:42 16:42
10	05:11 21:56	05:57 21:10	43	06:57 (WEA ZB1) 07:40 (WEA ZB1)	06:52 19:59			07:45 18:46	16	08:11 (WEA ZB3) 08:27 (WEA ZB3)	07:44 16:41
11	05:12 21:55	05:59 21:08	44	06:56 (WEA ZB1) 07:40 (WEA ZB1)	06:53 19:56			07:47 18:43	13	08:13 (WEA ZB3) 08:26 (WEA ZB3)	07:45 16:39
12	05:13 21:54	06:01 21:05	46	06:55 (WEA ZB1) 07:41 (WEA ZB1)	06:55 19:54			07:48 18:41	10	08:15 (WEA ZB3) 08:25 (WEA ZB3)	07:47 16:37
13	05:14 21:53	06:02 21:03	47	06:55 (WEA ZB1) 07:42 (WEA ZB1)	06:57 19:52	13	08:05 (WEA ZB2) 08:18 (WEA ZB2)	07:50 18:39	6	08:17 (WEA ZB3) 08:23 (WEA ZB3)	07:49 16:36
14	05:15 21:52	06:04 21:01	47	06:54 (WEA ZB1) 07:41 (WEA ZB1)	06:59 19:49	19	08:02 (WEA ZB2) 08:21 (WEA ZB2)	07:52 18:36	2	08:19 (WEA ZB3) 08:21 (WEA ZB3)	07:51 16:34
15	05:17 21:51	06:06 20:59	48	06:54 (WEA ZB1) 07:42 (WEA ZB1)	07:00 19:47	23	08:00 (WEA ZB2) 08:23 (WEA ZB2)	07:54 18:34			07:53 16:32
16	05:18 21:50	06:08 20:57	48	06:53 (WEA ZB1) 07:41 (WEA ZB1)	07:02 19:44	27	07:57 (WEA ZB2) 08:24 (WEA ZB2)	07:56 18:32			07:55 16:31
17	05:19 21:49	06:09 20:55	48	06:53 (WEA ZB1) 07:41 (WEA ZB1)	07:04 19:42	29	07:56 (WEA ZB2) 08:25 (WEA ZB2)	07:58 18:30			07:57 16:29
18	05:21 21:48	06:11 20:53	49	06:53 (WEA ZB1) 07:42 (WEA ZB1)	07:06 19:39	33	07:54 (WEA ZB2) 08:27 (WEA ZB2)	08:00 18:27			07:59 16:28
19	05:22 21:47	06:13 20:51	49	06:52 (WEA ZB1) 07:41 (WEA ZB1)	07:07 19:37	34	07:53 (WEA ZB2) 08:27 (WEA ZB2)	08:01 18:25			08:00 16:27
20	05:23 21:45	06:15 20:48	49	06:52 (WEA ZB1) 07:41 (WEA ZB1)	07:09 19:34	35	07:52 (WEA ZB2) 08:27 (WEA ZB2)	08:03 18:23			08:02 16:25
21	05:25 21:44	06:16 20:46	48	06:53 (WEA ZB1) 07:41 (WEA ZB1)	07:11 19:32	37	07:51 (WEA ZB2) 08:28 (WEA ZB2)	08:05 18:21			08:04 16:24
22	05:26 21:43	06:18 20:44	48	06:52 (WEA ZB1) 07:40 (WEA ZB1)	07:13 19:29	38	07:50 (WEA ZB2) 08:28 (WEA ZB2)	08:07 18:18			08:06 16:23
23	05:28 21:41	06:20 20:42	47	06:52 (WEA ZB1) 07:39 (WEA ZB1)	07:14 19:27	38	07:50 (WEA ZB2) 08:28 (WEA ZB2)	08:09 18:16			08:08 16:21
24	05:29 21:40	06:22 20:39	46	06:53 (WEA ZB1) 07:39 (WEA ZB1)	07:16 19:25	38	07:49 (WEA ZB2) 08:27 (WEA ZB2)	08:11 18:14			08:09 16:20
25	05:31 21:38	06:23 20:37	45	06:53 (WEA ZB1) 07:38 (WEA ZB1)	07:18 19:22	38	07:49 (WEA ZB2) 08:27 (WEA ZB2)	07:13 17:12			08:11 16:19
26	05:32 21:37	06:25 20:35	44	06:53 (WEA ZB1) 07:37 (WEA ZB1)	07:20 19:20	38	07:49 (WEA ZB2) 08:27 (WEA ZB2)	07:15 17:10			08:13 16:18
27	05:34 21:35	06:27 20:32	41	06:55 (WEA ZB1) 07:36 (WEA ZB1)	07:21 19:17	37	07:49 (WEA ZB2) 08:26 (WEA ZB2)	07:17 17:08			08:14 16:17
28	05:36 21:33	06:29 20:30	38	06:56 (WEA ZB1) 07:34 (WEA ZB1)	07:23 19:15	36	07:49 (WEA ZB2) 08:25 (WEA ZB3)	07:19 17:05			08:16 16:16
29	05:37 21:32	06:31 20:28	35	06:58 (WEA ZB1) 07:33 (WEA ZB1)	07:25 19:12	37	07:51 (WEA ZB2) 08:28 (WEA ZB3)	07:20 17:03			08:18 16:15
30	05:39 21:30	06:32 20:25	32	07:00 (WEA ZB1) 07:32 (WEA ZB1)	07:27 19:10	36	07:53 (WEA ZB2) 08:29 (WEA ZB3)	07:22 17:01			08:19 16:14
31	05:40 21:28	06:34 20:23	29	07:01 (WEA ZB1) 07:30 (WEA ZB1)				07:24 16:59			08:46 16:17
Sonnenscheinstunden		511	459		382		329		297	260	234
astr.max.mögl.Beschattung		42	1279		658						

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

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

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO28 - Klein Westerhausen 1

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März		April		Mai		Juni
1	08:45 16:18	08:16 17:09	07:19 18:04	2	07:43 (WEA ZB3) 07:04 07:45 (WEA ZB3) 20:02	66	07:41 (WEA ZB2) 05:55 08:47 (WEA ZB2) 20:57	27	07:51 (WEA ZB2) 05:06 08:18 (WEA ZB2) 21:47
2	08:45 16:20	08:14 17:11	07:16 18:06	10	07:41 (WEA ZB3) 07:02 07:51 (WEA ZB3) 20:04	67	07:40 (WEA ZB2) 05:53 08:47 (WEA ZB2) 20:59	20	07:54 (WEA ZB2) 05:06 08:14 (WEA ZB2) 21:48
3	08:45 16:21	08:12 17:13	07:14 18:08	16	07:38 (WEA ZB3) 06:59 07:54 (WEA ZB3) 20:06	68	07:39 (WEA ZB2) 05:51 08:47 (WEA ZB2) 21:01	11	07:58 (WEA ZB2) 05:05 08:09 (WEA ZB2) 21:49
4	08:45 16:22	08:10 17:15	07:12 18:10	20	07:36 (WEA ZB3) 06:57 07:56 (WEA ZB3) 20:08	69	07:38 (WEA ZB2) 05:49 08:47 (WEA ZB2) 21:03		05:04 21:50
5	08:45 16:23	08:09 17:17	07:09 18:12	24	07:34 (WEA ZB3) 06:54 07:58 (WEA ZB3) 20:10	69	07:38 (WEA ZB2) 05:47 08:47 (WEA ZB2) 21:04		05:03 21:51
6	08:44 16:24	08:07 17:19	07:07 18:14	27	07:31 (WEA ZB3) 06:52 07:58 (WEA ZB3) 20:12	69	07:38 (WEA ZB2) 05:45 08:47 (WEA ZB2) 21:06		05:02 21:52
7	08:44 16:26	08:05 17:21	07:05 18:16	31	07:29 (WEA ZB3) 06:50 08:00 (WEA ZB3) 20:13	69	07:37 (WEA ZB2) 05:43 08:46 (WEA ZB2) 21:08		05:02 21:53
8	08:43 16:27	08:03 17:23	07:02 18:18	34	07:26 (WEA ZB3) 06:47 08:00 (WEA ZB3) 20:15	69	07:37 (WEA ZB2) 05:42 08:46 (WEA ZB2) 21:10		05:01 21:54
9	08:43 16:29	08:01 17:25	07:00 18:20	37	07:24 (WEA ZB3) 06:45 08:01 (WEA ZB3) 20:17	69	07:37 (WEA ZB2) 05:40 08:46 (WEA ZB2) 21:11		05:01 21:55
10	08:42 16:30	07:59 17:27	06:58 18:22	40	07:21 (WEA ZB3) 06:42 08:01 (WEA ZB3) 20:19	69	07:36 (WEA ZB2) 05:38 08:45 (WEA ZB2) 21:13		05:00 21:56
11	08:41 16:32	07:57 17:29	06:55 18:24	40	07:21 (WEA ZB3) 06:40 08:01 (WEA ZB3) 20:21	69	07:36 (WEA ZB2) 05:36 08:45 (WEA ZB2) 21:15		05:00 21:57
12	08:41 16:33	07:55 17:31	06:53 18:25	42	07:20 (WEA ZB3) 06:38 08:02 (WEA ZB3) 20:23	69	07:36 (WEA ZB2) 05:34 08:45 (WEA ZB2) 21:17		04:59 21:58
13	08:40 16:35	07:53 17:33	06:50 18:27	42	07:19 (WEA ZB3) 06:35 08:01 (WEA ZB3) 20:24	68	07:35 (WEA ZB2) 05:33 08:43 (WEA ZB2) 21:18		04:59 21:58
14	08:39 16:36	07:51 17:35	06:48 18:29	43	07:19 (WEA ZB3) 06:33 08:02 (WEA ZB3) 20:26	67	07:36 (WEA ZB2) 05:31 08:43 (WEA ZB2) 21:20		04:59 21:59
15	08:38 16:38	07:49 17:37	06:45 18:31	42	07:19 (WEA ZB3) 06:31 08:01 (WEA ZB3) 20:28	66	07:36 (WEA ZB2) 05:29 08:42 (WEA ZB2) 21:22		04:58 22:00
16	08:37 16:40	07:47 17:39	06:43 18:33	42	07:19 (WEA ZB3) 06:28 08:01 (WEA ZB3) 20:30	65	07:36 (WEA ZB2) 05:27 08:41 (WEA ZB2) 21:23		04:58 22:00
17	08:36 16:41	07:45 17:41	06:41 18:35	42	07:18 (WEA ZB3) 06:26 08:00 (WEA ZB3) 20:32	64	07:36 (WEA ZB2) 05:26 08:40 (WEA ZB2) 21:25		04:58 22:01
18	08:35 16:43	07:43 17:43	06:38 18:37	51	07:08 (WEA ZB2) 06:24 07:59 (WEA ZB3) 20:34	62	07:37 (WEA ZB2) 05:24 08:39 (WEA ZB2) 21:27		04:58 22:01
19	08:34 16:45	07:41 17:45	06:36 18:38	55	07:03 (WEA ZB2) 06:22 07:58 (WEA ZB3) 20:35	62	07:37 (WEA ZB2) 05:23 08:39 (WEA ZB2) 21:28		04:58 22:01
20	08:33 16:47	07:39 17:47	06:33 18:40	57	07:00 (WEA ZB2) 06:19 07:57 (WEA ZB3) 20:37	60	07:38 (WEA ZB2) 05:21 08:38 (WEA ZB2) 21:30		04:58 22:02
21	08:32 16:48	07:37 17:49	06:31 18:42	59	06:57 (WEA ZB2) 06:17 07:56 (WEA ZB3) 20:39	58	07:38 (WEA ZB2) 05:20 08:36 (WEA ZB2) 21:31		04:58 22:02
22	08:30 16:50	07:34 17:51	06:28 18:44	60	06:55 (WEA ZB2) 06:15 07:55 (WEA ZB3) 20:41	57	07:38 (WEA ZB2) 05:18 08:35 (WEA ZB2) 21:33		04:58 22:02
23	08:29 16:52	07:32 17:53	06:26 18:46	61	06:53 (WEA ZB2) 06:13 07:54 (WEA ZB3) 20:43	54	07:39 (WEA ZB2) 05:17 08:33 (WEA ZB2) 21:34		04:59 22:02
24	08:28 16:54	07:30 17:55	06:24 18:48	60	06:51 (WEA ZB2) 06:10 07:51 (WEA ZB3) 20:45	52	07:40 (WEA ZB2) 05:16 08:32 (WEA ZB2) 21:36		04:59 22:02
25	08:26 16:56	07:28 17:57	06:21 18:50	59	06:50 (WEA ZB2) 06:08 07:49 (WEA ZB3) 20:46	50	07:41 (WEA ZB2) 05:14 08:31 (WEA ZB2) 21:37		04:59 22:02
26	08:25 16:58	07:25 17:59	06:19 18:51	59	06:47 (WEA ZB2) 06:06 07:46 (WEA ZB3) 20:48	47	07:42 (WEA ZB2) 05:13 08:29 (WEA ZB2) 21:39		05:00 22:02
27	08:23 17:00	07:23 18:01	06:16 18:53	58	06:47 (WEA ZB2) 06:04 07:45 (WEA ZB2) 20:50	43	07:44 (WEA ZB2) 05:12 08:27 (WEA ZB2) 21:40		05:00 22:02
28	08:22 17:01	07:21 18:03	06:14 18:55	60	06:45 (WEA ZB2) 06:02 07:45 (WEA ZB2) 20:52	40	07:45 (WEA ZB2) 05:11 08:25 (WEA ZB2) 21:42		05:01 22:02
29	08:20 17:03		07:11 19:57	62	07:44 (WEA ZB2) 06:00 08:46 (WEA ZB2) 20:54	36	07:47 (WEA ZB2) 05:10 08:23 (WEA ZB2) 21:43		05:01 22:02
30	08:19 17:05		07:09 19:59	64	07:42 (WEA ZB2) 05:57 08:46 (WEA ZB2) 20:55	33	07:48 (WEA ZB2) 05:08 08:21 (WEA ZB2) 21:44		05:02 22:02
31	08:17 17:07		07:07 20:01	65	07:42 (WEA ZB2) 05:55 08:47 (WEA ZB2) 20:55		05:07 21:45		
Sonnenscheinstunden	251	274	367		419		493		509
astr.max.mögl.Beschattung			1364		1806		58		

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)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO28 - Klein Westerhausen 1

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Jul	August	September	Oktober	November	Dezember
1	05:03 22:01	05:42 21:27	06:36 20:21	07:35 (WEA ZB2) 19:07	07:59 (WEA ZB3) 16:57	08:21 16:13
2	05:03 22:01	05:44 21:25	06:38 20:18	07:35 (WEA ZB2) 19:05	07:59 (WEA ZB3) 16:55	08:22 16:13
3	05:04 22:01	05:45 21:23	06:39 20:16	07:34 (WEA ZB2) 19:03	07:59 (WEA ZB3) 16:53	08:24 16:12
4	05:05 22:00	05:47 21:21	06:41 20:13	07:34 (WEA ZB2) 19:00	08:00 (WEA ZB3) 16:52	08:25 16:11
5	05:06 22:00	05:49 21:19	06:43 20:11	07:34 (WEA ZB2) 18:58	08:02 (WEA ZB3) 16:50	08:27 16:11
6	05:07 21:59	05:50 21:17	06:45 20:09	07:33 (WEA ZB2) 18:55	08:04 (WEA ZB3) 16:48	08:28 16:10
7	05:08 21:58	05:52 21:15	06:46 20:06	07:33 (WEA ZB2) 18:53	08:06 (WEA ZB3) 16:46	08:29 16:10
8	05:09 21:58	05:54 21:14	06:48 20:04	07:33 (WEA ZB2) 18:51	08:08 (WEA ZB3) 16:44	08:31 16:09
9	05:10 21:57	05:56 21:12	06:50 20:01	07:33 (WEA ZB2) 18:48	08:10 (WEA ZB3) 16:42	08:32 16:09
10	05:11 21:56	05:57 21:10	06:52 19:59	07:33 (WEA ZB2) 18:46	08:11 (WEA ZB3) 16:41	08:33 16:09
11	05:12 21:55	05:59 21:08	06:53 19:56	07:33 (WEA ZB2) 18:43	08:13 (WEA ZB3) 16:39	08:34 16:09
12	05:13 21:54	06:01 21:05	06:55 19:54	07:34 (WEA ZB2) 18:41	08:15 (WEA ZB3) 16:37	08:35 16:08
13	05:14 21:53	06:02 21:03	06:57 19:52	07:33 (WEA ZB2) 18:39	08:23 (WEA ZB3) 16:36	08:36 16:08
14	05:15 21:52	06:04 21:01	06:59 19:49	07:34 (WEA ZB2) 18:36	08:26 (WEA ZB3) 16:34	08:37 16:08
15	05:17 21:51	06:06 20:59	07:00 19:47	07:35 (WEA ZB2) 18:34	08:28 (WEA ZB3) 16:32	08:38 16:08
16	05:18 21:50	06:08 20:57	07:02 19:44	07:35 (WEA ZB2) 18:32	08:30 (WEA ZB3) 16:31	08:39 16:08
17	05:19 21:49	06:09 20:55	07:04 19:42	07:36 (WEA ZB2) 18:30	08:32 (WEA ZB3) 16:29	08:40 16:08
18	05:21 21:48	06:11 20:53	07:06 19:39	07:37 (WEA ZB2) 18:27	08:34 (WEA ZB3) 16:28	08:41 16:09
19	05:22 21:47	06:13 20:50	07:07 19:37	07:38 (WEA ZB2) 18:25	08:36 (WEA ZB3) 16:27	08:41 16:09
20	05:23 21:45	06:15 20:48	07:09 19:34	07:38 (WEA ZB2) 18:23	08:38 (WEA ZB3) 16:25	08:42 16:09
21	05:25 21:44	06:16 20:46	07:11 19:32	07:40 (WEA ZB2) 18:21	08:40 (WEA ZB3) 16:24	08:43 16:10
22	05:26 21:43	06:18 20:44	07:13 19:29	07:42 (WEA ZB2) 18:18	08:42 (WEA ZB3) 16:23	08:43 16:10
23	05:28 21:41	06:20 20:42	07:14 19:27	07:43 (WEA ZB2) 18:16	08:44 (WEA ZB3) 16:21	08:44 16:11
24	05:29 21:40	06:22 20:39	07:16 19:25	07:46 (WEA ZB2) 18:14	08:46 (WEA ZB3) 16:20	08:44 16:11
25	05:31 21:38	06:23 20:37	07:18 19:22	07:49 (WEA ZB2) 18:12	08:48 (WEA ZB3) 16:19	08:45 16:12
26	05:32 21:37	06:25 20:35	07:20 19:20	07:55 (WEA ZB2) 18:10	08:50 (WEA ZB3) 16:18	08:45 16:13
27	05:34 21:35	06:27 20:32	07:21 19:17	08:01 (WEA ZB3) 18:08	08:52 (WEA ZB3) 16:17	08:45 16:13
28	05:36 21:33	06:29 20:30	07:23 19:15	07:59 (WEA ZB3) 18:06	08:54 (WEA ZB3) 16:16	08:45 16:14
29	05:37 21:32	06:30 20:28	07:25 19:12	07:59 (WEA ZB3) 18:03	08:56 (WEA ZB3) 16:15	08:45 16:15
30	05:39 21:30	06:32 20:25	07:27 19:10	07:59 (WEA ZB3) 18:01	08:58 (WEA ZB3) 16:14	08:46 16:16
31	05:40 21:28	06:34 20:23	07:35 (WEA ZB2) 18:44 (WEA ZB2)	07:24 16:59		08:45 16:17
Sonnenscheinstunden	511	459	382	329	260	234
astr.max.mögl.Beschattung		1125	1799	344		

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO29 - Depenhäusen 1

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April		Mai		Juni	
1	08:45 16:18	08:16 17:09	07:19 18:05	07:04 20:02		05:55 20:57		05:06 21:47	05:46 (WEA ZB2)
2	08:45 16:20	08:14 17:11	07:16 18:06	07:02 20:04		05:53 20:59	22	06:48 (WEA ZB3) 06:50 (WEA ZB3)	05:46 (WEA ZB2)
3	08:45 16:21	08:12 17:13	07:14 18:08	06:59 20:06		05:51 21:01	18	07:08 (WEA ZB3) 06:52 (WEA ZB3)	05:45 (WEA ZB2)
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08		05:49 21:03	13	07:05 (WEA ZB3) 06:56 (WEA ZB3)	05:46 (WEA ZB2)
5	08:45 16:23	08:09 17:17	07:09 18:12	06:54 20:10		05:47 21:04	5	07:01 (WEA ZB3)	05:46 (WEA ZB2)
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:12		05:45 21:06		05:03 21:51	05:46 (WEA ZB2)
7	08:44 16:26	08:05 17:21	07:05 18:16	06:50 20:13		05:44 21:08		05:02 21:53	05:47 (WEA ZB2)
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15		05:42 21:10		05:01 21:54	05:47 (WEA ZB2)
9	08:43 16:29	08:01 17:25	07:00 18:20	06:45 20:17		05:40 21:11		06:06 (WEA ZB2) 06:12 (WEA ZB2)	05:47 (WEA ZB2)
10	08:42 16:30	07:59 17:27	06:58 18:22	06:42 20:19	3	07:06 (WEA ZB3) 07:09 (WEA ZB3)	6	06:05 (WEA ZB2) 06:16 (WEA ZB2)	05:47 (WEA ZB2)
11	08:41 16:32	07:57 17:29	06:55 18:24	06:40 20:21	8	07:04 (WEA ZB3) 07:12 (WEA ZB3)	11	06:03 (WEA ZB2) 06:18 (WEA ZB2)	05:47 (WEA ZB2)
12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:23	12	07:02 (WEA ZB3) 07:14 (WEA ZB3)	15	06:01 (WEA ZB2) 06:20 (WEA ZB2)	05:47 (WEA ZB2)
13	08:40 16:35	07:53 17:33	06:50 18:27	06:35 20:24	16	06:59 (WEA ZB3) 07:15 (WEA ZB3)	19	06:00 (WEA ZB2) 06:22 (WEA ZB2)	05:48 (WEA ZB2)
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	19	06:57 (WEA ZB3) 07:16 (WEA ZB3)	22	05:58 (WEA ZB2) 06:22 (WEA ZB2)	05:48 (WEA ZB2)
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	22	06:55 (WEA ZB3) 07:17 (WEA ZB3)	24	05:57 (WEA ZB2) 06:24 (WEA ZB2)	05:49 (WEA ZB2)
16	08:37 16:40	07:47 17:39	06:43 18:33	06:28 20:30	25	06:52 (WEA ZB3) 07:17 (WEA ZB3)	27	05:55 (WEA ZB2) 06:24 (WEA ZB2)	05:49 (WEA ZB2)
17	08:36 16:41	07:45 17:41	06:41 18:35	06:26 20:32	28	06:50 (WEA ZB3) 07:18 (WEA ZB3)	29	05:54 (WEA ZB2) 06:26 (WEA ZB2)	05:49 (WEA ZB2)
18	08:35 16:43	07:43 17:43	06:38 18:37	06:24 20:34	30	06:48 (WEA ZB3) 07:18 (WEA ZB3)	32	05:52 (WEA ZB2) 06:26 (WEA ZB2)	05:49 (WEA ZB2)
19	08:34 16:45	07:41 17:45	06:36 18:39	06:22 20:35	32	06:46 (WEA ZB3) 07:18 (WEA ZB3)	34	05:51 (WEA ZB2) 06:27 (WEA ZB2)	05:50 (WEA ZB2)
20	08:33 16:47	07:39 17:47	06:33 18:40	06:19 20:37	33	06:45 (WEA ZB3) 07:18 (WEA ZB3)	36	05:50 (WEA ZB2) 06:28 (WEA ZB2)	05:50 (WEA ZB2)
21	08:32 16:48	07:37 17:49	06:31 18:42	06:17 20:39	34	06:43 (WEA ZB3) 07:17 (WEA ZB3)	38	05:48 (WEA ZB2) 06:28 (WEA ZB2)	05:50 (WEA ZB2)
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	34	06:43 (WEA ZB3) 07:17 (WEA ZB3)	40	05:47 (WEA ZB2) 06:28 (WEA ZB2)	05:50 (WEA ZB2)
23	08:29 16:52	07:32 17:53	06:26 18:46	06:13 20:43	34	06:43 (WEA ZB3) 07:17 (WEA ZB3)	41	05:46 (WEA ZB2) 06:29 (WEA ZB2)	05:50 (WEA ZB2)
24	08:28 16:54	07:30 17:55	06:24 18:48	06:10 20:45	34	06:44 (WEA ZB3) 07:17 (WEA ZB3)	43	05:46 (WEA ZB2) 06:30 (WEA ZB2)	05:50 (WEA ZB2)
25	08:26 16:56	07:28 17:57	06:21 18:50	06:08 20:46	33	06:44 (WEA ZB3) 07:16 (WEA ZB3)	44	05:46 (WEA ZB2) 06:30 (WEA ZB2)	05:50 (WEA ZB2)
26	08:25 16:58	07:25 17:59	06:19 18:51	06:06 20:48	32	06:44 (WEA ZB3) 07:15 (WEA ZB3)	44	05:45 (WEA ZB2) 06:30 (WEA ZB2)	05:51 (WEA ZB2)
27	08:23 17:00	07:23 18:01	06:16 18:53	06:04 20:50	31	06:45 (WEA ZB3) 07:15 (WEA ZB3)	45	05:45 (WEA ZB2) 06:30 (WEA ZB2)	05:51 (WEA ZB2)
28	08:22 17:01	07:21 18:03	06:14 18:55	06:02 20:52	30	06:45 (WEA ZB3) 07:14 (WEA ZB3)	45	05:45 (WEA ZB2) 06:30 (WEA ZB2)	05:51 (WEA ZB2)
29	08:20 17:03		07:11 19:57	06:00 20:54	29	06:46 (WEA ZB3) 07:13 (WEA ZB3)	45	05:45 (WEA ZB2) 06:30 (WEA ZB2)	05:51 (WEA ZB2)
30	08:19 17:05		07:09 19:59	05:58 20:55	27	06:47 (WEA ZB3) 07:11 (WEA ZB3)	45	05:46 (WEA ZB2) 05:46 (WEA ZB2)	05:52 (WEA ZB2)
31	08:17 17:07		07:07 20:01		24		46	06:32 (WEA ZB2) 05:46 (WEA ZB2)	06:38 (WEA ZB2)
Sonnenscheinstunden	251	274	367	419		493		509	
astr.max.mögl.Beschattung				536		835		1375	

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)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO29 - Depenhäusen 1

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli			August			September			Oktober		November		Dezember	
1	05:03		05:51 (WEA ZB2)	05:42		06:12 (WEA ZB2)	06:36		07:03 (WEA ZB3)	07:29		07:26		08:21	
	22:01	46	06:37 (WEA ZB2)	21:27	17	06:29 (WEA ZB2)	20:21	8	07:11 (WEA ZB3)	19:07		16:57		16:14	
2	05:03		05:52 (WEA ZB2)	05:44		06:14 (WEA ZB2)	06:38		07:05 (WEA ZB3)	07:30		07:28		08:22	
	22:01	46	06:38 (WEA ZB2)	21:25	14	06:28 (WEA ZB2)	20:18	3	07:08 (WEA ZB3)	19:05		16:55		16:13	
3	05:04		05:52 (WEA ZB2)	05:45		06:16 (WEA ZB2)	06:39			07:32		07:30		08:24	
	22:01	46	06:38 (WEA ZB2)	21:23	9	06:25 (WEA ZB2)	20:16			19:03		16:53		16:12	
4	05:05		05:52 (WEA ZB2)	05:47		06:17 (WEA ZB2)	06:41			07:34		07:32		08:25	
	22:00	47	06:39 (WEA ZB2)	21:21	2	06:19 (WEA ZB2)	20:13			19:00		16:52		16:11	
5	05:06		05:52 (WEA ZB2)	05:49			06:43			07:36		07:34		08:27	
	22:00	46	06:38 (WEA ZB2)	21:19			20:11			18:58		16:50		16:11	
6	05:07		05:52 (WEA ZB2)	05:50			06:45			07:38		07:36		08:28	
	21:59	46	06:38 (WEA ZB2)	21:17			20:09			18:55		16:48		16:10	
7	05:08		05:52 (WEA ZB2)	05:52			06:46			07:39		07:38		08:29	
	21:58	47	06:39 (WEA ZB2)	21:15			20:06			18:53		16:46		16:10	
8	05:09		05:53 (WEA ZB2)	05:54			06:48			07:41		07:40		08:31	
	21:58	46	06:39 (WEA ZB2)	21:14			20:04			18:51		16:44		16:09	
9	05:10		05:53 (WEA ZB2)	05:56		07:03 (WEA ZB3)	06:50			07:43		07:42		08:32	
	21:57	46	06:39 (WEA ZB2)	21:12	9	07:12 (WEA ZB3)	20:01			18:48		16:42		16:09	
10	05:11		05:53 (WEA ZB2)	05:57		07:00 (WEA ZB3)	06:52			07:45		07:44		08:33	
	21:56	46	06:39 (WEA ZB2)	21:10	15	07:15 (WEA ZB3)	19:59			18:46		16:41		16:09	
11	05:12		05:53 (WEA ZB2)	05:59		06:58 (WEA ZB3)	06:53			07:47		07:45		08:34	
	21:55	46	06:39 (WEA ZB2)	21:08	19	07:17 (WEA ZB3)	19:56			18:43		16:39		16:09	
12	05:13		05:53 (WEA ZB2)	06:01		06:56 (WEA ZB3)	06:55			07:48		07:47		08:35	
	21:54	46	06:39 (WEA ZB2)	21:05	23	07:19 (WEA ZB3)	19:54			18:41		16:37		16:08	
13	05:14		05:53 (WEA ZB2)	06:02		06:55 (WEA ZB3)	06:57			07:50		07:49		08:36	
	21:53	46	06:39 (WEA ZB2)	21:03	25	07:20 (WEA ZB3)	19:52			18:39		16:36		16:08	
14	05:15		05:55 (WEA ZB2)	06:04		06:53 (WEA ZB3)	06:59			07:52		07:51		08:37	
	21:52	45	06:40 (WEA ZB2)	21:01	27	07:20 (WEA ZB3)	19:49			18:36		16:34		16:08	
15	05:17		05:55 (WEA ZB2)	06:06		06:53 (WEA ZB3)	07:00			07:54		07:53		08:38	
	21:51	45	06:40 (WEA ZB2)	20:59	29	07:22 (WEA ZB3)	19:47			18:34		16:32		16:08	
16	05:18		05:55 (WEA ZB2)	06:08		06:51 (WEA ZB3)	07:02			07:56		07:55		08:39	
	21:50	45	06:40 (WEA ZB2)	20:57	30	07:21 (WEA ZB3)	19:44			18:32		16:31		16:08	
17	05:19		05:55 (WEA ZB2)	06:09		06:51 (WEA ZB3)	07:04			07:58		07:57		08:40	
	21:49	44	06:39 (WEA ZB2)	20:55	31	07:22 (WEA ZB3)	19:42			18:30		16:29		16:09	
18	05:21		05:55 (WEA ZB2)	06:11		06:50 (WEA ZB3)	07:06			08:00		07:59		08:41	
	21:48	44	06:39 (WEA ZB2)	20:53	33	07:23 (WEA ZB3)	19:39			18:27		16:28		16:09	
19	05:22		05:56 (WEA ZB2)	06:13		06:49 (WEA ZB3)	07:07			08:01		08:00		08:41	
	21:47	43	06:39 (WEA ZB2)	20:50	33	07:22 (WEA ZB3)	19:37			18:25		16:27		16:09	
20	05:23		05:56 (WEA ZB2)	06:15		06:49 (WEA ZB3)	07:09			08:03		08:02		08:42	
	21:45	43	06:39 (WEA ZB2)	20:48	34	07:23 (WEA ZB3)	19:34			18:23		16:25		16:09	
21	05:25		05:56 (WEA ZB2)	06:16		06:49 (WEA ZB3)	07:11			08:05		08:04		08:43	
	21:44	42	06:38 (WEA ZB2)	20:46	34	07:23 (WEA ZB3)	19:32			18:21		16:24		16:10	
22	05:26		05:58 (WEA ZB2)	06:18		06:48 (WEA ZB3)	07:13			08:07		08:06		08:43	
	21:43	41	06:39 (WEA ZB2)	20:44	34	07:22 (WEA ZB3)	19:29			18:18		16:23		16:10	
23	05:28		05:59 (WEA ZB2)	06:20		06:48 (WEA ZB3)	07:14			08:09		08:07		08:44	
	21:41	39	06:38 (WEA ZB2)	20:42	34	07:22 (WEA ZB3)	19:27			18:16		16:21		16:11	
24	05:29		06:01 (WEA ZB2)	06:22		06:50 (WEA ZB3)	07:16			08:11		08:09		08:44	
	21:40	37	06:38 (WEA ZB2)	20:39	32	07:22 (WEA ZB3)	19:25			18:14		16:20		16:11	
25	05:31		06:02 (WEA ZB2)	06:23		06:51 (WEA ZB3)	07:18			07:13		08:11		08:45	
	21:38	35	06:37 (WEA ZB2)	20:37	30	07:21 (WEA ZB3)	19:22			17:12		16:19		16:12	
26	05:32		06:03 (WEA ZB2)	06:25		06:53 (WEA ZB3)	07:20			07:15		08:13		08:45	
	21:37	33	06:36 (WEA ZB2)	20:35	27	07:20 (WEA ZB3)	19:20			17:10		16:18		16:13	
27	05:34		06:05 (WEA ZB2)	06:27		06:55 (WEA ZB3)	07:21			07:17		08:14		08:45	
	21:35	31	06:36 (WEA ZB2)	20:32	25	07:20 (WEA ZB3)	19:17			17:08		16:17		16:13	
28	05:36		06:06 (WEA ZB2)	06:29		06:56 (WEA ZB3)	07:23			07:19		08:16		08:45	
	21:33	28	06:34 (WEA ZB2)	20:30	22	07:18 (WEA ZB3)	19:15			17:06		16:16		16:14	
29	05:37		06:08 (WEA ZB2)	06:31		06:58 (WEA ZB3)	07:25			07:20		08:18		08:45	
	21:32	26	06:34 (WEA ZB2)	20:28	19	07:17 (WEA ZB3)	19:12			17:03		16:15		16:15	
30	05:39		06:09 (WEA ZB2)	06:32		07:00 (WEA ZB3)	07:27			07:22		08:19		08:45	
	21:30	23	06:32 (WEA ZB2)	20:25	16	07:16 (WEA ZB3)	19:10			17:01		16:14		16:16	
31	05:40		06:11 (WEA ZB2)	06:34		07:01 (WEA ZB3)				07:24				08:45	
	21:28	20	06:31 (WEA ZB2)	20:23	12	07:13 (WEA ZB3)				16:59				16:17	
Sonnenscheinstunden		511		459			382			329		260		235	
astr.max.mögl.Beschattung		1264		635			11								

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO3 - Utwarfe 3

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:44 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:26 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:08	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:26	08:05 17:21	07:04 18:16	06:49 20:13	05:43 21:08	05:01 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:58	05:54 21:13	06:48 20:04	07:41 18:50	07:40 16:44	08:30 16:09
9	08:43 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	05:09 21:57	05:55 21:11	06:50 20:01	07:43 18:48	07:41 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	05:11 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:46 18:43	07:45 16:39	08:34 16:08
12	08:40 16:33	07:55 17:31	06:53 18:25	06:38 20:22	05:34 21:17	04:59 21:57	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:35	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 21:59	05:16 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:08 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:40 18:35	06:26 20:32	05:26 21:25	04:58 22:00	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:36	06:24 20:33	05:24 21:27	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	07:59 18:27	07:58 16:28	08:41 16:09
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:23 21:28	04:58 22:01	05:22 21:46	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:15 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:31 16:48	07:36 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:10
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:42	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:59 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:11
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:44 16:12
26	08:25 16:57	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	05:32 21:37	06:25 20:35	07:19 19:19	07:15 17:10	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:16 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:10 21:41	05:01 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:17 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:45 16:16
31	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.Beschattung												

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) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO30 - Purkswarfe 2
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:03 22:01	05:42 21:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:14
2	08:45 16:20	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:06 21:48	05:03 22:01	05:44 21:25	06:38 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:21	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:05 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:03	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:52	08:25 16:11
5	08:44 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:50	08:27 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:12	05:45 21:06	05:02 21:52	05:07 21:59	05:50 21:17	06:45 20:09	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:26	08:05 17:21	07:05 18:16	06:50 20:13	05:44 21:08	05:02 21:53	05:08 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:42 21:10	05:01 21:54	05:09 21:58	05:54 21:13	06:48 20:04	07:41 18:51	07:40 16:44	08:31 16:09
9	08:43 16:29	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:01 21:55	05:10 21:57	05:56 21:12	06:50 20:01	07:43 18:48	07:42 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	05:11 21:56	05:57 21:09	06:52 19:59	07:45 18:46	07:43 16:41	08:33 16:09
11	08:41 16:32	07:57 17:29	06:55 18:24	06:40 20:21	05:36 21:15	05:00 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:47 18:43	07:45 16:39	08:34 16:09
12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:23	05:34 21:17	04:59 21:58	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:35	07:53 17:33	06:50 18:27	06:35 20:24	05:33 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:52	07:50 18:39	07:49 16:36	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:59 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 21:59	05:17 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:40	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:08 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:41 18:35	06:26 20:32	05:26 21:25	04:58 22:00	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:30	07:57 16:29	08:40 16:09
18	08:35 16:43	07:43 17:43	06:38 18:37	06:24 20:34	05:24 21:27	04:58 22:01	05:21 21:48	06:11 20:53	07:05 19:39	08:00 18:27	07:58 16:28	08:41 16:09
19	08:34 16:45	07:41 17:45	06:36 18:38	06:22 20:35	05:23 21:28	04:58 22:01	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:27	08:41 16:09
20	08:33 16:47	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:15 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:37 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:21	08:04 16:24	08:43 16:10
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:42	06:18 20:44	07:13 19:29	08:07 18:18	08:06 16:23	08:43 16:10
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31	08:17 17:07		07:07 20:01		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	419	493	509	511	459	382	329	260	235
astr.max.mögl.Beschattung												

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) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO31 - Purkswarfe 3
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:03 22:01	05:42 21:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:20	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:06 21:48	05:03 22:01	05:44 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
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5	08:44 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:50	08:26 16:11
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22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:42	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:23	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:13 20:43	05:17 21:34	04:59 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:11
24	08:28 16:54	07:30 17:55	06:24 18:48	06:10 20:44	05:16 21:36	04:59 22:02	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:50	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:44 16:12
26	08:25 16:58	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	05:32 21:37	06:25 20:35	07:20 19:20	07:15 17:10	08:13 16:18	08:45 16:13
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28	08:22 17:01	07:21 18:03	06:14 18:55	06:02 20:52	05:11 21:41	05:01 22:02	05:36 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
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30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:45 16:16
31	08:17 17:07		07:06 20:01		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	419	493	509	511	459	382	329	260	235
astr.max.mögl.Beschattung												

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

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix.Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 15:56/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO32 - Putzwei 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	June	July	August	September	Oktober	November	Dezember		
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	20:55 (WEA ZB2) 21:13 (WEA ZB2)	05:03 22:01	20:54 (WEA ZB2) 21:26 (WEA ZB2)	05:42 21:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
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3	08:45 16:21	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:05 21:49	20:52 (WEA ZB2) 21:14 (WEA ZB2)	05:04 22:01	20:55 (WEA ZB2) 21:25 (WEA ZB2)	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
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10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	20:50 (WEA ZB2) 21:21 (WEA ZB2)	05:11 21:56	21:00 (WEA ZB2) 21:21 (WEA ZB2)	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:41	08:33 16:09
11	08:41 16:32	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	05:00 21:57	20:50 (WEA ZB2) 21:21 (WEA ZB2)	05:12 21:55	21:01 (WEA ZB2) 21:20 (WEA ZB2)	05:59 21:07	06:53 19:56	07:47 18:43	07:45 16:39	08:34 16:08
12	08:40 16:33	07:55 17:31	06:53 18:25	06:38 20:23	05:34 21:17	04:59 21:57	20:50 (WEA ZB2) 21:22 (WEA ZB2)	05:13 21:54	21:03 (WEA ZB2) 21:20 (WEA ZB2)	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
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24	08:28 16:54	07:30 17:55	06:24 18:48	06:10 20:44	05:16 21:36	04:59 22:02	20:52 (WEA ZB2) 21:27 (WEA ZB2)	05:29 21:40	20:42 21:40	07:16 19:29	08:11 18:14	08:09 16:20	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	20:52 (WEA ZB2) 21:27 (WEA ZB2)	05:31 21:38	20:43 21:38	07:18 19:22	08:13 17:12	08:11 16:19	08:11 16:19	08:44 16:12
26	08:25 16:58	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	20:53 (WEA ZB2) 21:27 (WEA ZB2)	05:32 21:37	20:35 21:37	07:20 19:20	07:15 17:10	08:13 16:18	08:13 16:18	08:45 16:13
27	08:23 16:59	07:23 18:01	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	20:52 (WEA ZB2) 21:27 (WEA ZB2)	05:34 21:35	20:35 21:32	07:21 19:17	07:17 17:08	08:14 16:17	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:11 21:41	05:01 22:02	20:53 (WEA ZB2) 21:27 (WEA ZB2)	05:35 21:33	20:29 21:30	07:23 19:15	07:18 17:05	08:16 16:16	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	06:00 20:54	05:09 21:43	05:01 22:02	20:58 (WEA ZB2) 21:09 (WEA ZB2)	05:37 22:02	20:30 21:26	07:25 19:12	07:20 17:03	08:17 16:15	08:17 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	20:56 (WEA ZB2) 21:10 (WEA ZB2)	05:39 22:02	20:32 21:26	07:27 19:10	07:22 17:01	08:19 16:14	08:19 16:14	08:45 16:16
31	08:17 17:07		07:06 20:01	05:07 21:45	05:07 21:45	05:02 21:45	20:56 (WEA ZB2) 21:12 (WEA ZB2)	05:40 21:28	20:25 21:28	19:10 20:23	17:01 16:59	16:14 16:59	16:14 16:59	16:16 16:17
Sonnenscheinstunden	251	274	367	419	493	509	511	511	459	382	329	260	235	
astr.max.mögl.Beschattung					47	932		346						

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO33 - Westerhausen 5
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar		Februar		März		April		Mai		Juni	
1	08:45	08:16			07:19	16:04 (WEA ZB3)	07:04	16:58 (WEA ZB3)	05:55	19:57 (WEA ZB1)	05:06	20:06 (WEA ZB1)
	16:18	17:09			18:04	76 17:20 (WEA ZB3)	20:02	120 19:34 (WEA ZB2)	20:57	31 20:28 (WEA ZB1)	21:47	20:26 (WEA ZB1)
2	08:45	08:14			07:16	16:03 (WEA ZB3)	07:02	16:59 (WEA ZB3)	05:53	19:56 (WEA ZB1)	05:05	20:07 (WEA ZB1)
	16:19	17:11			18:06	78 17:21 (WEA ZB3)	20:04	121 19:35 (WEA ZB2)	20:59	33 20:29 (WEA ZB1)	21:48	20:24 (WEA ZB1)
3	08:45	08:12			07:14	16:02 (WEA ZB3)	06:59	17:01 (WEA ZB3)	05:51	19:55 (WEA ZB1)	05:05	20:08 (WEA ZB1)
	16:21	17:13			18:08	79 17:21 (WEA ZB3)	20:06	120 19:36 (WEA ZB2)	21:01	36 20:31 (WEA ZB1)	21:49	20:23 (WEA ZB1)
4	08:45	08:10			07:12	16:01 (WEA ZB3)	06:57	17:01 (WEA ZB3)	05:49	19:55 (WEA ZB1)	05:04	20:10 (WEA ZB1)
	16:22	17:15			18:10	81 17:22 (WEA ZB3)	20:08	119 19:36 (WEA ZB2)	21:03	37 20:32 (WEA ZB1)	21:50	20:22 (WEA ZB1)
5	08:44	08:09			07:09	15:59 (WEA ZB3)	06:54	17:03 (WEA ZB3)	05:47	19:54 (WEA ZB1)	05:03	20:12 (WEA ZB1)
	16:23	17:17			18:12	83 17:22 (WEA ZB3)	20:10	117 19:36 (WEA ZB2)	21:04	40 20:34 (WEA ZB1)	21:51	20:20 (WEA ZB1)
6	08:44	08:07			07:07	15:59 (WEA ZB3)	06:52	17:05 (WEA ZB3)	05:45	19:54 (WEA ZB1)	05:02	
	16:24	17:19			18:14	84 17:23 (WEA ZB3)	20:12	114 19:37 (WEA ZB2)	21:06	41 20:35 (WEA ZB1)	21:52	
7	08:44	08:05			07:05	15:59 (WEA ZB3)	06:50	17:06 (WEA ZB3)	05:43	19:54 (WEA ZB1)	05:02	
	16:26	17:21			18:16	85 17:24 (WEA ZB3)	20:13	111 19:36 (WEA ZB2)	21:08	41 20:35 (WEA ZB1)	21:53	
8	08:43	08:03			07:02	15:57 (WEA ZB3)	06:47	17:08 (WEA ZB3)	05:42	19:53 (WEA ZB1)	05:01	
	16:27	17:23			18:18	86 17:23 (WEA ZB3)	20:15	108 19:37 (WEA ZB2)	21:10	42 20:35 (WEA ZB1)	21:54	
9	08:43	08:01			07:00	15:57 (WEA ZB3)	06:45	17:09 (WEA ZB3)	05:40	19:53 (WEA ZB1)	05:00	
	16:29	17:25			18:20	87 17:24 (WEA ZB3)	20:17	105 19:36 (WEA ZB2)	21:11	41 20:34 (WEA ZB1)	21:55	
10	08:42	07:59			06:57	15:56 (WEA ZB3)	06:42	17:12 (WEA ZB3)	05:38	19:53 (WEA ZB1)	05:00	
	16:30	17:27			18:22	88 17:24 (WEA ZB3)	20:19	100 19:36 (WEA ZB2)	21:13	42 20:35 (WEA ZB1)	21:56	
11	08:41	07:57			06:55	15:56 (WEA ZB3)	06:40	17:15 (WEA ZB3)	05:36	19:53 (WEA ZB1)	05:00	
	16:31	17:29			18:23	88 17:24 (WEA ZB3)	20:21	94 19:36 (WEA ZB2)	21:15	42 20:35 (WEA ZB1)	21:57	
12	08:41	07:55			06:53	15:54 (WEA ZB3)	06:38	17:17 (WEA ZB3)	05:34	19:53 (WEA ZB1)	04:59	
	16:33	17:31			18:25	90 17:24 (WEA ZB3)	20:23	89 19:35 (WEA ZB2)	21:17	41 20:34 (WEA ZB1)	21:57	
13	08:40	07:53			06:50	15:54 (WEA ZB3)	06:35	17:21 (WEA ZB3)	05:32	19:53 (WEA ZB1)	04:59	
	16:35	17:33			18:27	90 17:24 (WEA ZB3)	20:24	81 19:35 (WEA ZB2)	21:18	42 20:35 (WEA ZB1)	21:58	
14	08:39	07:51			06:48	15:55 (WEA ZB3)	06:33	17:27 (WEA ZB3)	05:31	19:53 (WEA ZB1)	04:59	
	16:36	17:35			18:29	90 17:25 (WEA ZB3)	20:26	68 19:34 (WEA ZB2)	21:20	41 20:34 (WEA ZB1)	21:59	
15	08:38	07:49			06:45	15:54 (WEA ZB3)	06:31	18:42 (WEA ZB2)	05:29	19:54 (WEA ZB1)	04:58	
	16:38	17:37			18:31	90 17:24 (WEA ZB3)	20:28	52 19:34 (WEA ZB2)	21:22	41 20:35 (WEA ZB1)	21:59	
16	08:37	07:47	16:35 (WEA ZB3)		06:43	15:54 (WEA ZB3)	06:28	18:42 (WEA ZB2)	05:27	19:54 (WEA ZB1)	04:58	
	16:40	17:39	17 16:52 (WEA ZB3)		18:33	90 17:24 (WEA ZB3)	20:30	51 19:33 (WEA ZB2)	21:23	40 20:34 (WEA ZB1)	22:00	
17	08:36	07:45	16:30 (WEA ZB3)		06:41	15:53 (WEA ZB3)	06:26	18:42 (WEA ZB2)	05:26	19:54 (WEA ZB1)	04:58	
	16:41	17:41	28 16:58 (WEA ZB3)		18:35	90 17:23 (WEA ZB3)	20:32	50 19:32 (WEA ZB2)	21:25	40 20:34 (WEA ZB1)	22:00	
18	08:35	07:43	16:25 (WEA ZB3)		06:38	15:53 (WEA ZB3)	06:24	18:43 (WEA ZB2)	05:24	19:54 (WEA ZB1)	04:58	
	16:43	17:43	36 17:01 (WEA ZB3)		18:37	91 17:24 (WEA ZB3)	20:33	48 19:31 (WEA ZB2)	21:27	39 20:33 (WEA ZB1)	22:01	
19	08:34	07:41	16:22 (WEA ZB3)		06:36	15:53 (WEA ZB3)	06:21	18:44 (WEA ZB2)	05:23	19:55 (WEA ZB1)	04:58	
	16:45	17:45	42 17:04 (WEA ZB3)		18:38	90 17:23 (WEA ZB3)	20:35	47 19:31 (WEA ZB2)	21:28	38 20:33 (WEA ZB1)	22:01	
20	08:33	07:39	16:20 (WEA ZB3)		06:33	15:53 (WEA ZB3)	06:19	18:44 (WEA ZB2)	05:21	19:56 (WEA ZB1)	04:58	
	16:46	17:47	47 17:07 (WEA ZB3)		18:40	90 17:23 (WEA ZB3)	20:37	46 19:30 (WEA ZB2)	21:30	37 20:33 (WEA ZB1)	22:02	
21	08:32	07:37	16:18 (WEA ZB3)		06:31	15:53 (WEA ZB3)	06:17	18:44 (WEA ZB2)	05:20	19:56 (WEA ZB1)	04:58	
	16:48	17:49	51 17:09 (WEA ZB3)		18:42	89 17:22 (WEA ZB3)	20:39	44 19:28 (WEA ZB2)	21:31	36 20:32 (WEA ZB1)	22:02	
22	08:30	07:34	16:15 (WEA ZB3)		06:28	15:53 (WEA ZB3)	06:15	18:45 (WEA ZB2)	05:18	19:57 (WEA ZB1)	04:58	
	16:50	17:51	55 17:10 (WEA ZB3)		18:44	89 17:22 (WEA ZB3)	20:41	42 19:27 (WEA ZB2)	21:33	35 20:32 (WEA ZB1)	22:02	
23	08:29	07:32	16:13 (WEA ZB3)		06:26	15:53 (WEA ZB3)	06:12	18:47 (WEA ZB2)	05:17	19:57 (WEA ZB1)	04:59	
	16:52	17:53	59 17:12 (WEA ZB3)		18:46	88 17:21 (WEA ZB3)	20:43	39 19:26 (WEA ZB2)	21:34	34 20:31 (WEA ZB1)	22:02	
24	08:28	07:30	16:12 (WEA ZB3)		06:24	15:54 (WEA ZB3)	06:10	18:48 (WEA ZB2)	05:16	19:58 (WEA ZB1)	04:59	
	16:54	17:55	62 17:14 (WEA ZB3)		18:48	96 18:19 (WEA ZB2)	20:44	41 20:16 (WEA ZB1)	21:36	33 20:31 (WEA ZB1)	22:02	
25	08:26	07:28	16:09 (WEA ZB3)		06:21	15:54 (WEA ZB3)	06:08	18:49 (WEA ZB2)	05:14	19:58 (WEA ZB1)	04:59	
	16:56	17:57	66 17:15 (WEA ZB3)		18:49	106 18:24 (WEA ZB2)	20:46	44 20:17 (WEA ZB1)	21:37	32 20:30 (WEA ZB1)	22:02	
26	08:25	07:25	16:08 (WEA ZB3)		06:19	15:54 (WEA ZB3)	06:06	18:51 (WEA ZB2)	05:13	19:59 (WEA ZB1)	05:00	
	16:58	17:59	69 17:17 (WEA ZB3)		18:51	110 18:25 (WEA ZB2)	20:48	45 20:19 (WEA ZB1)	21:39	30 20:29 (WEA ZB1)	22:02	
27	08:23	07:23	16:07 (WEA ZB3)		06:16	15:55 (WEA ZB3)	06:04	18:53 (WEA ZB2)	05:12	20:00 (WEA ZB1)	05:00	
	16:59	18:01	71 17:18 (WEA ZB3)		18:53	113 18:27 (WEA ZB2)	20:50	45 20:21 (WEA ZB1)	21:40	29 20:29 (WEA ZB1)	22:02	
28	08:22	07:21	16:05 (WEA ZB3)		06:14	15:55 (WEA ZB3)	06:02	18:56 (WEA ZB2)	05:11	20:01 (WEA ZB1)	05:01	
	17:01	18:02	73 17:18 (WEA ZB3)		18:55	115 18:28 (WEA ZB2)	20:52	42 20:23 (WEA ZB1)	21:41	27 20:28 (WEA ZB1)	22:02	
29	08:20				07:11	16:56 (WEA ZB3)	06:00	19:00 (WEA ZB2)	05:09	20:02 (WEA ZB1)	05:01	
	17:03				19:57	118 19:31 (WEA ZB2)	20:54	36 20:24 (WEA ZB1)	21:43	25 20:27 (WEA ZB1)	22:02	
30	08:19				07:09	16:56 (WEA ZB3)	05:57	19:58 (WEA ZB1)	05:08	20:03 (WEA ZB1)	05:02	
	17:05				19:59	120 19:32 (WEA ZB2)	20:55	28 20:26 (WEA ZB1)	21:44	24 20:27 (WEA ZB1)	22:02	
31	08:17				07:06	16:57 (WEA ZB3)			05:07	20:05 (WEA ZB1)		
	17:07				20:01	121 19:34 (WEA ZB2)			21:45	22 20:27 (WEA ZB1)		
Sonnenscheinstunden	251	274	676		367	2891	419	2167	1112	509	72	
astr.max.mögl.Beschattung												

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO33 - Westerhausen 5

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli		August		September		Oktober		November		Dezember			
1	05:03		05:42		20:03 (WEA ZB1)	06:36	17:14 (WEA ZB3)	07:28	16:34 (WEA ZB3)	07:26	08:21			
	22:01		21:27	42	20:45 (WEA ZB1)	20:21	94	19:35 (WEA ZB2)	19:07	90	18:04 (WEA ZB3)	16:57	16:13	
2	05:03		05:44		20:03 (WEA ZB1)	06:37		17:11 (WEA ZB3)	07:30		16:33 (WEA ZB3)	07:28	08:22	
	22:01		21:25	42	20:45 (WEA ZB1)	20:18	100	19:35 (WEA ZB2)	19:05	89	18:02 (WEA ZB3)	16:55	16:13	
3	05:04		05:45		20:03 (WEA ZB1)	06:39		17:07 (WEA ZB3)	07:32		16:34 (WEA ZB3)	07:30	08:24	
	22:01		21:23	42	20:45 (WEA ZB1)	20:16	105	19:34 (WEA ZB2)	19:02	88	18:02 (WEA ZB3)	16:53	16:12	
4	05:05		05:47		20:03 (WEA ZB1)	06:41		17:05 (WEA ZB3)	07:34		16:34 (WEA ZB3)	07:32	08:25	
	22:00		21:21	42	20:45 (WEA ZB1)	20:13	108	19:34 (WEA ZB2)	19:00	87	18:01 (WEA ZB3)	16:51	16:11	
5	05:06		05:49		20:04 (WEA ZB1)	06:43		17:03 (WEA ZB3)	07:36		16:34 (WEA ZB3)	07:34	08:26	
	22:00		21:19	41	20:45 (WEA ZB1)	20:11	111	19:33 (WEA ZB2)	18:58	87	18:01 (WEA ZB3)	16:50	16:11	
6	05:07		05:50		20:03 (WEA ZB1)	06:44		17:00 (WEA ZB3)	07:37		16:34 (WEA ZB3)	07:36	08:28	
	21:59		21:17	41	20:44 (WEA ZB1)	20:09	114	19:32 (WEA ZB2)	18:55	86	18:00 (WEA ZB3)	16:48	16:10	
7	05:08		05:52		20:04 (WEA ZB1)	06:46		16:58 (WEA ZB3)	07:39		16:35 (WEA ZB3)	07:38	08:29	
	21:58	5	20:25 (WEA ZB1)	21:15	40	20:44 (WEA ZB1)	20:06	117	19:32 (WEA ZB2)	18:53	84	17:59 (WEA ZB3)	16:46	16:10
8	05:09		05:54		20:03 (WEA ZB1)	06:48		16:57 (WEA ZB3)	07:41		16:35 (WEA ZB3)	07:40	08:30	
	21:58	10	20:28 (WEA ZB1)	21:13	40	20:43 (WEA ZB1)	20:04	118	19:31 (WEA ZB2)	18:50	83	17:58 (WEA ZB3)	16:44	16:09
9	05:10		05:55		20:04 (WEA ZB1)	06:50		16:54 (WEA ZB3)	07:43		16:35 (WEA ZB3)	07:42	08:32	
	21:57	14	20:30 (WEA ZB1)	21:11	37	20:41 (WEA ZB1)	20:01	119	19:29 (WEA ZB2)	18:48	82	17:57 (WEA ZB3)	16:42	16:09
10	05:11		05:57		20:05 (WEA ZB1)	06:51		16:53 (WEA ZB3)	07:45		16:35 (WEA ZB3)	07:43	08:33	
	21:56	16	20:31 (WEA ZB1)	21:09	35	20:40 (WEA ZB1)	19:59	121	19:29 (WEA ZB2)	18:46	81	17:56 (WEA ZB3)	16:41	16:09
11	05:12		05:59		20:05 (WEA ZB1)	06:53		16:51 (WEA ZB3)	07:47		16:36 (WEA ZB3)	07:45	08:34	
	21:55	19	20:33 (WEA ZB1)	21:07	32	20:37 (WEA ZB1)	19:56	122	19:28 (WEA ZB2)	18:43	79	17:55 (WEA ZB3)	16:39	16:08
12	05:13		06:01		20:06 (WEA ZB1)	06:55		16:49 (WEA ZB3)	07:48		16:37 (WEA ZB3)	07:47	08:35	
	21:54	21	20:34 (WEA ZB1)	21:05	30	20:36 (WEA ZB1)	19:54	121	19:26 (WEA ZB2)	18:41	76	17:53 (WEA ZB3)	16:37	16:08
13	05:14		06:02		20:06 (WEA ZB1)	06:57		16:48 (WEA ZB3)	07:50		16:38 (WEA ZB3)	07:49	08:36	
	21:53	23	20:35 (WEA ZB1)	21:03	27	20:33 (WEA ZB1)	19:52	119	19:23 (WEA ZB2)	18:39	74	17:52 (WEA ZB3)	16:36	16:08
14	05:15		06:04		19:06 (WEA ZB2)	06:58		16:47 (WEA ZB3)	07:52		16:39 (WEA ZB3)	07:51	08:37	
	21:52	24	20:36 (WEA ZB1)	21:01	38	20:31 (WEA ZB1)	19:49	118	19:21 (WEA ZB2)	18:36	72	17:51 (WEA ZB3)	16:34	16:08
15	05:17		06:06		19:03 (WEA ZB2)	07:00		16:46 (WEA ZB3)	07:54		16:40 (WEA ZB3)	07:53	08:38	
	21:51	26	20:37 (WEA ZB1)	20:59	42	20:30 (WEA ZB1)	19:47	115	19:19 (WEA ZB2)	18:34	70	17:50 (WEA ZB3)	16:32	16:08
16	05:18		06:08		18:59 (WEA ZB2)	07:02		16:44 (WEA ZB3)	07:56		16:41 (WEA ZB3)	07:55	08:39	
	21:50	28	20:38 (WEA ZB1)	20:57	45	20:27 (WEA ZB1)	19:44	114	19:16 (WEA ZB2)	18:32	67	17:48 (WEA ZB3)	16:31	16:08
17	05:19		06:09		18:57 (WEA ZB2)	07:04		16:43 (WEA ZB3)	07:58		16:42 (WEA ZB3)	07:57	08:40	
	21:49	30	20:39 (WEA ZB1)	20:55	45	20:25 (WEA ZB1)	19:42	110	19:14 (WEA ZB2)	18:29	65	17:47 (WEA ZB3)	16:29	16:08
18	05:21		06:11		18:56 (WEA ZB2)	07:05		16:42 (WEA ZB3)	07:59		16:43 (WEA ZB3)	07:58	08:41	
	21:48	31	20:39 (WEA ZB1)	20:53	44	20:24 (WEA ZB1)	19:39	107	19:12 (WEA ZB2)	18:27	62	17:45 (WEA ZB3)	16:28	16:09
19	05:22		06:13		18:53 (WEA ZB2)	07:07		16:40 (WEA ZB3)	08:01		16:45 (WEA ZB3)	08:00	08:41	
	21:46	32	20:40 (WEA ZB1)	20:50	40	20:21 (WEA ZB1)	19:37	101	19:08 (WEA ZB2)	18:25	58	17:43 (WEA ZB3)	16:27	16:09
20	05:23		06:15		18:52 (WEA ZB2)	07:09		16:40 (WEA ZB3)	08:03		16:47 (WEA ZB3)	08:02	08:42	
	21:45	34	20:41 (WEA ZB1)	20:48	40	19:32 (WEA ZB2)	19:34	87	18:07 (WEA ZB3)	18:23	54	17:41 (WEA ZB3)	16:25	16:09
21	05:25		06:16		18:51 (WEA ZB2)	07:11		16:39 (WEA ZB3)	08:05		16:49 (WEA ZB3)	08:04	08:43	
	21:44	34	20:41 (WEA ZB1)	20:46	42	19:33 (WEA ZB2)	19:32	88	18:07 (WEA ZB3)	18:20	50	17:39 (WEA ZB3)	16:24	16:10
22	05:26		06:18		18:49 (WEA ZB2)	07:12		16:38 (WEA ZB3)	08:07		16:51 (WEA ZB3)	08:06	08:43	
	21:42	35	20:42 (WEA ZB1)	20:44	44	19:33 (WEA ZB2)	19:29	89	18:07 (WEA ZB3)	18:18	45	17:36 (WEA ZB3)	16:23	16:10
23	05:28		06:20		18:48 (WEA ZB2)	07:14		16:37 (WEA ZB3)	08:09		16:53 (WEA ZB3)	08:07	08:44	
	21:41	37	20:43 (WEA ZB1)	20:41	46	19:34 (WEA ZB2)	19:27	89	18:06 (WEA ZB3)	18:16	41	17:34 (WEA ZB3)	16:21	16:11
24	05:29		06:22		18:47 (WEA ZB2)	07:16		16:36 (WEA ZB3)	08:11		16:56 (WEA ZB3)	08:09	08:44	
	21:40	38	20:43 (WEA ZB1)	20:39	48	19:35 (WEA ZB2)	19:24	90	18:06 (WEA ZB3)	18:14	34	17:30 (WEA ZB3)	16:20	16:11
25	05:31		06:23		18:45 (WEA ZB2)	07:18		16:36 (WEA ZB3)	07:13		16:00 (WEA ZB3)	08:11	08:45	
	21:38	39	20:44 (WEA ZB1)	20:37	49	19:34 (WEA ZB2)	19:22	90	18:06 (WEA ZB3)	17:12	26	16:26 (WEA ZB3)	16:19	16:12
26	05:32		06:25		18:45 (WEA ZB2)	07:20		16:36 (WEA ZB3)	07:15		16:06 (WEA ZB3)	08:13	08:45	
	21:37	40	20:44 (WEA ZB1)	20:35	50	19:35 (WEA ZB2)	19:20	90	18:06 (WEA ZB3)	17:10	14	16:20 (WEA ZB3)	16:18	16:13
27	05:34		06:27		18:44 (WEA ZB2)	07:21		16:35 (WEA ZB3)	07:17			08:14	08:45	
	21:35	39	20:44 (WEA ZB1)	20:32	51	19:35 (WEA ZB2)	19:17	90	18:05 (WEA ZB3)	17:07		16:17	16:13	
28	05:35		06:29		18:43 (WEA ZB2)	07:23		16:34 (WEA ZB3)	07:18			08:16	08:45	
	21:33	40	20:44 (WEA ZB1)	20:30	52	19:35 (WEA ZB2)	19:15	91	18:05 (WEA ZB3)	17:05		16:16	16:14	
29	05:37		06:30		17:28 (WEA ZB3)	07:25		16:34 (WEA ZB3)	07:20			08:18	08:45	
	21:32	41	20:45 (WEA ZB1)	20:28	69	19:35 (WEA ZB2)	19:12	91	18:05 (WEA ZB3)	17:03		16:15	16:15	
30	05:39		06:32		17:22 (WEA ZB3)	07:27		16:34 (WEA ZB3)	07:22			08:19	08:45	
	21:30	42	20:45 (WEA ZB1)	20:25	81	19:36 (WEA ZB2)	19:10	90	18:04 (WEA ZB3)	17:01		16:14	16:16	
31	05:40		06:34		17:17 (WEA ZB3)				07:24				08:45	
	21:28	41	20:45 (WEA ZB1)	20:23	89	19:35 (WEA ZB2)			16:59				16:17	
Sonnenscheinstunden		511	459				382		329		260	235		
astr.max.mögl.Beschattung		739	1406				3119		1744					

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

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

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH

Helmut-A. Müller-Straße 1-5

DE-82152 Planegg / München

0049 89 85 602 0

Felix Bergholz / Felix.Bergholz@mbbm-ind.com

Berechnet:

17.09.2024 15:56/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO34 - Westerhausen 6

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar			Februar			März			April			Mai			Juni		
1	08:45		13:19 (WEA ZB3)	08:16		13:27 (WEA ZB3)	07:19		16:30 (WEA ZB2)	07:04		17:40 (WEA ZB2)	05:55		19:07 (WEA ZB1)	05:06		
	16:18	87	14:46 (WEA ZB3)	17:09	92	14:59 (WEA ZB3)	18:04	60	17:30 (WEA ZB2)	20:02	27	18:07 (WEA ZB2)	20:57	54	20:01 (WEA ZB1)	21:47		
2	08:45		13:20 (WEA ZB3)	08:14		13:27 (WEA ZB3)	07:16		16:29 (WEA ZB2)	07:02		17:44 (WEA ZB2)	05:53		19:08 (WEA ZB1)	05:05		
	16:19	86	14:46 (WEA ZB3)	17:11	91	14:58 (WEA ZB3)	18:06	62	17:31 (WEA ZB2)	20:04	18	18:02 (WEA ZB2)	20:59	52	20:00 (WEA ZB1)	21:48		
3	08:45		13:19 (WEA ZB3)	08:12		13:27 (WEA ZB3)	07:14		16:27 (WEA ZB2)	06:59			05:51		19:08 (WEA ZB1)	05:05		
	16:21	87	14:46 (WEA ZB3)	17:13	91	14:58 (WEA ZB3)	18:08	64	17:31 (WEA ZB2)	20:06			21:01	52	20:00 (WEA ZB1)	21:49		
4	08:45		13:20 (WEA ZB3)	08:10		13:29 (WEA ZB3)	07:12		16:27 (WEA ZB2)	06:57			05:49		19:08 (WEA ZB1)	05:04		
	16:22	87	14:47 (WEA ZB3)	17:15	90	14:59 (WEA ZB3)	18:10	65	17:32 (WEA ZB2)	20:08			21:03	51	19:59 (WEA ZB1)	21:50		
5	08:44		13:21 (WEA ZB3)	08:09		13:29 (WEA ZB3)	07:09		16:26 (WEA ZB2)	06:54			05:47		19:09 (WEA ZB1)	05:03		
	16:23	88	14:49 (WEA ZB3)	17:17	90	14:59 (WEA ZB3)	18:12	66	17:32 (WEA ZB2)	20:10			21:04	49	19:58 (WEA ZB1)	21:51		
6	08:44		13:21 (WEA ZB3)	08:07		13:30 (WEA ZB3)	07:07		16:25 (WEA ZB2)	06:52			05:45		19:10 (WEA ZB1)	05:02		
	16:24	88	14:49 (WEA ZB3)	17:19	88	14:58 (WEA ZB3)	18:14	67	17:32 (WEA ZB2)	20:12			21:06	48	19:58 (WEA ZB1)	21:52		
7	08:44		13:21 (WEA ZB3)	08:05		13:30 (WEA ZB3)	07:05		16:25 (WEA ZB2)	06:50		19:31 (WEA ZB1)	05:43		19:10 (WEA ZB1)	05:02		
	16:26	88	14:49 (WEA ZB3)	17:21	88	14:58 (WEA ZB3)	18:16	68	17:33 (WEA ZB2)	20:13	15	19:46 (WEA ZB1)	21:08	47	19:57 (WEA ZB1)	21:53		
8	08:43		13:21 (WEA ZB3)	08:03		13:31 (WEA ZB3)	07:02		16:24 (WEA ZB2)	06:47		19:27 (WEA ZB1)	05:42		19:11 (WEA ZB1)	05:01		
	16:27	89	14:50 (WEA ZB3)	17:23	87	14:58 (WEA ZB3)	18:18	68	17:32 (WEA ZB2)	20:15	21	19:48 (WEA ZB1)	21:10	45	19:56 (WEA ZB1)	21:54		
9	08:43		13:21 (WEA ZB3)	08:01		13:32 (WEA ZB3)	07:00		16:24 (WEA ZB2)	06:45		19:23 (WEA ZB1)	05:40		19:11 (WEA ZB1)	05:00		
	16:29	90	14:51 (WEA ZB3)	17:25	85	14:57 (WEA ZB3)	18:20	69	17:33 (WEA ZB2)	20:17	26	19:49 (WEA ZB1)	21:11	44	19:55 (WEA ZB1)	21:55		
10	08:42		13:22 (WEA ZB3)	07:59		13:32 (WEA ZB3)	06:57		16:23 (WEA ZB2)	06:42		19:21 (WEA ZB1)	05:38		19:13 (WEA ZB1)	05:00		
	16:30	89	14:51 (WEA ZB3)	17:27	85	14:57 (WEA ZB3)	18:22	69	17:32 (WEA ZB2)	20:19	30	19:51 (WEA ZB1)	21:13	42	19:55 (WEA ZB1)	21:56		
11	08:41		13:22 (WEA ZB3)	07:57		13:33 (WEA ZB3)	06:55		16:23 (WEA ZB2)	06:40		19:19 (WEA ZB1)	05:36		19:14 (WEA ZB1)	05:00		
	16:32	90	14:52 (WEA ZB3)	17:29	83	14:56 (WEA ZB3)	18:23	70	17:33 (WEA ZB2)	20:21	35	19:54 (WEA ZB1)	21:15	40	19:54 (WEA ZB1)	21:57		
12	08:41		13:22 (WEA ZB3)	07:55		13:33 (WEA ZB3)	06:53		16:22 (WEA ZB2)	06:38		19:17 (WEA ZB1)	05:34		19:14 (WEA ZB1)	04:59		
	16:33	90	14:52 (WEA ZB3)	17:31	82	14:55 (WEA ZB3)	18:25	70	17:32 (WEA ZB2)	20:23	38	19:55 (WEA ZB1)	21:17	38	19:52 (WEA ZB1)	21:58		
13	08:40		13:22 (WEA ZB3)	07:53		13:35 (WEA ZB3)	06:50		16:23 (WEA ZB2)	06:35		19:16 (WEA ZB1)	05:32		19:16 (WEA ZB1)	04:59		
	16:35	91	14:53 (WEA ZB3)	17:33	79	14:54 (WEA ZB3)	18:27	69	17:32 (WEA ZB2)	20:24	41	19:57 (WEA ZB1)	21:18	36	19:52 (WEA ZB1)	21:58		
14	08:39		13:22 (WEA ZB3)	07:51		13:36 (WEA ZB3)	06:48		16:23 (WEA ZB2)	06:33		19:15 (WEA ZB1)	05:31		19:17 (WEA ZB1)	04:59		
	16:36	91	14:53 (WEA ZB3)	17:35	77	14:53 (WEA ZB3)	18:29	69	17:32 (WEA ZB2)	20:26	44	19:59 (WEA ZB1)	21:20	33	19:50 (WEA ZB1)	21:59		
15	08:38		13:23 (WEA ZB3)	07:49		13:37 (WEA ZB3)	06:45		16:22 (WEA ZB2)	06:31		19:14 (WEA ZB1)	05:29		19:19 (WEA ZB1)	04:58		
	16:38	91	14:54 (WEA ZB3)	17:37	76	14:53 (WEA ZB3)	18:31	69	17:31 (WEA ZB2)	20:28	47	20:01 (WEA ZB1)	21:22	30	19:49 (WEA ZB1)	21:59		
16	08:37		13:23 (WEA ZB3)	07:47		13:38 (WEA ZB3)	06:43		16:23 (WEA ZB2)	06:28		19:12 (WEA ZB1)	05:27		19:20 (WEA ZB1)	04:58		
	16:40	92	14:55 (WEA ZB3)	17:39	74	14:52 (WEA ZB3)	18:33	68	17:31 (WEA ZB2)	20:30	49	20:01 (WEA ZB1)	21:23	27	19:47 (WEA ZB1)	22:00		
17	08:36		13:23 (WEA ZB3)	07:45		13:40 (WEA ZB3)	06:41		16:22 (WEA ZB2)	06:26		19:11 (WEA ZB1)	05:26		19:23 (WEA ZB1)	04:58		
	16:41	92	14:55 (WEA ZB3)	17:41	71	14:51 (WEA ZB3)	18:35	68	17:30 (WEA ZB2)	20:32	50	20:01 (WEA ZB1)	21:25	23	19:46 (WEA ZB1)	22:01		
18	08:35		13:23 (WEA ZB3)	07:43		13:41 (WEA ZB3)	06:38		16:23 (WEA ZB2)	06:24		19:10 (WEA ZB1)	05:24		19:24 (WEA ZB1)	04:58		
	16:43	92	14:55 (WEA ZB3)	17:43	85	17:09 (WEA ZB2)	18:37	67	17:30 (WEA ZB2)	20:34	52	20:02 (WEA ZB1)	21:27	19	19:43 (WEA ZB1)	22:01		
19	08:34		13:23 (WEA ZB3)	07:41		13:43 (WEA ZB3)	06:36		16:23 (WEA ZB2)	06:21		19:10 (WEA ZB1)	05:23		19:28 (WEA ZB1)	04:58		
	16:45	93	14:56 (WEA ZB3)	17:45	91	17:14 (WEA ZB2)	18:38	65	17:28 (WEA ZB2)	20:35	53	20:03 (WEA ZB1)	21:28	12	19:40 (WEA ZB1)	22:01		
20	08:33		13:24 (WEA ZB3)	07:39		13:45 (WEA ZB3)	06:33		16:24 (WEA ZB2)	06:19		19:09 (WEA ZB1)	05:21			04:58		
	16:47	93	14:57 (WEA ZB3)	17:47	93	17:17 (WEA ZB2)	18:40	64	17:28 (WEA ZB2)	20:37	54	20:03 (WEA ZB1)	21:30			22:02		
21	08:32		13:23 (WEA ZB3)	07:37		13:47 (WEA ZB3)	06:31		16:24 (WEA ZB2)	06:17		19:08 (WEA ZB1)	05:20			04:58		
	16:48	93	14:56 (WEA ZB3)	17:49	96	17:20 (WEA ZB2)	18:42	62	17:26 (WEA ZB2)	20:39	54	20:02 (WEA ZB1)	21:31			22:02		
22	08:30		13:24 (WEA ZB3)	07:34		13:49 (WEA ZB3)	06:28		16:25 (WEA ZB2)	06:15		19:08 (WEA ZB1)	05:18			04:58		
	16:50	93	14:57 (WEA ZB3)	17:51	94	17:21 (WEA ZB2)	18:44	61	17:26 (WEA ZB2)	20:41	54	20:02 (WEA ZB1)	21:33			22:02		
23	08:29		13:24 (WEA ZB3)	07:32		13:52 (WEA ZB3)	06:26		16:25 (WEA ZB2)	06:12		19:07 (WEA ZB1)	05:17			04:59		
	16:52	93	14:57 (WEA ZB3)	17:53	92	17:23 (WEA ZB2)	18:46	59	17:24 (WEA ZB2)	20:43	56	20:03 (WEA ZB1)	21:34			22:02		
24	08:28		13:25 (WEA ZB3)	07:30		13:56 (WEA ZB3)	06:24		16:26 (WEA ZB2)	06:10		19:07 (WEA ZB1)	05:16			04:59		
	16:54	93	14:58 (WEA ZB3)	17:55	90	17:25 (WEA ZB2)	18:48	57	17:23 (WEA ZB2)	20:44	56	20:03 (WEA ZB1)	21:36			22:02		
25	08:26		13:24 (WEA ZB3)	07:28		13:59 (WEA ZB3)	06:21		16:28 (WEA ZB2)	06:08		19:07 (WEA ZB1)	05:14			04:59		
	16:56	94	14:58 (WEA ZB3)	17:57	85	17:26 (WEA ZB2)	18:50	55	17:23 (WEA ZB2)	20:46	56	20:03 (WEA ZB1)	21:37			22:02		
26	08:25		13:25 (WEA ZB3)	07:25		14:05 (WEA ZB3)	06:19		16:28 (WEA ZB2)	06:06		19:07 (WEA ZB1)	05:13			05:00		
	16:58	94	14:59 (WEA ZB3)	17:59	76	17:27 (WEA ZB2)	18:51	52	17:20 (WEA ZB2)	20:48	55	20:02 (WEA ZB1)	21:39			22:02		
27	08:23		13:25 (WEA ZB3)	07:23		16:32 (WEA ZB2)	06:16		16:30 (WEA ZB2)	06:04		19:07 (WEA ZB1)	05:12			05:00		
	16:59	93	14:58 (WEA ZB3)	18:01	57	17:29 (WEA ZB2)	18:53	49	17:19 (WEA ZB2)	20:50	55	20:02 (WEA ZB1)	21:40			22:02		
28	08:22		13:25 (WEA ZB3)	07:21		16:30 (WEA ZB2)	06:14		16:31 (WEA ZB2)	06:02		19:07 (WEA ZB1)	05:11			05:01		
	17:01	93	14:58 (WEA ZB3)	18:02	59	17:29 (WEA ZB2)	18:55	46	17:17 (WEA ZB2)	20:52	55	20:02 (WEA ZB1)	21:42			22:02		
29	08:20		13:26 (WEA ZB3)				07:11		17:33 (WEA ZB2)	06:00		19:07 (WEA ZB1)	05:09			05:01		
	17:03	93	14:59 (WEA ZB3)				19:57	42	18:15 (WEA ZB2)	20:54	55	20:02 (WEA ZB1)	21:43			22:02		
30	08:19		13:26 (WEA ZB3)				07:09		17:34 (WEA ZB2)	05:57		19:07 (WEA ZB1)	05:08			05:02		
	17:05	93	14:59 (WEA ZB3)				19:59	38	18:12 (WEA ZB2)	20:55	54	20:01 (WEA ZB1)	21:44			22:02		
31	08:17		13:26 (WEA ZB3)				07:06		17:37 (WEA ZB2)				05:07					
	17:07	93	14:59 (WEA ZB3)				20:01	33	18:10 (WEA ZB2)				21:45					
Sonnenscheinstunden		251			274			367			419			493			509	
astr.max.mögl.Beschattung		2819			2347			1891			1150			742				

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

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

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO34 - Westerhausen 6
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli		August		September		Oktober		November		Dezember	
1	05:03		05:42	19:24 (WEA ZB1)	06:36	19:18 (WEA ZB1)	07:28	70	17:02 (WEA ZB2)	07:26	13:01 (WEA ZB3)	08:21
	22:01		21:27	39 20:23 (WEA ZB1)	20:21	34 19:52 (WEA ZB1)	19:07		18:12 (WEA ZB2)	16:57	85 14:26 (WEA ZB3)	16:13
2	05:03		05:44	19:24 (WEA ZB1)	06:37	19:20 (WEA ZB1)	07:30		17:01 (WEA ZB2)	07:28	13:01 (WEA ZB3)	08:22
	22:01		21:25	40 20:04 (WEA ZB1)	20:18	30 19:50 (WEA ZB1)	19:05	69	18:10 (WEA ZB2)	16:55	86 14:27 (WEA ZB3)	16:13
3	05:04		05:45	19:22 (WEA ZB1)	06:39	19:21 (WEA ZB1)	07:32		17:01 (WEA ZB2)	07:30	13:00 (WEA ZB3)	08:24
	22:01		21:23	43 20:05 (WEA ZB1)	20:16	26 19:47 (WEA ZB1)	19:02	69	18:10 (WEA ZB2)	16:53	87 14:27 (WEA ZB3)	16:12
4	05:05		05:47	19:21 (WEA ZB1)	06:41	19:24 (WEA ZB1)	07:34		17:01 (WEA ZB2)	07:32	13:00 (WEA ZB3)	08:25
	22:00		21:21	45 20:06 (WEA ZB1)	20:13	21 19:45 (WEA ZB1)	19:00	69	18:10 (WEA ZB2)	16:51	88 14:28 (WEA ZB3)	16:11
5	05:06		05:49	19:21 (WEA ZB1)	06:43	19:28 (WEA ZB1)	07:36		17:01 (WEA ZB2)	07:34	12:59 (WEA ZB3)	08:27
	22:00		21:19	46 20:07 (WEA ZB1)	20:11	15 19:43 (WEA ZB1)	18:58	69	18:10 (WEA ZB2)	16:50	89 14:28 (WEA ZB3)	16:11
6	05:07		05:50	19:20 (WEA ZB1)	06:44		07:37		17:01 (WEA ZB2)	07:36	12:59 (WEA ZB3)	08:28
	21:59		21:17	47 20:07 (WEA ZB1)	20:09		18:55	68	18:09 (WEA ZB2)	16:48	89 14:28 (WEA ZB3)	16:10
7	05:08		05:52	19:19 (WEA ZB1)	06:46		07:39		17:01 (WEA ZB2)	07:38	12:58 (WEA ZB3)	08:29
	21:58		21:15	49 20:08 (WEA ZB1)	20:06		18:53	68	18:09 (WEA ZB2)	16:46	91 14:29 (WEA ZB3)	16:10
8	05:09		05:54	19:18 (WEA ZB1)	06:48		07:40		17:01 (WEA ZB2)	07:40	13:00 (WEA ZB3)	08:31
	21:58		21:13	50 20:08 (WEA ZB1)	20:04		18:50	67	18:08 (WEA ZB2)	16:44	91 14:29 (WEA ZB3)	16:09
9	05:10		05:55	19:17 (WEA ZB1)	06:50		07:43		17:01 (WEA ZB2)	07:42	12:58 (WEA ZB3)	08:32
	21:57		21:11	51 20:08 (WEA ZB1)	20:01		18:48	65	18:06 (WEA ZB2)	16:42	91 14:29 (WEA ZB3)	16:09
10	05:11		05:57	19:17 (WEA ZB2)	06:51	17:38 (WEA ZB2)	07:45		17:01 (WEA ZB2)	07:43	12:57 (WEA ZB3)	08:33
	21:56		21:09	52 20:09 (WEA ZB1)	19:59	17	17:55 (WEA ZB2)	64	18:05 (WEA ZB2)	16:41	92 14:29 (WEA ZB3)	16:09
11	05:12		05:59	19:16 (WEA ZB2)	06:53		07:47		17:02 (WEA ZB2)	07:45	12:57 (WEA ZB3)	08:34
	21:55		21:07	53 20:09 (WEA ZB1)	19:56	26	17:59 (WEA ZB2)	63	18:05 (WEA ZB2)	16:39	93 14:30 (WEA ZB3)	16:08
12	05:13		06:01	19:16 (WEA ZB2)	06:55		07:48		17:02 (WEA ZB2)	07:47	12:57 (WEA ZB3)	08:35
	21:54		21:05	53 20:09 (WEA ZB1)	19:54	32	18:01 (WEA ZB2)	62	18:04 (WEA ZB2)	16:37	93 14:30 (WEA ZB3)	16:08
13	05:14		06:02	19:15 (WEA ZB2)	06:57		07:50		17:03 (WEA ZB2)	07:49	12:58 (WEA ZB3)	08:36
	21:53		21:03	54 20:09 (WEA ZB1)	19:52	37	18:03 (WEA ZB2)	60	18:03 (WEA ZB2)	16:36	93 14:31 (WEA ZB3)	16:08
14	05:15		06:04	19:15 (WEA ZB2)	06:58		07:52		17:04 (WEA ZB2)	07:51	12:58 (WEA ZB3)	08:37
	21:52		21:01	54 20:09 (WEA ZB1)	19:49	41	18:05 (WEA ZB2)	58	18:02 (WEA ZB2)	16:34	93 14:31 (WEA ZB3)	16:08
15	05:16		06:06	19:15 (WEA ZB2)	07:00		07:53		18:02 (WEA ZB2)	16:33	93 14:31 (WEA ZB3)	16:08
	21:51		20:59	55 20:10 (WEA ZB1)	19:47	46	18:07 (WEA ZB2)	65	18:00 (WEA ZB2)	16:32	93 14:31 (WEA ZB3)	16:08
16	05:18		06:08	19:14 (WEA ZB2)	07:02		07:56		14:35 (WEA ZB3)	16:52	12:58 (WEA ZB3)	08:39
	21:50		20:57	55 20:09 (WEA ZB1)	19:48	48	18:07 (WEA ZB2)	80	17:59 (WEA ZB2)	16:31	93 14:31 (WEA ZB3)	16:08
17	05:19		06:09	19:14 (WEA ZB2)	07:04		07:58		14:30 (WEA ZB3)	16:57	12:58 (WEA ZB3)	08:40
	21:49		20:55	55 20:09 (WEA ZB1)	19:42	52	18:09 (WEA ZB2)	86	17:57 (WEA ZB2)	16:29	94 14:32 (WEA ZB3)	16:08
18	05:21		06:11	19:14 (WEA ZB2)	07:05		08:00		14:26 (WEA ZB3)	16:58	12:59 (WEA ZB3)	08:41
	21:48		20:53	55 20:09 (WEA ZB1)	19:39	55	18:10 (WEA ZB2)	91	17:56 (WEA ZB2)	16:28	93 14:32 (WEA ZB3)	16:09
19	05:22		06:13	19:13 (WEA ZB2)	07:07		08:01		14:22 (WEA ZB3)	16:58	12:59 (WEA ZB3)	08:41
	21:47		20:50	55 20:08 (WEA ZB1)	19:37	57	18:10 (WEA ZB2)	94	17:54 (WEA ZB2)	16:27	93 14:32 (WEA ZB3)	16:09
20	05:23		06:15	19:13 (WEA ZB2)	07:09		08:03		14:19 (WEA ZB3)	16:58	12:59 (WEA ZB3)	08:42
	21:45		20:48	55 20:08 (WEA ZB1)	19:34	59	18:11 (WEA ZB2)	96	17:52 (WEA ZB2)	16:25	93 14:32 (WEA ZB3)	16:09
21	05:25		06:16	19:13 (WEA ZB2)	07:11		08:05		14:17 (WEA ZB3)	16:58	12:59 (WEA ZB3)	08:43
	21:44		20:46	55 20:08 (WEA ZB1)	19:32	60	18:11 (WEA ZB2)	93	17:49 (WEA ZB2)	16:24	93 14:32 (WEA ZB3)	16:10
22	05:26		06:18	19:13 (WEA ZB2)	07:12		08:07		14:15 (WEA ZB3)	16:58	13:00 (WEA ZB3)	08:43
	21:42		20:44	54 20:07 (WEA ZB1)	19:29	62	18:12 (WEA ZB2)	93	17:47 (WEA ZB2)	16:23	93 14:33 (WEA ZB3)	16:10
23	05:28		06:20	19:13 (WEA ZB2)	07:14		08:08		14:13 (WEA ZB3)	16:57	13:00 (WEA ZB3)	08:44
	21:41		20:41	54 20:07 (WEA ZB1)	19:27	63	18:11 (WEA ZB2)	89	17:43 (WEA ZB2)	16:21	93 14:33 (WEA ZB3)	16:11
24	05:29	19:41 (WEA ZB1)	06:22	19:14 (WEA ZB2)	07:16		08:11		14:11 (WEA ZB3)	16:59	13:01 (WEA ZB3)	08:44
	21:40	6 19:47 (WEA ZB1)	20:39	52 20:06 (WEA ZB1)	19:24	65	18:12 (WEA ZB2)	83	17:38 (WEA ZB2)	16:20	92 14:33 (WEA ZB3)	16:11
25	05:31	19:37 (WEA ZB1)	06:23	19:13 (WEA ZB2)	07:18		07:13		13:09 (WEA ZB3)	16:58	13:00 (WEA ZB3)	08:45
	21:38	15 19:52 (WEA ZB1)	20:37	52 20:05 (WEA ZB1)	19:22	66	18:12 (WEA ZB2)	72	14:21 (WEA ZB3)	16:19	92 14:32 (WEA ZB3)	16:12
26	05:32	19:34 (WEA ZB1)	06:25	19:14 (WEA ZB2)	07:20		07:15		13:08 (WEA ZB3)	16:58	13:01 (WEA ZB3)	08:45
	21:37	20 19:54 (WEA ZB1)	20:35	50 20:04 (WEA ZB1)	19:20	67	18:12 (WEA ZB2)	74	14:22 (WEA ZB3)	16:18	92 14:33 (WEA ZB3)	16:13
27	05:34	19:32 (WEA ZB1)	06:27	19:15 (WEA ZB2)	07:21		07:17		13:06 (WEA ZB3)	16:58	13:02 (WEA ZB3)	08:45
	21:35	25 19:57 (WEA ZB1)	20:32	48 20:03 (WEA ZB1)	19:17	68	18:12 (WEA ZB2)	76	14:22 (WEA ZB3)	16:17	91 14:33 (WEA ZB3)	16:13
28	05:35	19:30 (WEA ZB1)	06:29	19:15 (WEA ZB2)	07:23		07:18		13:05 (WEA ZB3)	16:58	13:02 (WEA ZB3)	08:45
	21:33	28 19:58 (WEA ZB1)	20:30	46 20:01 (WEA ZB1)	19:15	69	18:12 (WEA ZB2)	78	14:23 (WEA ZB3)	16:16	91 14:33 (WEA ZB3)	16:14
29	05:37	19:29 (WEA ZB1)	06:30	19:16 (WEA ZB2)	07:25		07:20		13:04 (WEA ZB3)	16:58	13:03 (WEA ZB3)	08:45
	21:32	31 20:00 (WEA ZB1)	20:28	43 19:59 (WEA ZB1)	19:12	69	18:12 (WEA ZB2)	80	14:24 (WEA ZB3)	16:15	91 14:34 (WEA ZB3)	16:15
30	05:39	19:27 (WEA ZB1)	06:32	19:17 (WEA ZB2)	07:27		07:22		13:03 (WEA ZB3)	16:59	13:03 (WEA ZB3)	08:45
	21:30	34 20:01 (WEA ZB1)	20:25	40 19:57 (WEA ZB1)	19:10	70	18:12 (WEA ZB2)	81	14:24 (WEA ZB3)	16:14	90 14:33 (WEA ZB3)	16:16
31	05:40	19:26 (WEA ZB1)	06:34	19:17 (WEA ZB2)			07:21		13:02 (WEA ZB3)			08:45
	21:28	36 20:02 (WEA ZB1)	20:23	37 19:54 (WEA ZB1)			16:59	83	14:25 (WEA ZB3)			16:17
Sonnenscheinstunden	511		459			382		329		260		234
astr. max. mögl. Beschattung	195		1537		1255		2335		2738		2679	

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH

Helmut-A. Müller-Straße 1-5

DE-82152 Planegg / München

0049 89 85 602 0

Felix Bergholz / Felix.Bergholz@mbbm-ind.com

Berechnet:

17.09.2024 15:56/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO35 - Westerhausen 7

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni	
1	08:45	12:47 (WEA ZB3)	08:16	13:09 (WEA ZB3)	07:19	15:45 (WEA ZB2)	07:04	18:43 (WEA ZB1)	05:55	18:55 (WEA ZB1)	05:06
2	08:45	14:06 (WEA ZB3)	17:09	16:36 (WEA ZB2)	18:04	16:50 (WEA ZB2)	20:02	19:34 (WEA ZB1)	20:57	19:10 (WEA ZB1)	21:47
3	08:45	12:48 (WEA ZB3)	08:14	13:11 (WEA ZB3)	07:16	15:46 (WEA ZB2)	07:02	18:41 (WEA ZB1)	05:53		05:05
4	08:45	14:07 (WEA ZB3)	17:11	16:38 (WEA ZB2)	18:06	16:49 (WEA ZB2)	20:04	19:34 (WEA ZB1)	20:59		21:48
5	08:45	12:48 (WEA ZB3)	08:12	13:13 (WEA ZB3)	07:14	15:46 (WEA ZB2)	06:59	18:41 (WEA ZB1)	05:51		05:05
6	08:45	14:06 (WEA ZB3)	17:13	16:41 (WEA ZB2)	18:08	16:48 (WEA ZB2)	20:06	19:35 (WEA ZB1)	21:01		21:49
7	08:45	12:49 (WEA ZB3)	08:10	13:15 (WEA ZB3)	07:12	15:47 (WEA ZB2)	06:57	18:39 (WEA ZB1)	05:49		05:04
8	08:45	14:07 (WEA ZB3)	17:15	16:42 (WEA ZB2)	18:10	16:47 (WEA ZB2)	20:08	19:35 (WEA ZB1)	21:03		21:50
9	08:44	12:50 (WEA ZB3)	08:09	13:17 (WEA ZB3)	07:09	15:48 (WEA ZB2)	06:54	18:39 (WEA ZB1)	05:47		05:03
10	08:44	14:08 (WEA ZB3)	17:17	16:43 (WEA ZB2)	18:12	16:46 (WEA ZB2)	20:10	19:35 (WEA ZB1)	21:04		21:51
11	08:44	12:50 (WEA ZB3)	08:07	13:20 (WEA ZB3)	07:07	15:49 (WEA ZB2)	06:52	18:38 (WEA ZB1)	05:45		05:02
12	08:44	14:08 (WEA ZB3)	17:19	16:45 (WEA ZB2)	18:14	16:45 (WEA ZB2)	20:12	19:36 (WEA ZB1)	21:06		21:52
13	08:44	12:50 (WEA ZB3)	08:05	13:23 (WEA ZB3)	07:05	15:50 (WEA ZB2)	06:50	18:37 (WEA ZB1)	05:43		05:02
14	08:44	14:08 (WEA ZB3)	17:21	16:46 (WEA ZB2)	18:16	16:44 (WEA ZB2)	20:13	19:35 (WEA ZB1)	21:08		21:53
15	08:43	12:51 (WEA ZB3)	08:03	13:27 (WEA ZB3)	07:02	15:51 (WEA ZB2)	06:47	18:37 (WEA ZB1)	05:42		05:01
16	08:43	14:09 (WEA ZB3)	17:23	16:47 (WEA ZB2)	18:18	16:42 (WEA ZB2)	20:15	19:35 (WEA ZB1)	21:10		21:54
17	08:43	12:51 (WEA ZB3)	08:01	13:34 (WEA ZB3)	07:00	15:53 (WEA ZB2)	06:45	18:36 (WEA ZB1)	05:40		05:00
18	08:43	14:09 (WEA ZB3)	17:25	16:48 (WEA ZB2)	18:20	16:41 (WEA ZB2)	20:17	19:35 (WEA ZB1)	21:11		21:55
19	08:42	12:52 (WEA ZB3)	07:59	15:49 (WEA ZB2)	06:57	15:54 (WEA ZB2)	06:42	18:36 (WEA ZB1)	05:38		05:00
20	08:42	14:09 (WEA ZB3)	17:27	16:49 (WEA ZB2)	18:22	16:39 (WEA ZB2)	20:19	19:35 (WEA ZB1)	21:13		21:56
21	08:41	12:52 (WEA ZB3)	07:57	15:49 (WEA ZB2)	06:55	15:56 (WEA ZB2)	06:40	18:36 (WEA ZB1)	05:36		05:00
22	08:41	14:10 (WEA ZB3)	17:29	16:49 (WEA ZB2)	18:23	16:37 (WEA ZB2)	20:21	19:35 (WEA ZB1)	21:15		21:57
23	08:41	12:53 (WEA ZB3)	07:55	15:47 (WEA ZB2)	06:53	15:58 (WEA ZB2)	06:38	18:35 (WEA ZB1)	05:34		04:59
24	08:41	14:10 (WEA ZB3)	17:31	16:49 (WEA ZB2)	18:25	16:34 (WEA ZB2)	20:23	19:34 (WEA ZB1)	21:17		21:58
25	08:40	12:53 (WEA ZB3)	07:53	15:47 (WEA ZB2)	06:50	16:01 (WEA ZB2)	06:35	18:35 (WEA ZB1)	05:32		04:59
26	08:40	14:10 (WEA ZB3)	17:33	16:50 (WEA ZB2)	18:27	16:32 (WEA ZB2)	20:24	19:34 (WEA ZB1)	21:18		21:58
27	08:39	12:54 (WEA ZB3)	07:51	15:46 (WEA ZB2)	06:48	16:05 (WEA ZB2)	06:33	18:36 (WEA ZB1)	05:31		04:59
28	08:39	14:10 (WEA ZB3)	17:35	16:51 (WEA ZB2)	18:29	16:28 (WEA ZB2)	20:26	19:34 (WEA ZB1)	21:20		21:59
29	08:38	12:54 (WEA ZB3)	07:49	15:46 (WEA ZB2)	06:45	16:10 (WEA ZB2)	06:31	18:36 (WEA ZB1)	05:29		04:58
30	08:38	14:11 (WEA ZB3)	17:37	16:51 (WEA ZB2)	18:31	16:22 (WEA ZB2)	20:28	19:33 (WEA ZB1)	21:22		21:59
31	08:37	12:55 (WEA ZB3)	07:47	15:46 (WEA ZB2)	06:43		06:28	18:36 (WEA ZB1)	05:27		04:58
1	08:40	14:11 (WEA ZB3)	17:39	16:52 (WEA ZB2)	18:33		20:30	19:32 (WEA ZB1)	21:23		22:00
2	08:36	12:56 (WEA ZB3)	07:45	15:46 (WEA ZB2)	06:41		06:26	18:36 (WEA ZB1)	05:26		04:58
3	08:41	14:11 (WEA ZB3)	17:41	16:52 (WEA ZB2)	18:35		20:32	19:31 (WEA ZB1)	21:25		22:01
4	08:35	12:56 (WEA ZB3)	07:43	15:44 (WEA ZB2)	06:38		06:24	18:37 (WEA ZB1)	05:24		04:58
5	08:43	14:11 (WEA ZB3)	17:43	16:52 (WEA ZB2)	18:37		20:34	19:31 (WEA ZB1)	21:27		22:01
6	08:34	12:57 (WEA ZB3)	07:41	15:44 (WEA ZB2)	06:36		06:21	18:37 (WEA ZB1)	05:23		04:58
7	08:45	14:11 (WEA ZB3)	17:45	16:52 (WEA ZB2)	18:38		20:35	19:30 (WEA ZB1)	21:28		22:01
8	08:33	12:58 (WEA ZB3)	07:39	15:44 (WEA ZB2)	06:33		06:19	18:38 (WEA ZB1)	05:21		04:58
9	08:46	14:11 (WEA ZB3)	17:47	16:53 (WEA ZB2)	18:40		20:37	19:30 (WEA ZB1)	21:30		22:02
10	08:32	12:58 (WEA ZB3)	07:37	15:45 (WEA ZB2)	06:31		06:17	18:38 (WEA ZB1)	05:20		04:58
11	08:48	14:11 (WEA ZB3)	17:49	16:53 (WEA ZB2)	18:42		20:39	19:28 (WEA ZB1)	21:31		22:02
12	08:30	12:59 (WEA ZB3)	07:34	15:44 (WEA ZB2)	06:28		06:15	18:39 (WEA ZB1)	05:18		04:58
13	08:50	14:11 (WEA ZB3)	17:51	16:52 (WEA ZB2)	18:44		20:41	19:27 (WEA ZB1)	21:33		22:02
14	08:29	12:59 (WEA ZB3)	07:32	15:44 (WEA ZB2)	06:26		06:12	18:40 (WEA ZB1)	05:17		04:59
15	08:52	14:10 (WEA ZB3)	17:53	16:52 (WEA ZB2)	18:46	13	18:17 (WEA ZB1)	19:26 (WEA ZB1)	21:34		22:02
16	08:28	13:01 (WEA ZB3)	07:30	15:44 (WEA ZB2)	06:24		17:59 (WEA ZB1)	18:41 (WEA ZB1)	05:16		04:59
17	08:54	14:11 (WEA ZB3)	17:55	16:52 (WEA ZB2)	18:48	22	18:21 (WEA ZB1)	19:25 (WEA ZB1)	21:36		22:02
18	08:26	13:01 (WEA ZB3)	07:28	15:44 (WEA ZB2)	06:21		17:56 (WEA ZB1)	18:42 (WEA ZB1)	05:14		04:59
19	08:56	14:10 (WEA ZB3)	17:57	16:51 (WEA ZB2)	18:50	28	18:24 (WEA ZB1)	19:23 (WEA ZB1)	21:37		22:02
20	08:25	13:03 (WEA ZB3)	07:25	15:44 (WEA ZB2)	06:19		17:53 (WEA ZB1)	18:43 (WEA ZB1)	05:13		05:00
21	08:58	14:10 (WEA ZB3)	17:59	16:51 (WEA ZB2)	18:51	32	18:25 (WEA ZB1)	19:22 (WEA ZB1)	21:39		22:02
22	08:23	13:03 (WEA ZB3)	07:23	15:45 (WEA ZB2)	06:16		17:51 (WEA ZB1)	18:45 (WEA ZB1)	05:12		05:00
23	08:59	16:21 (WEA ZB2)	18:01	16:51 (WEA ZB2)	18:53	36	18:27 (WEA ZB1)	19:20 (WEA ZB1)	21:40		22:02
24	08:22	13:04 (WEA ZB3)	07:21	15:45 (WEA ZB2)	06:14		17:48 (WEA ZB1)	18:47 (WEA ZB1)	05:11		05:01
25	08:17	16:26 (WEA ZB2)	18:02	16:50 (WEA ZB2)	18:55	40	18:28 (WEA ZB1)	19:18 (WEA ZB1)	21:42		22:02
26	08:20	13:06 (WEA ZB3)			07:11		18:47 (WEA ZB1)	18:49 (WEA ZB1)	05:09		05:01
27	08:19	16:30 (WEA ZB2)			07:17	44	19:31 (WEA ZB1)	19:16 (WEA ZB1)	21:43		22:02
28	08:19	13:07 (WEA ZB3)			07:09		18:45 (WEA ZB1)	18:51 (WEA ZB1)	05:08		05:02
29	08:17	16:32 (WEA ZB2)			07:06	47	19:32 (WEA ZB1)	19:13 (WEA ZB1)	21:44		22:02
30	08:17	13:08 (WEA ZB3)			07:06	49	18:44 (WEA ZB1)		05:07		
31	08:17	16:35 (WEA ZB2)			20:01		19:33 (WEA ZB1)		21:45		
Sonnenscheinstunden		251	274	367	419	1507	15	493	509		
astr.max.mögl.Beschattung		2391	2050	1016	1507	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	

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO35 - Westerhausen 7
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli		August		September		Oktober		November		Dezember	
1	05:03	05:42			06:36	18:35 (WEA ZB1)	07:28	16:39 (WEA ZB2)	07:26	15:18 (WEA ZB2)	08:21	12:34 (WEA ZB3)
	22:01	21:27			20:21	59 19:34 (WEA ZB1)	19:07	34 17:13 (WEA ZB2)	16:57	59 16:17 (WEA ZB2)	16:13	78 13:52 (WEA ZB3)
2	05:03	05:44			06:37	18:35 (WEA ZB1)	07:30	16:35 (WEA ZB2)	07:28	13:02 (WEA ZB3)	08:22	12:35 (WEA ZB3)
	22:01	21:25			20:18	59 19:34 (WEA ZB1)	19:05	39 17:14 (WEA ZB2)	16:55	72 16:17 (WEA ZB2)	16:13	78 13:53 (WEA ZB3)
3	05:04	05:45			06:39	18:34 (WEA ZB1)	07:32	16:33 (WEA ZB2)	07:30	12:56 (WEA ZB3)	08:24	12:35 (WEA ZB3)
	22:01	21:23			20:16	59 19:33 (WEA ZB1)	19:02	43 17:16 (WEA ZB2)	16:53	82 16:16 (WEA ZB2)	16:12	77 13:52 (WEA ZB3)
4	05:05	05:47			06:41	18:34 (WEA ZB1)	07:34	16:31 (WEA ZB2)	07:32	12:52 (WEA ZB3)	08:25	12:35 (WEA ZB3)
	22:00	21:21			20:13	58 19:32 (WEA ZB1)	19:00	46 17:17 (WEA ZB2)	16:51	87 16:15 (WEA ZB2)	16:11	78 13:53 (WEA ZB3)
5	05:06	05:49			06:43	18:34 (WEA ZB1)	07:36	16:29 (WEA ZB2)	07:34	12:49 (WEA ZB3)	08:27	12:35 (WEA ZB3)
	22:00	21:19			20:11	58 19:32 (WEA ZB1)	18:58	50 17:19 (WEA ZB2)	16:50	91 16:14 (WEA ZB2)	16:11	78 13:53 (WEA ZB3)
6	05:07	05:50			06:44	18:34 (WEA ZB1)	07:37	16:27 (WEA ZB2)	07:36	12:47 (WEA ZB3)	08:28	12:36 (WEA ZB3)
	21:59	21:17			20:09	57 19:31 (WEA ZB1)	18:55	53 17:20 (WEA ZB2)	16:48	93 16:13 (WEA ZB2)	16:10	78 13:54 (WEA ZB3)
7	05:08	05:52			06:46	18:34 (WEA ZB1)	07:39	16:26 (WEA ZB2)	07:38	12:45 (WEA ZB3)	08:29	12:36 (WEA ZB3)
	21:58	21:15			20:06	56 19:30 (WEA ZB1)	18:53	55 17:21 (WEA ZB2)	16:46	95 16:12 (WEA ZB2)	16:10	78 13:54 (WEA ZB3)
8	05:09	05:54			06:48	18:34 (WEA ZB1)	07:41	16:24 (WEA ZB2)	07:40	12:43 (WEA ZB3)	08:31	12:37 (WEA ZB3)
	21:58	21:13			20:04	56 19:30 (WEA ZB1)	18:50	57 17:21 (WEA ZB2)	16:44	95 16:10 (WEA ZB2)	16:09	78 13:55 (WEA ZB3)
9	05:10	05:55			06:50	18:34 (WEA ZB1)	07:43	16:22 (WEA ZB2)	07:42	12:41 (WEA ZB3)	08:32	12:37 (WEA ZB3)
	21:57	21:11			20:01	54 19:28 (WEA ZB1)	18:48	59 17:21 (WEA ZB2)	16:42	96 16:09 (WEA ZB2)	16:09	78 13:55 (WEA ZB3)
10	05:11	05:57			06:51	18:35 (WEA ZB1)	07:45	16:21 (WEA ZB2)	07:43	12:40 (WEA ZB3)	08:33	12:37 (WEA ZB3)
	21:56	21:09			19:59	52 19:27 (WEA ZB1)	18:46	61 17:22 (WEA ZB2)	16:41	94 16:07 (WEA ZB2)	16:09	79 13:56 (WEA ZB3)
11	05:12	05:59			06:53	18:35 (WEA ZB1)	07:47	16:20 (WEA ZB2)	07:45	12:39 (WEA ZB3)	08:34	12:37 (WEA ZB3)
	21:55	21:07	4	19:13 (WEA ZB1)	19:56	52 19:27 (WEA ZB1)	18:43	62 17:22 (WEA ZB2)	16:39	92 16:05 (WEA ZB2)	16:08	79 13:56 (WEA ZB3)
12	05:13	06:01			06:55	18:35 (WEA ZB1)	07:48	16:19 (WEA ZB2)	07:47	12:38 (WEA ZB3)	08:35	12:39 (WEA ZB3)
	21:54	21:05	17	19:19 (WEA ZB1)	19:54	50 19:25 (WEA ZB1)	18:41	64 17:23 (WEA ZB2)	16:37	90 16:03 (WEA ZB2)	16:08	78 13:57 (WEA ZB3)
13	05:14	06:02			06:57	18:36 (WEA ZB1)	07:50	16:18 (WEA ZB2)	07:49	12:38 (WEA ZB3)	08:36	12:39 (WEA ZB3)
	21:53	21:03	24	19:22 (WEA ZB1)	19:52	47 19:23 (WEA ZB1)	18:39	65 17:23 (WEA ZB2)	16:36	87 16:02 (WEA ZB2)	16:08	79 13:58 (WEA ZB3)
14	05:15	06:04			06:58	18:37 (WEA ZB1)	07:52	16:18 (WEA ZB2)	07:51	12:37 (WEA ZB3)	08:37	12:39 (WEA ZB3)
	21:52	21:01	28	19:24 (WEA ZB1)	19:49	44 19:21 (WEA ZB1)	18:36	65 17:23 (WEA ZB2)	16:34	83 15:59 (WEA ZB2)	16:08	79 13:58 (WEA ZB3)
15	05:17	06:06			07:00	18:39 (WEA ZB1)	07:54	16:17 (WEA ZB2)	07:53	12:36 (WEA ZB3)	08:38	12:40 (WEA ZB3)
	21:51	20:59	32	19:26 (WEA ZB1)	19:47	40 19:19 (WEA ZB1)	18:34	66 17:23 (WEA ZB2)	16:32	74 15:53 (WEA ZB2)	16:08	79 13:59 (WEA ZB3)
16	05:18	06:08			07:02	18:39 (WEA ZB1)	07:56	16:16 (WEA ZB2)	07:55	12:36 (WEA ZB3)	08:39	12:40 (WEA ZB3)
	21:50	20:57	36	19:27 (WEA ZB1)	19:44	37 19:16 (WEA ZB1)	18:32	68 17:24 (WEA ZB2)	16:31	67 13:43 (WEA ZB3)	16:08	78 13:58 (WEA ZB3)
17	05:19	06:09			07:04	18:41 (WEA ZB1)	07:58	16:16 (WEA ZB2)	07:57	12:35 (WEA ZB3)	08:40	12:40 (WEA ZB3)
	21:49	20:55	39	19:29 (WEA ZB1)	19:42	33 19:14 (WEA ZB1)	18:29	68 17:24 (WEA ZB2)	16:29	69 13:44 (WEA ZB3)	16:08	79 13:59 (WEA ZB3)
18	05:21	06:11			07:05	18:43 (WEA ZB1)	08:00	16:16 (WEA ZB2)	07:58	12:35 (WEA ZB3)	08:41	12:41 (WEA ZB3)
	21:48	20:53	42	19:30 (WEA ZB1)	19:39	29 19:12 (WEA ZB1)	18:27	68 17:24 (WEA ZB2)	16:28	70 13:45 (WEA ZB3)	16:09	78 13:59 (WEA ZB3)
19	05:22	06:13			07:07	18:45 (WEA ZB1)	08:01	16:15 (WEA ZB2)	08:00	12:34 (WEA ZB3)	08:41	12:42 (WEA ZB3)
	21:47	20:50	45	19:31 (WEA ZB1)	19:37	23 19:08 (WEA ZB1)	18:25	68 17:23 (WEA ZB2)	16:27	71 13:45 (WEA ZB3)	16:09	78 14:00 (WEA ZB3)
20	05:23	06:15			07:09	18:49 (WEA ZB1)	08:03	16:15 (WEA ZB2)	08:02	12:34 (WEA ZB3)	08:42	12:41 (WEA ZB3)
	21:45	20:48	47	19:32 (WEA ZB1)	19:34	16 19:05 (WEA ZB1)	18:23	68 17:23 (WEA ZB2)	16:25	72 13:46 (WEA ZB3)	16:09	79 14:00 (WEA ZB3)
21	05:25	06:16			07:11	18:44 (WEA ZB1)	08:05	16:15 (WEA ZB2)	08:04	12:34 (WEA ZB3)	08:43	12:42 (WEA ZB3)
	21:44	20:46	49	19:33 (WEA ZB1)	19:32		18:20	68 17:23 (WEA ZB2)	16:24	73 13:47 (WEA ZB3)	16:10	79 14:01 (WEA ZB3)
22	05:26	06:18			07:12	18:42 (WEA ZB1)	08:07	16:15 (WEA ZB2)	08:06	12:34 (WEA ZB3)	08:43	12:42 (WEA ZB3)
	21:43	20:44	51	19:33 (WEA ZB1)	19:29		18:18	68 17:23 (WEA ZB2)	16:23	73 13:47 (WEA ZB3)	16:10	79 14:01 (WEA ZB3)
23	05:28	06:20			07:14	18:42 (WEA ZB1)	08:09	16:15 (WEA ZB2)	08:07	12:34 (WEA ZB3)	08:44	12:43 (WEA ZB3)
	21:41	20:41	51	19:33 (WEA ZB1)	19:27		18:16	68 17:23 (WEA ZB2)	16:21	74 13:48 (WEA ZB3)	16:11	79 14:02 (WEA ZB3)
24	05:29	06:22			07:16	18:41 (WEA ZB1)	08:11	16:15 (WEA ZB2)	08:09	12:34 (WEA ZB3)	08:44	12:44 (WEA ZB3)
	21:40	20:39	53	19:34 (WEA ZB1)	19:24		18:14	67 17:22 (WEA ZB2)	16:20	75 13:49 (WEA ZB3)	16:11	78 14:02 (WEA ZB3)
25	05:31	06:23			07:18	18:39 (WEA ZB1)	08:13	16:15 (WEA ZB2)	08:11	12:33 (WEA ZB3)	08:45	12:44 (WEA ZB3)
	21:38	20:37	55	19:34 (WEA ZB1)	19:22		17:12	67 16:22 (WEA ZB2)	16:19	75 13:48 (WEA ZB3)	16:12	78 14:02 (WEA ZB3)
26	05:32	06:25			07:20	18:39 (WEA ZB1)	08:15	16:15 (WEA ZB2)	08:13	12:33 (WEA ZB3)	08:45	12:45 (WEA ZB3)
	21:37	20:35	55	19:34 (WEA ZB1)	19:20		17:10	66 16:21 (WEA ZB2)	16:18	76 13:49 (WEA ZB3)	16:13	79 14:04 (WEA ZB3)
27	05:34	06:27			07:21	18:38 (WEA ZB1)	08:17	16:15 (WEA ZB2)	08:14	12:34 (WEA ZB3)	08:45	12:45 (WEA ZB3)
	21:35	20:32	57	19:35 (WEA ZB1)	19:17		17:08	66 16:21 (WEA ZB2)	16:17	76 13:50 (WEA ZB3)	16:13	79 14:04 (WEA ZB3)
28	05:35	06:29			07:23	18:37 (WEA ZB1)	08:18	16:16 (WEA ZB2)	08:16	12:34 (WEA ZB3)	08:45	12:46 (WEA ZB3)
	21:33	20:30	57	19:34 (WEA ZB1)	19:15		17:05	64 16:20 (WEA ZB2)	16:16	76 13:50 (WEA ZB3)	16:14	78 14:04 (WEA ZB3)
29	05:37	06:30			07:25	18:37 (WEA ZB1)	08:20	16:16 (WEA ZB2)	08:18	12:34 (WEA ZB3)	08:45	12:46 (WEA ZB3)
	21:32	20:28	57	19:34 (WEA ZB1)	19:12	21 17:07 (WEA ZB2)	17:03	63 16:19 (WEA ZB2)	16:15	77 13:51 (WEA ZB3)	16:15	79 14:05 (WEA ZB3)
30	05:39	06:32			07:27	18:36 (WEA ZB1)	08:22	16:17 (WEA ZB2)	08:19	12:34 (WEA ZB3)	08:45	12:47 (WEA ZB3)
	21:30	20:25	59	19:35 (WEA ZB1)	19:10	28 17:10 (WEA ZB2)	17:01	62 16:19 (WEA ZB2)	16:14	77 13:51 (WEA ZB3)	16:16	78 14:05 (WEA ZB3)
31	05:40	06:34			07:24	18:35 (WEA ZB1)	08:24	16:19 (WEA ZB2)			08:45	12:46 (WEA ZB3)
	21:28	20:23	59	19:34 (WEA ZB1)			16:59	61 16:18 (WEA ZB2)			16:17	79 14:05 (WEA ZB3)
Sonnenscheinstunden	511	459			382		329		260		234	
astr.max.mögl.Beschattung			917		988		1879		2391		2431	

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO36 - Westerhausen 10

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar			Februar			März			April			Mai			Juni	
1	08:45	13:19 (WEA ZB3)	08:16	13:38 (WEA ZB3)	07:19	16:03 (WEA ZB2)	07:04	18:46 (WEA ZB1)	05:55	05:06							
	16:18	76	14:35 (WEA ZB3)	17:09	59	14:37 (WEA ZB3)	18:04	60	17:03 (WEA ZB2)	20:02	48	19:34 (WEA ZB1)	20:57			21:47	
2	08:45		13:20 (WEA ZB3)	08:14		13:39 (WEA ZB3)	07:16		16:03 (WEA ZB2)	07:02		18:46 (WEA ZB1)	05:53			05:05	
	16:19	75	14:35 (WEA ZB3)	17:11	60	16:34 (WEA ZB2)	18:06	60	17:03 (WEA ZB2)	20:04	49	19:35 (WEA ZB1)	20:59			21:48	
3	08:45		13:20 (WEA ZB3)	08:12		13:41 (WEA ZB3)	07:14		16:03 (WEA ZB2)	06:59		18:45 (WEA ZB1)	05:51			05:05	
	16:21	75	14:35 (WEA ZB3)	17:13	71	16:41 (WEA ZB2)	18:08	58	17:01 (WEA ZB2)	20:06	51	19:36 (WEA ZB1)	21:01			21:49	
4	08:45		13:21 (WEA ZB3)	08:10		13:43 (WEA ZB3)	07:12		16:04 (WEA ZB2)	06:57		18:44 (WEA ZB1)	05:49			05:04	
	16:22	75	14:36 (WEA ZB3)	17:15	75	16:44 (WEA ZB2)	18:10	57	17:01 (WEA ZB2)	20:08	51	19:35 (WEA ZB1)	21:03			21:50	
5	08:44		13:22 (WEA ZB3)	08:09		13:45 (WEA ZB3)	07:09		16:04 (WEA ZB2)	06:54		18:44 (WEA ZB1)	05:47			05:03	
	16:23	75	14:37 (WEA ZB3)	17:17	77	16:47 (WEA ZB2)	18:12	56	17:00 (WEA ZB2)	20:10	52	19:36 (WEA ZB1)	21:04			21:51	
6	08:44		13:22 (WEA ZB3)	08:07		13:47 (WEA ZB3)	07:07		16:05 (WEA ZB2)	06:52		18:43 (WEA ZB1)	05:45			05:02	
	16:24	75	14:37 (WEA ZB3)	17:19	77	16:49 (WEA ZB2)	18:14	54	16:59 (WEA ZB2)	20:12	53	19:36 (WEA ZB1)	21:06			21:52	
7	08:44		13:22 (WEA ZB3)	08:05		13:49 (WEA ZB3)	07:05		16:06 (WEA ZB2)	06:50		18:42 (WEA ZB1)	05:43			05:02	
	16:26	75	14:37 (WEA ZB3)	17:21	77	16:51 (WEA ZB2)	18:16	52	16:58 (WEA ZB2)	20:13	53	19:35 (WEA ZB1)	21:08			21:53	
8	08:43		13:23 (WEA ZB3)	08:03		13:51 (WEA ZB3)	07:02		16:07 (WEA ZB2)	06:47		18:42 (WEA ZB1)	05:42			05:01	
	16:27	75	14:38 (WEA ZB3)	17:23	76	16:53 (WEA ZB2)	18:18	50	16:57 (WEA ZB2)	20:15	54	19:36 (WEA ZB1)	21:10			21:54	
9	08:43		13:23 (WEA ZB3)	08:01		13:55 (WEA ZB3)	07:00		16:08 (WEA ZB2)	06:45		18:41 (WEA ZB1)	05:40			05:00	
	16:29	75	14:38 (WEA ZB3)	17:25	74	16:55 (WEA ZB2)	18:20	48	16:56 (WEA ZB2)	20:17	54	19:35 (WEA ZB1)	21:11			21:55	
10	08:42		13:23 (WEA ZB3)	07:59		13:59 (WEA ZB3)	06:57		16:09 (WEA ZB2)	06:42		18:42 (WEA ZB1)	05:38			05:00	
	16:30	76	14:39 (WEA ZB3)	17:27	69	16:57 (WEA ZB2)	18:22	44	16:53 (WEA ZB2)	20:19	53	19:35 (WEA ZB1)	21:13			21:56	
11	08:41		13:24 (WEA ZB3)	07:57		14:05 (WEA ZB3)	06:55		16:11 (WEA ZB2)	06:40		18:42 (WEA ZB1)	05:36			05:00	
	16:31	75	14:39 (WEA ZB3)	17:29	60	16:59 (WEA ZB2)	18:23	41	16:52 (WEA ZB2)	20:21	52	19:34 (WEA ZB1)	21:15			21:57	
12	08:41		13:24 (WEA ZB3)	07:55		16:08 (WEA ZB2)	06:53		16:12 (WEA ZB2)	06:38		18:41 (WEA ZB1)	05:34			04:59	
	16:33	75	14:39 (WEA ZB3)	17:31	51	16:59 (WEA ZB2)	18:25	38	16:50 (WEA ZB2)	20:23	52	19:33 (WEA ZB1)	21:17			21:58	
13	08:40		13:25 (WEA ZB3)	07:53		16:07 (WEA ZB2)	06:50		16:15 (WEA ZB2)	06:35		18:42 (WEA ZB1)	05:32			04:59	
	16:35	74	14:39 (WEA ZB3)	17:33	53	17:00 (WEA ZB2)	18:27	33	16:48 (WEA ZB2)	20:24	51	19:33 (WEA ZB1)	21:18			21:58	
14	08:39		13:25 (WEA ZB3)	07:51		16:07 (WEA ZB2)	06:48		16:18 (WEA ZB2)	06:33		18:42 (WEA ZB1)	05:31			04:59	
	16:36	75	14:40 (WEA ZB3)	17:35	54	17:01 (WEA ZB2)	18:29	27	16:45 (WEA ZB2)	20:26	51	19:33 (WEA ZB1)	21:20			21:59	
15	08:38		13:26 (WEA ZB3)	07:49		16:06 (WEA ZB2)	06:45		16:21 (WEA ZB2)	06:31		18:43 (WEA ZB1)	05:29			04:58	
	16:38	74	14:40 (WEA ZB3)	17:37	56	17:02 (WEA ZB2)	18:31	20	16:41 (WEA ZB2)	20:28	49	19:32 (WEA ZB1)	21:22			21:59	
16	08:37		13:26 (WEA ZB3)	07:47		16:06 (WEA ZB2)	06:43		16:29 (WEA ZB2)	06:28		18:42 (WEA ZB1)	05:27			04:58	
	16:40	75	14:41 (WEA ZB3)	17:39	56	17:02 (WEA ZB2)	18:33	4	16:33 (WEA ZB2)	20:30	48	19:30 (WEA ZB1)	21:23			22:00	
17	08:36		13:27 (WEA ZB3)	07:45		16:05 (WEA ZB2)	06:41			06:26		18:43 (WEA ZB1)	05:26			04:58	
	16:41	74	14:41 (WEA ZB3)	17:41	58	17:03 (WEA ZB2)	18:35			20:32	47	19:30 (WEA ZB1)	21:25			22:01	
18	08:35		13:27 (WEA ZB3)	07:43		16:04 (WEA ZB2)	06:38			06:24		18:44 (WEA ZB1)	05:24			04:58	
	16:43	73	14:40 (WEA ZB3)	17:43	59	17:03 (WEA ZB2)	18:37			20:34	45	19:29 (WEA ZB1)	21:27			22:01	
19	08:34		13:28 (WEA ZB3)	07:41		16:04 (WEA ZB2)	06:36			06:21		18:45 (WEA ZB1)	05:23			04:58	
	16:45	73	14:41 (WEA ZB3)	17:45	60	17:04 (WEA ZB2)	18:38			20:35	43	19:28 (WEA ZB1)	21:28			22:01	
20	08:33		13:29 (WEA ZB3)	07:39		16:04 (WEA ZB2)	06:33			06:19		18:46 (WEA ZB1)	05:21			04:58	
	16:46	72	14:41 (WEA ZB3)	17:47	60	17:04 (WEA ZB2)	18:40			20:37	41	19:27 (WEA ZB1)	21:30			22:02	
21	08:32		13:29 (WEA ZB3)	07:37		16:03 (WEA ZB2)	06:31			06:17		18:46 (WEA ZB1)	05:20			04:58	
	16:48	72	14:41 (WEA ZB3)	17:49	62	17:05 (WEA ZB2)	18:42			20:39	39	19:25 (WEA ZB1)	21:31			22:02	
22	08:30		13:30 (WEA ZB3)	07:34		16:02 (WEA ZB2)	06:28			06:15		18:48 (WEA ZB1)	05:18			04:58	
	16:50	71	14:41 (WEA ZB3)	17:51	62	17:04 (WEA ZB2)	18:44			20:41	35	19:23 (WEA ZB1)	21:33			22:02	
23	08:29		13:30 (WEA ZB3)	07:32		16:03 (WEA ZB2)	06:26		18:06 (WEA ZB1)	06:12		18:49 (WEA ZB1)	05:17			04:59	
	16:52	71	14:41 (WEA ZB3)	17:53	61	17:04 (WEA ZB2)	18:46	13	18:19 (WEA ZB1)	20:43	33	19:22 (WEA ZB1)	21:34			22:02	
24	08:28		13:31 (WEA ZB3)	07:30		16:03 (WEA ZB2)	06:24		18:02 (WEA ZB1)	06:10		18:51 (WEA ZB1)	05:16			04:59	
	16:54	70	14:41 (WEA ZB3)	17:55	62	17:05 (WEA ZB2)	18:48	19	18:21 (WEA ZB1)	20:44	29	19:20 (WEA ZB1)	21:36			22:02	
25	08:26		13:31 (WEA ZB3)	07:28		16:02 (WEA ZB2)	06:21		17:59 (WEA ZB1)	06:08		18:53 (WEA ZB1)	05:14			04:59	
	16:56	69	14:40 (WEA ZB3)	17:57	62	17:04 (WEA ZB2)	18:50	25	18:24 (WEA ZB1)	20:46	24	19:17 (WEA ZB1)	21:37			22:02	
26	08:25		13:33 (WEA ZB3)	07:25		16:02 (WEA ZB2)	06:19		17:56 (WEA ZB1)	06:06		18:56 (WEA ZB1)	05:13			05:00	
	16:58	68	14:41 (WEA ZB3)	17:59	62	17:04 (WEA ZB2)	18:51	29	18:25 (WEA ZB1)	20:48	18	19:14 (WEA ZB1)	21:39			22:02	
27	08:23		13:33 (WEA ZB3)	07:23		16:03 (WEA ZB2)	06:16		17:55 (WEA ZB1)	06:04		19:01 (WEA ZB1)	05:12			05:00	
	16:59	67	14:40 (WEA ZB3)	18:01	61	17:04 (WEA ZB2)	18:53	32	18:27 (WEA ZB1)	20:50	8	19:09 (WEA ZB1)	21:40			22:02	
28	08:22		13:34 (WEA ZB3)	07:21		16:02 (WEA ZB2)	06:14		17:52 (WEA ZB1)	06:02			05:11			05:01	
	17:01	65	14:39 (WEA ZB3)	18:02	61	17:03 (WEA ZB2)	18:55	36	18:28 (WEA ZB1)	20:52			21:42			22:02	
29	08:20		13:36 (WEA ZB3)				07:11		18:51 (WEA ZB1)	06:00			05:09			05:01	
	17:03	64	14:40 (WEA ZB3)				19:57	40	19:31 (WEA ZB1)	20:54			21:43			22:02	
30	08:19		13:36 (WEA ZB3)				07:09		18:49 (WEA ZB1)	05:57			05:08			05:02	
	17:05	63	14:39 (WEA ZB3)				19:59	43	19:32 (WEA ZB1)	20:55			21:44			22:02	
31	08:17		13:37 (WEA ZB3)				07:06		18:48 (WEA ZB1)				05:07				
	17:07	61	14:38 (WEA ZB3)				20:01	46	19:34 (WEA ZB1)				21:45				
Sonnenscheinstunden		251		274			367			419			493			509	
astr.max.mögl.Beschattung		2233		1775			985			1183							

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

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

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 15:56/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO36 - Westerhausen 10
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember	
1	05:03 22:01	05:42 21:27		06:36 20:21	18:41 (WEA ZB1) 19:33 (WEA ZB1)	07:28 19:07	16:53 (WEA ZB2) 17:29 (WEA ZB2)	07:26 16:57	13:26 (WEA ZB3) 16:26 (WEA ZB3)	08:21 16:13	13:06 (WEA ZB3) 14:21 (WEA ZB3)
2	05:03 22:01	05:44 21:25		06:37 20:18	18:41 (WEA ZB1) 19:34 (WEA ZB1)	07:30 19:05	16:50 (WEA ZB2) 17:29 (WEA ZB2)	07:28 16:55	13:24 (WEA ZB3) 16:25 (WEA ZB3)	08:22 16:13	13:06 (WEA ZB3) 14:22 (WEA ZB3)
3	05:04 22:01	05:45 21:23		06:39 20:16	18:39 (WEA ZB1) 19:33 (WEA ZB1)	07:32 19:02	16:48 (WEA ZB2) 17:31 (WEA ZB2)	07:30 16:53	13:21 (WEA ZB3) 16:22 (WEA ZB3)	08:24 16:12	13:06 (WEA ZB3) 14:22 (WEA ZB3)
4	05:05 22:00	05:47 21:21		06:41 20:13	18:39 (WEA ZB1) 19:33 (WEA ZB1)	07:34 19:00	16:46 (WEA ZB2) 17:32 (WEA ZB2)	07:32 16:51	13:18 (WEA ZB3) 16:20 (WEA ZB3)	08:25 16:11	13:07 (WEA ZB3) 14:22 (WEA ZB3)
5	05:06 22:00	05:49 21:19		06:43 20:11	18:39 (WEA ZB1) 19:32 (WEA ZB1)	07:36 18:58	16:44 (WEA ZB2) 17:33 (WEA ZB2)	07:34 16:50	13:16 (WEA ZB3) 16:18 (WEA ZB3)	08:27 16:11	13:07 (WEA ZB3) 14:22 (WEA ZB3)
6	05:07 21:59	05:50 21:17		06:44 20:09	18:39 (WEA ZB1) 19:31 (WEA ZB1)	07:37 18:55	16:43 (WEA ZB2) 17:34 (WEA ZB2)	07:36 16:48	13:14 (WEA ZB3) 16:16 (WEA ZB3)	08:28 16:10	13:08 (WEA ZB3) 14:23 (WEA ZB3)
7	05:08 21:58	05:52 21:15		06:46 20:06	18:39 (WEA ZB1) 19:31 (WEA ZB1)	07:39 18:53	16:42 (WEA ZB2) 17:35 (WEA ZB2)	07:38 16:46	13:13 (WEA ZB3) 16:14 (WEA ZB3)	08:29 16:10	13:08 (WEA ZB3) 14:23 (WEA ZB3)
8	05:09 21:58	05:54 21:13		06:48 20:04	18:39 (WEA ZB1) 19:30 (WEA ZB1)	07:41 18:50	16:41 (WEA ZB2) 17:35 (WEA ZB2)	07:40 16:44	13:11 (WEA ZB3) 16:12 (WEA ZB3)	08:31 16:09	13:09 (WEA ZB3) 14:24 (WEA ZB3)
9	05:10 21:57	05:55 21:11		06:50 20:01	18:38 (WEA ZB1) 19:29 (WEA ZB1)	07:43 18:48	16:39 (WEA ZB2) 17:35 (WEA ZB2)	07:42 16:42	13:10 (WEA ZB3) 14:07 (WEA ZB3)	08:32 16:09	13:09 (WEA ZB3) 14:24 (WEA ZB3)
10	05:11 21:56	05:57 21:09		06:51 19:59	18:39 (WEA ZB1) 19:28 (WEA ZB1)	07:45 18:46	16:38 (WEA ZB2) 17:35 (WEA ZB2)	07:43 16:41	13:09 (WEA ZB3) 14:08 (WEA ZB3)	08:33 16:09	13:09 (WEA ZB3) 14:24 (WEA ZB3)
11	05:12 21:55	05:59 21:07		06:53 19:56	18:39 (WEA ZB1) 19:28 (WEA ZB1)	07:47 18:43	16:37 (WEA ZB2) 17:36 (WEA ZB2)	07:45 16:39	13:08 (WEA ZB3) 14:09 (WEA ZB3)	08:34 16:08	13:09 (WEA ZB3) 14:25 (WEA ZB3)
12	05:13 21:54	06:01 21:05		06:55 19:54	18:39 (WEA ZB1) 19:26 (WEA ZB1)	07:48 18:41	16:36 (WEA ZB2) 17:36 (WEA ZB2)	07:47 16:37	13:07 (WEA ZB3) 14:10 (WEA ZB3)	08:35 16:08	13:11 (WEA ZB3) 14:26 (WEA ZB3)
13	05:14 21:53	06:02 21:03		06:57 19:52	18:40 (WEA ZB1) 19:23 (WEA ZB1)	07:50 18:39	16:36 (WEA ZB2) 17:36 (WEA ZB2)	07:49 16:36	13:07 (WEA ZB3) 14:12 (WEA ZB3)	08:36 16:08	13:11 (WEA ZB3) 14:26 (WEA ZB3)
14	05:15 21:52	06:04 21:01		06:58 19:49	18:41 (WEA ZB1) 19:21 (WEA ZB1)	07:52 18:36	16:35 (WEA ZB2) 17:36 (WEA ZB2)	07:51 16:34	13:07 (WEA ZB3) 14:12 (WEA ZB3)	08:37 16:08	13:12 (WEA ZB3) 14:27 (WEA ZB3)
15	05:17 21:51	06:06 20:59		07:00 19:47	18:42 (WEA ZB1) 19:19 (WEA ZB1)	07:54 18:34	16:35 (WEA ZB2) 17:36 (WEA ZB2)	07:53 16:32	13:06 (WEA ZB3) 14:13 (WEA ZB3)	08:38 16:08	13:12 (WEA ZB3) 14:27 (WEA ZB3)
16	05:18 21:50	06:08 20:57	12	07:02 19:44	18:43 (WEA ZB1) 19:16 (WEA ZB1)	07:56 18:32	16:34 (WEA ZB2) 17:36 (WEA ZB2)	07:55 16:31	13:06 (WEA ZB3) 14:14 (WEA ZB3)	08:39 16:08	13:12 (WEA ZB3) 14:27 (WEA ZB3)
17	05:19 21:49	06:09 20:55	20	07:04 19:42	18:44 (WEA ZB1) 19:14 (WEA ZB1)	07:58 18:29	16:34 (WEA ZB2) 17:36 (WEA ZB2)	07:57 16:29	13:05 (WEA ZB3) 14:14 (WEA ZB3)	08:40 16:08	13:12 (WEA ZB3) 14:27 (WEA ZB3)
18	05:21 21:48	06:11 20:53	26	07:05 19:39	18:59 (WEA ZB1) 19:25 (WEA ZB1)	08:00 18:27	16:34 (WEA ZB2) 17:36 (WEA ZB2)	07:58 16:28	13:05 (WEA ZB3) 14:15 (WEA ZB3)	08:41 16:09	13:13 (WEA ZB3) 14:28 (WEA ZB3)
19	05:22 21:47	06:13 20:50	30	07:07 19:37	18:56 (WEA ZB1) 19:26 (WEA ZB1)	08:01 18:25	16:34 (WEA ZB2) 17:36 (WEA ZB2)	08:00 16:27	13:05 (WEA ZB3) 14:16 (WEA ZB3)	08:41 16:09	13:14 (WEA ZB3) 14:29 (WEA ZB3)
20	05:23 21:45	06:15 20:48	33	07:09 19:34	18:55 (WEA ZB1) 19:28 (WEA ZB1)	08:03 18:23	16:34 (WEA ZB2) 17:35 (WEA ZB2)	08:02 16:25	13:05 (WEA ZB3) 14:16 (WEA ZB3)	08:42 16:09	13:14 (WEA ZB3) 14:29 (WEA ZB3)
21	05:25 21:44	06:16 20:46	36	07:11 19:32	18:53 (WEA ZB1) 19:29 (WEA ZB1)	08:05 18:20	16:34 (WEA ZB2) 17:35 (WEA ZB2)	08:04 16:24	13:05 (WEA ZB3) 14:17 (WEA ZB3)	08:43 16:10	13:15 (WEA ZB3) 14:30 (WEA ZB3)
22	05:26 21:42	06:18 20:44	39	07:12 19:29	18:51 (WEA ZB1) 19:30 (WEA ZB1)	08:07 18:18	16:34 (WEA ZB2) 17:34 (WEA ZB2)	08:06 16:23	13:05 (WEA ZB3) 14:17 (WEA ZB3)	08:43 16:10	13:15 (WEA ZB3) 14:30 (WEA ZB3)
23	05:28 21:41	06:20 20:41	41	07:14 19:27	18:50 (WEA ZB1) 19:31 (WEA ZB1)	08:09 18:16	16:34 (WEA ZB2) 17:34 (WEA ZB2)	08:07 16:21	13:05 (WEA ZB3) 14:18 (WEA ZB3)	08:44 16:11	13:16 (WEA ZB3) 14:31 (WEA ZB3)
24	05:29 21:40	06:22 20:39	44	07:16 19:24	18:48 (WEA ZB1) 19:32 (WEA ZB1)	08:11 18:14	16:34 (WEA ZB2) 17:33 (WEA ZB2)	08:09 16:20	13:05 (WEA ZB3) 14:18 (WEA ZB3)	08:44 16:11	13:16 (WEA ZB3) 14:31 (WEA ZB3)
25	05:31 21:38	06:23 20:37	45	07:18 19:22	18:47 (WEA ZB1) 19:32 (WEA ZB1)	08:13 17:12	16:35 (WEA ZB2) 16:33 (WEA ZB2)	08:11 16:19	13:04 (WEA ZB3) 14:18 (WEA ZB3)	08:45 16:12	13:16 (WEA ZB3) 14:31 (WEA ZB3)
26	05:32 21:37	06:25 20:35	47	07:20 19:20	18:46 (WEA ZB1) 19:33 (WEA ZB1)	08:15 17:10	16:35 (WEA ZB2) 16:32 (WEA ZB2)	08:13 16:18	13:04 (WEA ZB3) 14:19 (WEA ZB3)	08:45 16:13	13:17 (WEA ZB3) 14:32 (WEA ZB3)
27	05:34 21:35	06:27 20:32	48	07:21 19:17	18:45 (WEA ZB1) 19:33 (WEA ZB1)	08:17 17:07	16:36 (WEA ZB2) 16:31 (WEA ZB2)	08:14 16:17	13:05 (WEA ZB3) 14:19 (WEA ZB3)	08:45 16:13	13:18 (WEA ZB3) 14:33 (WEA ZB3)
28	05:35 21:33	06:29 20:30	50	07:23 19:15	18:43 (WEA ZB1) 19:33 (WEA ZB1)	08:18 17:05	16:36 (WEA ZB2) 16:30 (WEA ZB2)	08:16 16:16	13:05 (WEA ZB3) 14:20 (WEA ZB3)	08:45 16:14	13:18 (WEA ZB3) 14:33 (WEA ZB3)
29	05:37 21:32	06:30 20:28	50	07:25 19:12	18:43 (WEA ZB1) 19:33 (WEA ZB1)	08:20 17:03	16:37 (WEA ZB2) 16:29 (WEA ZB2)	08:18 16:15	13:06 (WEA ZB3) 14:21 (WEA ZB3)	08:45 16:15	13:18 (WEA ZB3) 14:34 (WEA ZB3)
30	05:39 21:30	06:32 20:25	52	07:27 19:10	18:42 (WEA ZB1) 19:34 (WEA ZB1)	08:22 17:01	16:38 (WEA ZB2) 16:28 (WEA ZB2)	08:19 16:14	13:05 (WEA ZB3) 14:20 (WEA ZB3)	08:45 16:16	13:19 (WEA ZB3) 14:34 (WEA ZB3)
31	05:40 21:28	06:34 20:23	52	07:24 19:33	18:41 (WEA ZB1) 19:33 (WEA ZB1)	07:24 16:59	13:32 (WEA ZB3) 16:27 (WEA ZB2)	16:14	14:20 (WEA ZB3)	08:45 16:17	13:19 (WEA ZB3) 14:34 (WEA ZB3)
Sonnenscheinstunden		511	459	382		329		260		234	
astr.max.mögl.Beschattung			625	932		1722		2122		2329	

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

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

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO37 - Westerhausen 1

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar		Februar		März		April		Mai		Juni	
1	08:45	08:16	07:19		07:04	19:15 (WEA ZB3)	05:55		19:05 (WEA ZB3)	05:06		
	16:18	17:09	18:04		20:02	20 19:35 (WEA ZB3)	20:57	61	20:28 (WEA ZB1)	21:47		
2	08:45	08:14	07:16		07:02	19:12 (WEA ZB3)	05:53		19:06 (WEA ZB3)	05:05		
	16:19	17:11	18:06		20:04	25 19:37 (WEA ZB3)	20:59	59	20:29 (WEA ZB1)	21:48		
3	08:45	08:12	07:14		06:59	19:10 (WEA ZB3)	05:51		19:08 (WEA ZB3)	05:05		
	16:21	17:13	18:08		20:06	30 19:40 (WEA ZB3)	21:01	56	20:31 (WEA ZB1)	21:49		
4	08:45	08:10	07:12		06:57	19:07 (WEA ZB3)	05:49		19:10 (WEA ZB3)	05:04		
	16:22	17:15	18:10		20:08	34 19:41 (WEA ZB3)	21:03	51	20:32 (WEA ZB1)	21:50		
5	08:44	08:09	07:09		06:54	19:06 (WEA ZB3)	05:47		19:14 (WEA ZB3)	05:03		
	16:23	17:17	18:12		20:10	37 19:43 (WEA ZB3)	21:04	42	20:34 (WEA ZB1)	21:51		
6	08:44	08:07	07:07		06:52	19:04 (WEA ZB3)	05:45		19:45 (WEA ZB2)	05:02		
	16:24	17:19	18:14		20:11	40 19:44 (WEA ZB3)	21:06	28	20:35 (WEA ZB1)	21:52		
7	08:44	08:05	07:05		06:50	19:03 (WEA ZB3)	05:43		20:19 (WEA ZB1)	05:02		
	16:26	17:21	18:16		20:13	43 19:46 (WEA ZB3)	21:08	19	20:38 (WEA ZB1)	21:53		
8	08:43	08:03	07:02		06:47	19:02 (WEA ZB3)	05:42		20:18 (WEA ZB1)	05:01		
	16:27	17:23	18:18		20:15	46 19:48 (WEA ZB3)	21:10	21	20:39 (WEA ZB1)	21:54		
9	08:43	08:01	07:00		06:45	19:01 (WEA ZB3)	05:40		20:18 (WEA ZB1)	05:00		
	16:29	17:25	18:20		20:17	46 19:47 (WEA ZB3)	21:11	22	20:40 (WEA ZB1)	21:55		
10	08:42	07:59	06:57		06:42	19:00 (WEA ZB3)	05:38		20:18 (WEA ZB1)	05:00		
	16:30	17:27	18:22		20:19	48 19:48 (WEA ZB3)	21:13	25	20:43 (WEA ZB1)	21:56		
11	08:41	07:57	06:55		06:40	18:59 (WEA ZB3)	05:36		20:18 (WEA ZB1)	05:00		
	16:31	17:29	18:23		20:21	50 19:49 (WEA ZB3)	21:15	26	20:44 (WEA ZB1)	21:57		
12	08:40	07:55	06:53		06:38	18:58 (WEA ZB3)	05:34		20:17 (WEA ZB1)	04:59		
	16:33	17:31	18:25		20:22	57 19:55 (WEA ZB2)	21:17	28	20:45 (WEA ZB1)	21:57		
13	08:40	07:53	06:50		06:35	18:58 (WEA ZB3)	05:32		20:18 (WEA ZB1)	04:59		
	16:35	17:33	18:27		20:24	59 19:57 (WEA ZB2)	21:18	29	20:47 (WEA ZB1)	21:58		
14	08:39	07:51	06:48		06:33	18:58 (WEA ZB3)	05:31		20:18 (WEA ZB1)	04:59		
	16:36	17:35	18:29		20:26	61 19:59 (WEA ZB2)	21:20	28	20:46 (WEA ZB1)	21:59		
15	08:38	07:49	06:45		06:31	18:58 (WEA ZB3)	05:29		20:18 (WEA ZB1)	04:58		
	16:38	17:37	18:31		20:28	63 20:01 (WEA ZB2)	21:22	28	20:46 (WEA ZB1)	21:59		
16	08:37	07:47	06:43		06:28	18:56 (WEA ZB3)	05:27		20:18 (WEA ZB1)	04:58		
	16:40	17:39	18:33		20:30	66 20:02 (WEA ZB2)	21:23	28	20:46 (WEA ZB1)	22:00		
17	08:36	07:45	06:41		06:26	18:57 (WEA ZB3)	05:26		20:19 (WEA ZB1)	04:58		
	16:41	17:41	18:35		20:32	67 20:04 (WEA ZB2)	21:25	27	20:46 (WEA ZB1)	22:00		
18	08:35	07:43	06:38		06:24	18:57 (WEA ZB3)	05:24		20:19 (WEA ZB1)	04:58		
	16:43	17:43	18:37		20:33	68 20:05 (WEA ZB2)	21:27	26	20:45 (WEA ZB1)	22:01		
19	08:34	07:41	06:36		06:21	18:57 (WEA ZB3)	05:23		20:20 (WEA ZB1)	04:58		
	16:45	17:45	18:38		20:35	70 20:07 (WEA ZB2)	21:28	25	20:45 (WEA ZB1)	22:01		
20	08:33	07:39	06:33		06:19	18:57 (WEA ZB3)	05:21		20:21 (WEA ZB1)	04:58		
	16:46	17:47	18:40		20:37	72 20:09 (WEA ZB2)	21:30	24	20:45 (WEA ZB1)	22:02		
21	08:31	07:36	06:31		06:17	18:56 (WEA ZB3)	05:20		20:21 (WEA ZB1)	04:58		
	16:48	17:49	18:42		20:39	74 20:10 (WEA ZB2)	21:31	22	20:43 (WEA ZB1)	22:02		
22	08:30	07:34	06:28		06:15	18:57 (WEA ZB3)	05:18		20:22 (WEA ZB1)	04:58		
	16:50	17:51	18:44		20:41	74 20:11 (WEA ZB2)	21:33	21	20:43 (WEA ZB1)	22:02		
23	08:29	07:32	06:26		06:12	18:57 (WEA ZB3)	05:17		20:23 (WEA ZB1)	04:59		
	16:52	17:53	18:46		20:43	74 20:11 (WEA ZB2)	21:34	20	20:43 (WEA ZB1)	22:02		
24	08:28	07:30	06:23		06:10	18:58 (WEA ZB3)	05:16		20:24 (WEA ZB1)	04:59		
	16:54	17:55	18:48		20:44	73 20:11 (WEA ZB2)	21:36	18	20:42 (WEA ZB1)	22:02		
25	08:26	07:28	06:21		06:08	18:59 (WEA ZB3)	05:14		20:24 (WEA ZB1)	04:59		
	16:56	17:57	18:49		20:46	71 20:10 (WEA ZB2)	21:37	16	20:40 (WEA ZB1)	22:02		
26	08:25	07:25	06:19		06:06	18:59 (WEA ZB3)	05:13		20:26 (WEA ZB1)	05:00		
	16:58	17:59	18:51		20:48	71 20:10 (WEA ZB2)	21:39	13	20:39 (WEA ZB1)	22:02		
27	08:23	07:23	06:16		06:04	19:00 (WEA ZB3)	05:12		20:28 (WEA ZB1)	05:00		
	16:59	18:01	18:53		20:50	69 20:09 (WEA ZB2)	21:40	9	20:37 (WEA ZB1)	22:02		
28	08:22	07:21	06:14		06:02	19:01 (WEA ZB3)	05:11		20:30 (WEA ZB1)	05:01		
	17:01	18:02	18:55		20:52	68 20:09 (WEA ZB2)	21:41	5	20:35 (WEA ZB1)	22:02		
29	08:20		07:11		06:00	19:02 (WEA ZB3)	05:09			05:01		
	17:03		19:57		20:54	66 20:08 (WEA ZB2)	21:43			22:02		
30	08:19		07:09		05:57	19:03 (WEA ZB3)	05:08			05:02		
	17:05		19:59		20:55	64 20:07 (WEA ZB2)	21:44			22:02		
31	08:17		07:06	19:19 (WEA ZB3)			05:07					
	17:07		20:00	15 19:34 (WEA ZB3)			21:45					
Sonnenscheinstunden	251	274	367		419		493			509		
astr.max.mögl.Beschattung			15		1706		777					

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO37 - Westerhausen 1

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	July	August	September	Oktober	November	Dezember
1	05:03 22:01	05:42 21:27	20:28 (WEA ZB1) 06:36 20:55 (WEA ZB1) 20:21	18:58 (WEA ZB3) 07:28 19:48 (WEA ZB3) 19:07	07:26 16:57	08:21 16:13
2	05:03 22:01	05:44 21:25	20:28 (WEA ZB1) 06:37 20:54 (WEA ZB1) 20:18	18:59 (WEA ZB3) 07:30 19:47 (WEA ZB3) 19:05	07:28 16:55	08:22 16:13
3	05:04 22:01	05:45 21:23	20:28 (WEA ZB1) 06:39 20:51 (WEA ZB1) 20:16	18:59 (WEA ZB3) 07:32 19:45 (WEA ZB3) 19:02	07:30 16:53	08:24 16:12
4	05:05 22:00	05:47 21:21	20:28 (WEA ZB1) 06:41 20:50 (WEA ZB1) 20:13	18:59 (WEA ZB3) 07:34 19:45 (WEA ZB3) 19:00	07:32 16:51	08:25 16:11
5	05:06 22:00	05:49 21:19	20:29 (WEA ZB1) 06:43 20:49 (WEA ZB1) 20:11	19:00 (WEA ZB3) 07:36 19:43 (WEA ZB3) 18:58	07:34 16:50	08:26 16:11
6	05:07 21:59	05:50 21:17	19:58 (WEA ZB2) 06:44 20:46 (WEA ZB1) 20:09	19:00 (WEA ZB3) 07:37 19:40 (WEA ZB3) 18:55	07:36 16:48	08:28 16:10
7	05:08 21:58	05:52 21:15	19:55 (WEA ZB2) 06:46 20:45 (WEA ZB1) 20:06	19:01 (WEA ZB3) 07:39 19:38 (WEA ZB3) 18:53	07:38 16:46	08:29 16:10
8	05:09 21:58	05:54 21:13	19:22 (WEA ZB3) 06:48 20:43 (WEA ZB1) 20:04	19:03 (WEA ZB3) 07:41 19:36 (WEA ZB3) 18:50	07:40 16:44	08:30 16:09
9	05:10 21:57	05:55 21:11	19:19 (WEA ZB3) 06:50 20:41 (WEA ZB1) 20:01	19:03 (WEA ZB3) 07:43 19:33 (WEA ZB3) 18:48	07:42 16:42	08:32 16:09
10	05:11 21:56	05:57 21:09	19:17 (WEA ZB3) 06:51 20:40 (WEA ZB1) 19:59	19:05 (WEA ZB3) 07:45 19:31 (WEA ZB3) 18:46	07:43 16:41	08:33 16:09
11	05:12 21:55	05:59 21:07	19:14 (WEA ZB3) 06:53 20:37 (WEA ZB1) 19:56	19:07 (WEA ZB3) 07:47 19:29 (WEA ZB3) 18:43	07:45 16:39	08:34 16:08
12	05:13 21:54	06:01 21:05	19:13 (WEA ZB3) 06:55 20:15 (WEA ZB2) 19:54	19:10 (WEA ZB3) 07:48 19:26 (WEA ZB3) 18:41	07:47 16:37	08:35 16:08
13	05:14 21:53	06:02 21:03	19:10 (WEA ZB3) 06:57 20:15 (WEA ZB2) 19:51	19:18 (WEA ZB3) 07:50 19:19 (WEA ZB3) 18:39	07:49 16:36	08:36 16:08
14	05:15 21:52	06:04 21:01	19:09 (WEA ZB3) 06:58 20:16 (WEA ZB2) 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	05:17 21:51	06:06 20:59	19:08 (WEA ZB3) 07:00 20:17 (WEA ZB2) 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	05:18 21:50	06:08 20:57	19:06 (WEA ZB3) 07:02 20:16 (WEA ZB2) 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	05:19 21:49	06:09 20:55	19:06 (WEA ZB3) 07:04 20:17 (WEA ZB2) 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	05:21 21:48	06:11 20:53	19:05 (WEA ZB3) 07:05 20:17 (WEA ZB2) 19:39	07:59 18:27	07:58 16:28	08:41 16:09
19	05:22 21:46	06:13 20:50	19:03 (WEA ZB3) 07:07 20:16 (WEA ZB2) 19:37	08:01 18:25	08:00 16:27	08:41 16:09
20	05:23 21:45	06:15 20:48	19:03 (WEA ZB3) 07:09 20:16 (WEA ZB2) 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	05:25 21:44	06:16 20:46	19:02 (WEA ZB3) 07:11 20:16 (WEA ZB2) 19:32	08:05 18:20	08:04 16:24	08:43 16:10
22	05:26 21:42	06:18 20:44	19:01 (WEA ZB3) 07:12 20:15 (WEA ZB2) 19:29	08:07 18:18	08:06 16:23	08:43 16:10
23	05:28 21:41	06:20 20:41	19:01 (WEA ZB3) 07:14 20:13 (WEA ZB2) 19:27	08:09 18:16	08:07 16:21	08:44 16:11
24	05:29 21:40	06:22 20:39	19:01 (WEA ZB3) 07:16 20:11 (WEA ZB2) 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	05:31 21:38	06:23 20:37	18:59 (WEA ZB3) 07:18 20:08 (WEA ZB2) 19:22	08:13 17:12	08:11 16:19	08:44 16:12
26	05:32 21:37	06:25 20:35	18:59 (WEA ZB3) 07:20 20:06 (WEA ZB2) 19:20	08:15 17:10	08:13 16:18	08:45 16:13
27	05:34 21:35	06:27 20:32	18:59 (WEA ZB3) 07:21 20:04 (WEA ZB2) 19:17	08:17 17:07	08:14 16:17	08:45 16:13
28	05:35 21:33	06:29 20:30	18:58 (WEA ZB3) 07:23 20:01 (WEA ZB2) 19:15	08:18 17:05	08:16 16:16	08:45 16:14
29	05:37 21:32	06:30 20:28	18:59 (WEA ZB3) 07:25 19:59 (WEA ZB2) 19:12	08:20 17:03	08:17 16:15	08:45 16:15
30	05:39 21:30	06:32 20:25	18:59 (WEA ZB3) 07:27 19:57 (WEA ZB2) 19:10	08:22 17:01	08:19 16:14	08:45 16:16
31	05:40 21:28	06:34 20:23	18:58 (WEA ZB3) 19:54 (WEA ZB2)	08:24 16:59	 260	08:45 16:17
	Sonnenscheinstunden 511	459	382	329	260	235
	astr.max.mögl.Beschattung 352	1733	438			

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO4 - Utwarfe 4

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45	08:16	07:19	07:04	05:55	05:06	05:02	05:42	06:36	07:28	07:26	08:21
	16:18	17:09	18:04	20:02	20:57	21:47	22:01	21:27	20:20	19:07	16:57	16:13
2	08:45	08:14	07:16	07:02	05:53	05:05	05:03	05:43	06:37	07:30	07:28	08:22
	16:19	17:11	18:06	20:04	20:59	21:48	22:01	21:25	20:18	19:05	16:55	16:13
3	08:45	08:12	07:14	06:59	05:51	05:04	05:04	05:45	06:39	07:32	07:30	08:24
	16:20	17:13	18:08	20:06	21:01	21:49	22:01	21:23	20:16	19:02	16:53	16:12
4	08:45	08:10	07:12	06:57	05:49	05:04	05:05	05:47	06:41	07:34	07:32	08:25
	16:22	17:15	18:10	20:08	21:03	21:50	22:00	21:21	20:13	19:00	16:51	16:11
5	08:44	08:09	07:09	06:54	05:47	05:03	05:06	05:49	06:43	07:36	07:34	08:26
	16:23	17:17	18:12	20:10	21:04	21:51	22:00	21:19	20:11	18:58	16:49	16:11
6	08:44	08:07	07:07	06:52	05:45	05:02	05:06	05:50	06:44	07:37	07:36	08:28
	16:24	17:19	18:14	20:11	21:06	21:52	21:59	21:17	20:08	18:55	16:48	16:10
7	08:44	08:05	07:04	06:49	05:43	05:01	05:07	05:52	06:46	07:39	07:38	08:29
	16:26	17:21	18:16	20:13	21:08	21:53	21:58	21:15	20:06	18:53	16:46	16:10
8	08:43	08:03	07:02	06:47	05:41	05:01	05:08	05:54	06:48	07:41	07:40	08:30
	16:27	17:23	18:18	20:15	21:10	21:54	21:58	21:13	20:04	18:50	16:44	16:09
9	08:43	08:01	07:00	06:45	05:40	05:00	05:09	05:55	06:50	07:43	07:41	08:32
	16:28	17:25	18:20	20:17	21:11	21:55	21:57	21:11	20:01	18:48	16:42	16:09
10	08:42	07:59	06:57	06:42	05:38	05:00	05:11	05:57	06:51	07:45	07:43	08:33
	16:30	17:27	18:22	20:19	21:13	21:56	21:56	21:09	19:59	18:46	16:40	16:09
11	08:41	07:57	06:55	06:40	05:36	04:59	05:12	05:59	06:53	07:46	07:45	08:34
	16:31	17:29	18:23	20:21	21:15	21:57	21:55	21:07	19:56	18:43	16:39	16:08
12	08:40	07:55	06:53	06:38	05:34	04:59	05:13	06:01	06:55	07:48	07:47	08:35
	16:33	17:31	18:25	20:22	21:17	21:57	21:54	21:05	19:54	18:41	16:37	16:08
13	08:40	07:53	06:50	06:35	05:32	04:59	05:14	06:02	06:57	07:50	07:49	08:36
	16:35	17:33	18:27	20:24	21:18	21:58	21:53	21:03	19:51	18:39	16:35	16:08
14	08:39	07:51	06:48	06:33	05:31	04:58	05:15	06:04	06:58	07:52	07:51	08:37
	16:36	17:35	18:29	20:26	21:20	21:59	21:52	21:01	19:49	18:36	16:34	16:08
15	08:38	07:49	06:45	06:31	05:29	04:58	05:16	06:06	07:00	07:54	07:53	08:38
	16:38	17:37	18:31	20:28	21:22	21:59	21:51	20:59	19:47	18:34	16:32	16:08
16	08:37	07:47	06:43	06:28	05:27	04:58	05:18	06:08	07:02	07:56	07:55	08:39
	16:39	17:39	18:33	20:30	21:23	22:00	21:50	20:57	19:44	18:32	16:31	16:08
17	08:36	07:45	06:40	06:26	05:26	04:58	05:19	06:09	07:04	07:58	07:57	08:40
	16:41	17:41	18:35	20:32	21:25	22:00	21:49	20:55	19:42	18:29	16:29	16:08
18	08:35	07:43	06:38	06:24	05:24	04:58	05:20	06:11	07:05	07:59	07:58	08:41
	16:43	17:43	18:36	20:33	21:27	22:01	21:48	20:53	19:39	18:27	16:28	16:09
19	08:34	07:41	06:36	06:21	05:23	04:58	05:22	06:13	07:07	08:01	08:00	08:41
	16:45	17:45	18:38	20:35	21:28	22:01	21:46	20:50	19:37	18:25	16:26	16:09
20	08:33	07:39	06:33	06:19	05:21	04:58	05:23	06:15	07:09	08:03	08:02	08:42
	16:46	17:47	18:40	20:37	21:30	22:02	21:45	20:48	19:34	18:23	16:25	16:09
21	08:32	07:36	06:31	06:17	05:20	04:58	05:25	06:16	07:11	08:05	08:04	08:43
	16:48	17:49	18:42	20:39	21:31	22:02	21:44	20:46	19:32	18:20	16:24	16:10
22	08:30	07:34	06:28	06:15	05:18	04:58	05:26	06:18	07:12	08:07	08:06	08:43
	16:50	17:51	18:44	20:41	21:33	22:02	21:42	20:44	19:29	18:18	16:22	16:10
23	08:29	07:32	06:26	06:12	05:17	04:59	05:28	06:20	07:14	08:09	08:07	08:44
	16:52	17:53	18:46	20:43	21:34	22:02	21:41	20:41	19:27	18:16	16:21	16:11
24	08:28	07:30	06:23	06:10	05:15	04:59	05:29	06:22	07:16	08:11	08:09	08:44
	16:54	17:55	18:48	20:44	21:36	22:02	21:40	20:39	19:24	18:14	16:20	16:11
25	08:26	07:28	06:21	06:08	05:14	04:59	05:31	06:23	07:18	08:13	08:11	08:44
	16:56	17:57	18:49	20:46	21:37	22:02	21:38	20:37	19:22	18:12	16:19	16:12
26	08:25	07:25	06:19	06:06	05:13	05:00	05:32	06:25	07:19	08:15	08:13	08:45
	16:57	17:59	18:51	20:48	21:39	22:02	21:37	20:35	19:19	18:10	16:18	16:12
27	08:23	07:23	06:16	06:04	05:12	05:00	05:34	06:27	07:21	08:16	08:14	08:45
	16:59	18:00	18:53	20:50	21:40	22:02	21:35	20:32	19:17	18:07	16:17	16:13
28	08:22	07:21	06:14	06:02	05:10	05:01	05:35	06:29	07:23	08:18	08:16	08:45
	17:01	18:02	18:55	20:52	21:41	22:02	21:33	20:30	19:15	18:05	16:16	16:14
29	08:20		07:11	05:59	05:09	05:01	05:37	06:30	07:25	08:20	08:17	08:45
	17:03		19:57	20:54	21:43	22:02	21:32	20:28	19:12	18:03	16:15	16:15
30	08:19		07:09	05:57	05:08	05:02	05:39	06:32	07:27	08:22	08:19	08:45
	17:05		19:59	20:55	21:44	22:02	21:30	20:25	19:10	18:01	16:14	16:16
31	08:17		07:06		05:07		05:40	06:34		07:24		08:45
	17:07		20:00		21:45		21:28	20:23		16:59		16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.Beschattung												

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)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO5 - Klein Buschhausen 3
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:44 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:27 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:09	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:26	08:05 17:21	07:05 18:16	06:49 20:13	05:43 21:08	05:01 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:58	05:54 21:13	06:48 20:04	07:41 18:50	07:40 16:44	08:30 16:09
9	08:43 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	05:09 21:57	05:55 21:11	06:50 20:01	07:43 18:48	07:42 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	05:11 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:46 18:43	07:45 16:39	08:34 16:08
12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:22	05:34 21:17	04:59 21:58	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:34	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 21:59	05:16 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:07 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:41 18:35	06:26 20:32	05:26 21:25	04:58 22:01	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:36	06:24 20:33	05:24 21:27	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	07:59 18:27	07:58 16:28	08:41 16:08
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:23 21:28	04:58 22:01	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:14 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:36 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:09
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:42	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:58 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:10
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:45 16:12
26	08:25 16:57	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	05:32 21:37	06:25 20:35	07:19 19:19	07:15 17:09	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:17 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:10 21:42	05:00 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:18 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:45 16:16
31	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.Beschattung												

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) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO6 - Bohnenburg 20
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:26	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:01 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:02	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:44 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:48 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:26 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:08	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:26	08:05 17:21	07:04 18:16	06:49 20:13	05:43 21:08	05:01 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:58	05:54 21:13	06:48 20:04	07:41 18:50	07:40 16:44	08:30 16:09
9	08:42 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:39 21:11	05:00 21:55	05:09 21:57	05:55 21:11	06:50 20:01	07:43 18:48	07:41 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:21	06:42 20:19	05:38 21:13	05:00 21:56	05:10 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:46 18:43	07:45 16:39	08:34 16:08
12	08:40 16:33	07:55 17:31	06:53 18:25	06:38 20:22	05:34 21:17	04:59 21:57	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:34	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 21:59	05:16 21:51	06:06 20:59	07:00 19:46	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:07 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:40 18:35	06:26 20:32	05:26 21:25	04:58 22:00	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:36	06:24 20:33	05:24 21:26	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	07:59 18:27	07:58 16:28	08:41 16:08
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:22 21:28	04:58 22:01	05:22 21:46	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:14 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:31 16:48	07:36 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:09
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:42	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:58 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:10
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:21 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:44 16:12
26	08:25 16:57	07:25 17:58	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	05:32 21:36	06:25 20:35	07:19 19:19	07:15 17:09	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:16 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:01 20:52	05:10 21:41	05:00 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:53	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:17 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:45 16:16
31	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO7 - Sengwarder Chausseehaus

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:26	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:01 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:02	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:44 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:26 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:08	07:37 18:55	07:36 16:48	08:28 16:10
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10	08:42 16:30	07:59 17:27	06:57 18:21	06:42 20:19	05:38 21:13	05:00 21:56	05:11 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
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31	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.Beschattung												

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

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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO8 - Idschenhausen 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
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31	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	419	493	509	511	459	382	329	260	234
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung **Schattenrezeptor:** IO9 - Idschenhausen 2
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:26	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
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astr.max.mögl.Beschattung												

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) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Anhang C

Berechnungsergebnisse Gesamtbelastung

\\S-GKN-FS02.MBBM-GROUP.COM\ALLEFIRMEN\M\PROJ\180\M180777\M180777_02_BER_1D.DOCX: 13. 11. 2024

SHADOW - Hauptergebnis

Berechnung: M180777_02 Gesamtbelastung Annahmen für Schattenwurfberechnung

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

Die dargestellten Zeiten sind die astronomisch maximal mögliche
Beschattungsdauer, berechnet unter folgenden Annahmen:
Die Sonne scheint täglich von Sonnenauf- bis -untergang
Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
Die Windenergieanlage/n ist/sind immer in Betrieb

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: M180777_02_EMDGrid_0.wpg
Rasterauflösung: 1,0 m

Alle Koordinatenangaben in:
UTM (north)-WGS84 Zone: 32

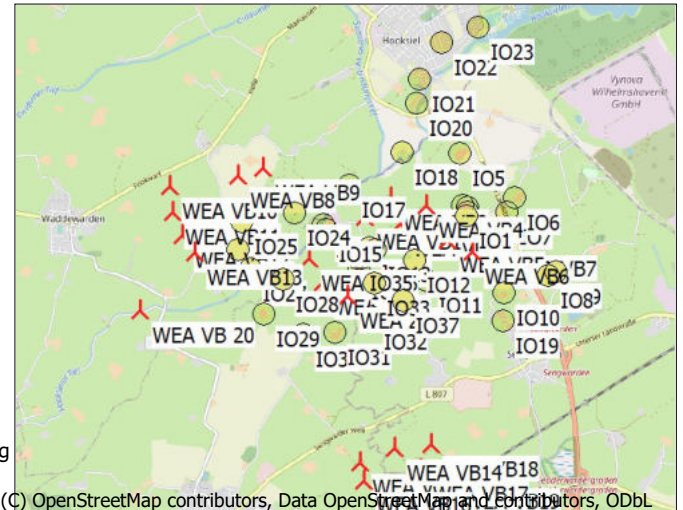
WEA

	Ost	Nord	Z	Beschreibung	WEA-Typ			Nenn- leistung	Rotor- durch- messer	NH	Schattendaten	
					Ak- tu- ell	Hersteller	Typ				Beschatt.- Bereich	U/min
			[m]					[kW]	[m]	[m]	[m]	[U/min]
WEA VB 20	431.787	5.939.386	1,2	VESTAS V39 50...	Nein	VESTAS	V39-500	500	39,0	41,5	765	30,1
WEA VB1	434.774	5.940.580	1,2	VESTAS V112-3...	Ja	VESTAS	V112-3.3 Gridstreame-3.300	3.300	112,0	94,0	1.711	13,1
WEA VB10	432.205	5.941.014	1,3	ENERCON E-82 ...	Ja	ENERCON	E-82 E2-2.300	2.300	82,0	108,4	1.601	18,0
WEA VB11	432.241	5.940.674	1,5	ENERCON E-82 ...	Ja	ENERCON	E-82 E2-2.300	2.300	82,0	108,4	1.601	18,0
WEA VB12	432.356	5.940.371	1,0	ENERCON E-10...	Nein	ENERCON	E-101-3.000	3.000	101,0	99,0	2.216	14,5
WEA VB13	432.527	5.940.125	1,1	ENERCON E-10...	Nein	ENERCON	E-101-3.000	3.000	101,0	99,0	2.216	14,5
WEA VB14	435.137	5.937.518	2,2	Siemens SWT-6...	Nein	Siemens	SWT-6.0-6.000	6.000	154,0	120,0	2.500	-
WEA VB15	434.680	5.937.333	1,1	MICON NM900-...	Nein	MICON	NM900-52-900	900	52,0	49,0	2.500	-
WEA VB16	434.720	5.937.091	1,0	MICON NM900-...	Nein	MICON	NM900-52-900	900	52,0	49,0	2.500	-
WEA VB17	435.480	5.937.236	1,0	VESTAS V112-3...	Ja	VESTAS	V112-3.3 Gridstreame-3.300	3.300	112,0	112,0	1.710	13,1
WEA VB18	435.622	5.937.556	2,0	NORDEX N117 ...	Nein	NORDEX	N117-2.400	2.400	117,0	91,0	1.489	11,8
WEA VB19	435.903	5.937.129	2,4	Siemens SWT-6...	Nein	Siemens	SWT-6.0-6.000	6.000	154,0	120,0	2.500	-
WEA VB2	435.138	5.940.834	1,2	VESTAS V112-3...	Ja	VESTAS	V112-3.3 Gridstreame-3.300	3.300	112,0	119,0	1.709	13,1
WEA VB3	435.257	5.940.480	1,3	VESTAS V112-3...	Ja	VESTAS	V112-3.3 Gridstreame-3.300	3.300	112,0	119,0	1.709	13,1
WEA VB4	435.599	5.940.725	1,0	VESTAS V112-3...	Ja	VESTAS	V112-3.3 Gridstreame-3.300	3.300	112,0	119,0	1.709	13,1
WEA VB5	435.874	5.940.249	1,6	VESTAS V112-3...	Ja	VESTAS	V112-3.3 Gridstreame-3.300	3.300	112,0	119,0	1.709	13,1
WEA VB6	436.206	5.940.107	1,4	VESTAS V112-3...	Ja	VESTAS	V112-3.3 Gridstreame-3.300	3.300	112,0	119,0	1.709	13,1
WEA VB7	436.556	5.940.198	1,5	VESTAS V112-3...	Ja	VESTAS	V112-3.3 Gridstreame-3.300	3.300	112,0	94,0	1.711	13,1
WEA VB8	433.106	5.941.146	2,5	MICON M1500 ...	Nein	MICON	M1500-250/150	600	43,0	46,0	2.500	27,0
WEA VB9	433.437	5.941.235	2,0	MICON M750 2...	Nein	MICON	M750-600/50	250	31,0	36,0	2.500	30,5
WEA ZB1	434.029	5.940.044	1,1	NORDEX N163/...	Ja	NORDEX	N163/6.X-7.000	7.000	163,0	118,0	1.788	10,7
WEA ZB2	434.212	5.939.722	0,7	NORDEX N163/...	Ja	NORDEX	N163/6.X-7.000	7.000	163,0	118,0	1.788	10,7
WEA ZB3	434.540	5.939.539	0,5	NORDEX N163/...	Ja	NORDEX	N163/6.X-7.000	7.000	163,0	118,0	1.788	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]
IO1	Utwarfe 1	436.131	5.940.572	3,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO10	Rommelhausen 4	436.614	5.939.542	2,9	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO11	Westerhausen 3	435.587	5.939.724	2,1	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO12	Westerhausen 4	435.445	5.939.994	2,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO13	Westerhausen 11	434.919	5.940.137	1,9	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO14	Westerhausen 12	434.838	5.940.170	3,7	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO15	Westerhausen 9A	434.262	5.940.420	1,5	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO16	Westerhausen 9	434.230	5.940.481	2,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO17	Rüschstede 1	434.591	5.941.001	2,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0

(Fortsetzung nächste Seite)...



SHADOW - Hauptergebnis

Berechnung: M180777_02 Gesamtbelastung

...(Fortsetzung von vorheriger Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
				[m]	[m]	[m]	[m]	[°]		[m]
IO18	Langengroden 1	435.289	5.941.414	1,9	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO19	WA Sengwarden BP207	436.605	5.939.173	1,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO2	Utwarfe 2	436.140	5.940.625	3,6	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO20	Langengrodener Weg 17	435.491	5.942.055	1,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO21	Am Sudring 15	435.532	5.942.394	1,9	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO22	Georg-Adden-Straße 55	435.830	5.942.859	1,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO23	Hooksiel	436.324	5.943.054	0,8	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO24	Depenhausen/Pakens 1	433.854	5.940.646	0,8	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO25	Tain 3	433.154	5.940.529	2,7	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO26	Waterpott 1	433.089	5.940.168	1,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO27	Klein Depenhausen 1	433.254	5.939.909	2,5	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO28	Klein Westerhausen 1	433.683	5.939.767	2,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO29	Depenhausen 1	433.437	5.939.318	1,6	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO3	Utwarfe 3	436.153	5.940.685	2,8	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO30	Purkswarfe 2	433.950	5.939.029	1,4	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO31	Purkswarfe 3	434.370	5.939.047	1,6	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO32	Putzwei 1	434.854	5.939.246	2,5	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO33	Westerhausen 5	434.903	5.939.704	1,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO34	Westerhausen 6	434.704	5.939.918	4,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO35	Westerhausen 7	434.664	5.940.034	4,0	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO36	Westerhausen 10	434.732	5.940.032	4,4	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO37	Westerhausen 1	435.270	5.939.464	1,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO4	Utwarfe 4	436.089	5.940.708	3,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO5	Klein Buschhausen 3	436.045	5.941.392	1,9	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO6	Bohnenburg 20	436.785	5.940.793	1,5	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO7	Sengwarder Chausseehaus	436.664	5.940.615	1,4	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO8	Idschenhausen 1	437.215	5.939.770	3,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO9	Idschenhausen 2	437.310	5.939.811	2,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0

Berechnungsergebnisse

Schattenrezeptor

astron. max. mögl. Beschattungsdauer

Nr.	Name	Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag
		[h/a]	[d/a]	[h/d]
IO1	Utwarfe 1	297:19	314	2:15
IO10	Rommelhausen 4	11:52	54	0:17
IO11	Westerhausen 3	70:32	185	0:39
IO12	Westerhausen 4	82:54	198	0:44
IO13	Westerhausen 11	166:53	239	1:04
IO14	Westerhausen 12	164:08	237	1:02
IO15	Westerhausen 9A	352:23	338	2:26
IO16	Westerhausen 9	253:47	284	2:10
IO17	Rüschentede 1	167:08	184	1:32
IO18	Langengroden 1	87:02	66	1:57
IO19	WA Sengwarden BP207	8:29	40	0:16
IO2	Utwarfe 2	256:54	252	2:08
IO20	Langengrodener Weg 17	0:00	0	0:00
IO21	Am Sudring 15	0:00	0	0:00
IO22	Georg-Adden-Straße 55	0:00	0	0:00
IO23	Hooksiel	0:00	0	0:00
IO24	Depenhausen/Pakens 1	122:46	217	1:38
IO25	Tain 3	94:05	211	1:13
IO26	Waterpott 1	109:11	228	1:17
IO27	Klein Depenhausen 1	122:21	211	1:19
IO28	Klein Westerhausen 1	122:54	183	1:09
IO29	Depenhausen 1	81:42	174	0:47
IO3	Utwarfe 3	242:00	222	2:01
IO30	Purkswarfe 2	12:33	68	0:19
IO31	Purkswarfe 3	4:08	37	0:11
IO32	Putzwei 1	35:33	57	0:51
IO33	Westerhausen 5	265:31	253	2:02
IO34	Westerhausen 6	342:36	298	1:36
IO35	Westerhausen 7	275:15	270	1:36

(Fortsetzung nächste Seite)...

SHADOW - Hauptergebnis

Berechnung: M180777_02 Gesamtbelastung

...(Fortsetzung von vorheriger Seite)

Nr.	Name	astron. max. mögl. Beschattungsdauer		
		Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag
		[h/a]	[d/a]	[h/d]
IO36	Westerhausen 10	245:55	243	1:17
IO37	Westerhausen 1	102:47	167	1:14
IO4	Utwarfe 4	243:17	223	1:59
IO5	Klein Buschhausen 3	73:22	119	0:59
IO6	Bohnenburg 20	87:39	173	1:00
IO7	Sengwarder Chausseehaus	152:49	203	1:31
IO8	Idschenhausen 1	46:26	108	0:36
IO9	Idschenhausen 2	51:02	127	0:33

Gesamtdauer Beschattung an Rezeptoren pro WEA

Nr.	Name	Maximal [h/a]
WEA VB 20	VESTAS V39 500 39.0 !#! NH: 41,5 m (Ges:61,0 m) (24)	0:00
WEA VB1	VESTAS V112-3.3 Gridstreame 3300 112.0 !O! NH: 94,0 m (Ges:150,0 m) (4)	238:08
WEA VB10	ENERCON E-82 E2 2300 82.0 !O! NH: 108,4 m (Ges:149,4 m) (13)	10:52
WEA VB11	ENERCON E-82 E2 2300 82.0 !O! NH: 108,4 m (Ges:149,4 m) (14)	32:03
WEA VB12	ENERCON E-101 3000 101.0 !-! NH: 99,0 m (Ges:149,5 m) (15)	56:41
WEA VB13	ENERCON E-101 3000 101.0 !-! NH: 99,0 m (Ges:149,5 m) (16)	81:06
WEA VB14	Siemens SWT-6.0 6000 154.0 !O! NH: 120,0 m (Ges:197,0 m) (17)	22:37
WEA VB15	MICON NM900-52 900 52.0 !-! NH: 49,0 m (Ges:75,0 m) (18)	0:00
WEA VB16	MICON NM900-52 900 52.0 !-! NH: 49,0 m (Ges:75,0 m) (19)	0:00
WEA VB17	VESTAS V112-3.3 Gridstreame 3300 112.0 !O! NH: 112,0 m (Ges:168,0 m) (20)	0:00
WEA VB18	NORDEX N117 2400 117.0 !O! NH: 91,0 m (Ges:149,5 m) (21)	0:00
WEA VB19	Siemens SWT-6.0 6000 154.0 !O! NH: 120,0 m (Ges:197,0 m) (22)	3:04
WEA VB2	VESTAS V112-3.3 Gridstreame 3300 112.0 !O! NH: 119,0 m (Ges:175,0 m) (5)	175:38
WEA VB3	VESTAS V112-3.3 Gridstreame 3300 112.0 !O! NH: 119,0 m (Ges:175,0 m) (6)	116:28
WEA VB4	VESTAS V112-3.3 Gridstreame 3300 112.0 !O! NH: 119,0 m (Ges:175,0 m) (7)	248:01
WEA VB5	VESTAS V112-3.3 Gridstreame 3300 112.0 !O! NH: 119,0 m (Ges:175,0 m) (8)	293:07
WEA VB6	VESTAS V112-3.3 Gridstreame 3300 112.0 !O! NH: 119,0 m (Ges:175,0 m) (9)	238:24
WEA VB7	VESTAS V112-3.3 Gridstreame 3300 112.0 !O! NH: 94,0 m (Ges:150,0 m) (10)	298:19
WEA VB8	MICON M1500 600-150 43.0 !O! NH: 46,0 m (Ges:67,5 m) (11)	2:43
WEA VB9	MICON M750 250-50 31.0 !O! NH: 36,0 m (Ges:51,5 m) (12)	0:00
WEA ZB1	NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (1)	578:16
WEA ZB2	NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (2)	500:59
WEA ZB3	NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (3)	564:49

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:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH

Helmut-A. Müller-Straße 1-5

DE-82152 Planegg / München

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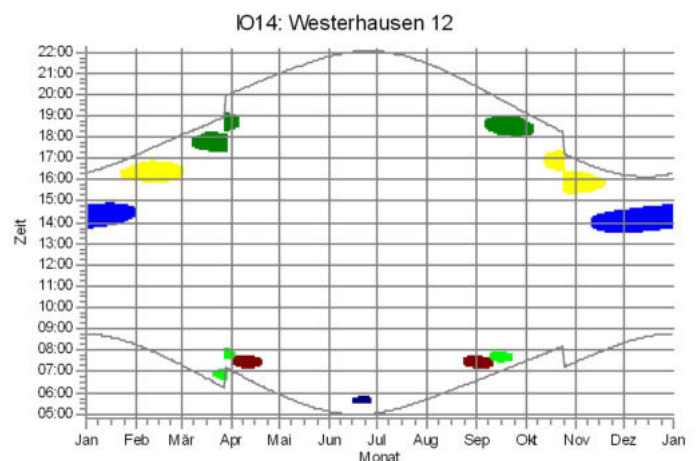
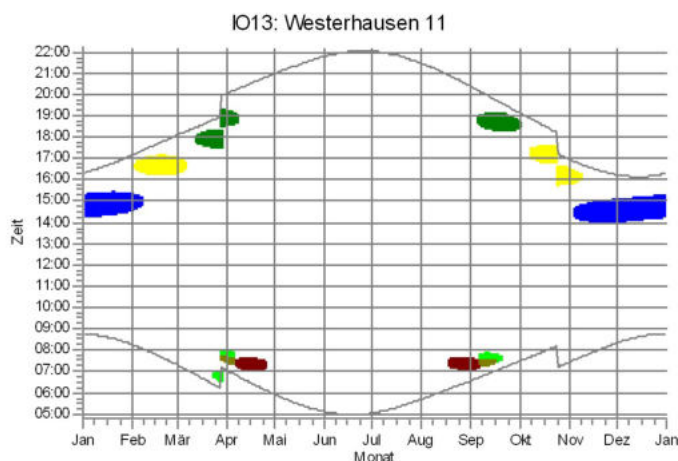
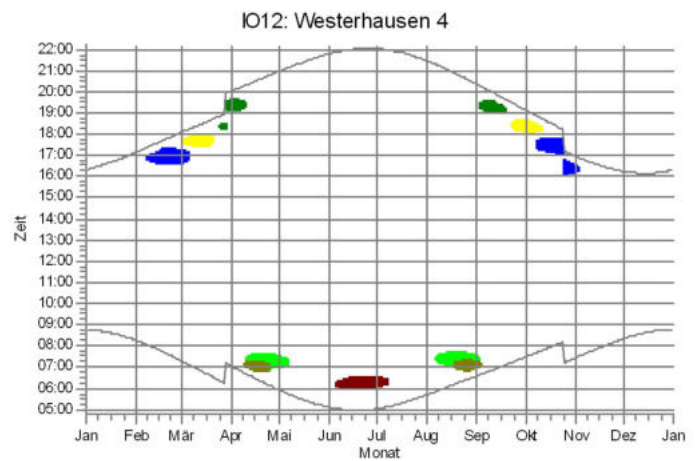
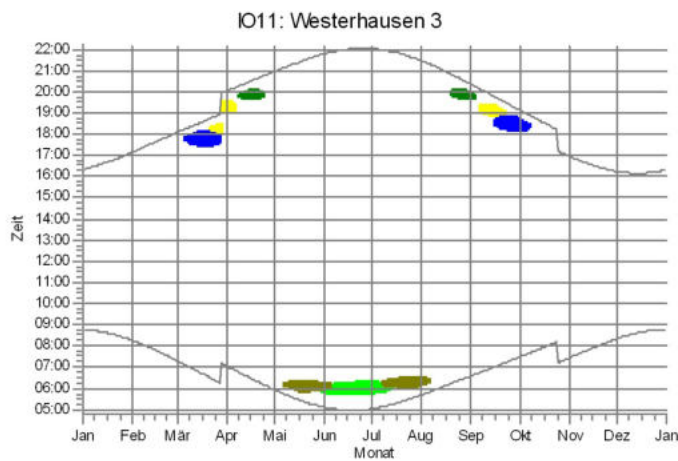
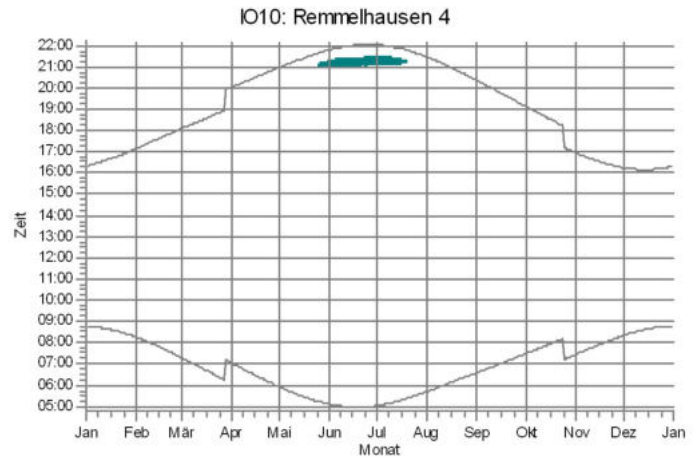
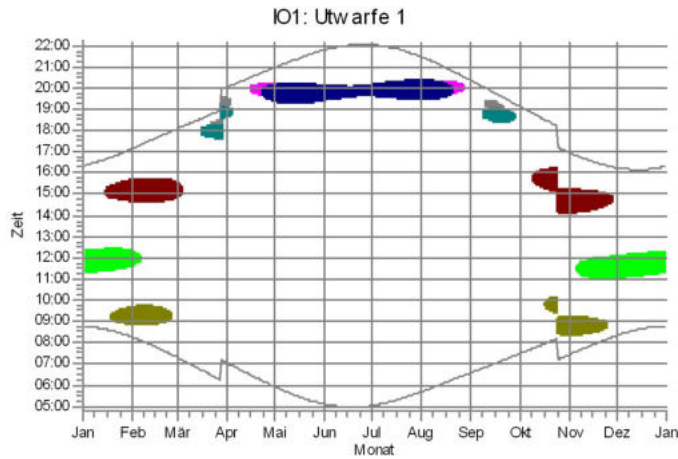
Felix Bergholz / Felix.Bergholz@mbbm-ind.com

Berechnet:

17.09.2024 16:15/4.0.531

SHADOW - Grafischer Kalender

Berechnung: M180777_02 Gesamtbelastung



WEA

WEA ZB1: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (1)
WEA ZB2: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (2)
WEA ZB3: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (3)
WEA VB1: VESTAS V112-3.3 Gridstreame 3300 112.0 IO! NH: 94,0 m (Ges:150,0 m) (4)
WEA VB2: VESTAS V112-3.3 Gridstreame 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (5)

WEA VB3: VESTAS V112-3.3 Gridstreame 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (6)
WEA VB4: VESTAS V112-3.3 Gridstreame 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (7)
WEA VB5: VESTAS V112-3.3 Gridstreame 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (8)
WEA VB6: VESTAS V112-3.3 Gridstreame 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (9)
WEA VB7: VESTAS V112-3.3 Gridstreame 3300 112.0 IO! NH: 94,0 m (Ges:150,0 m) (10)

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH

Helmut-A. Müller-Straße 1-5

DE-82152 Planegg / München

0049 89 85 602 0

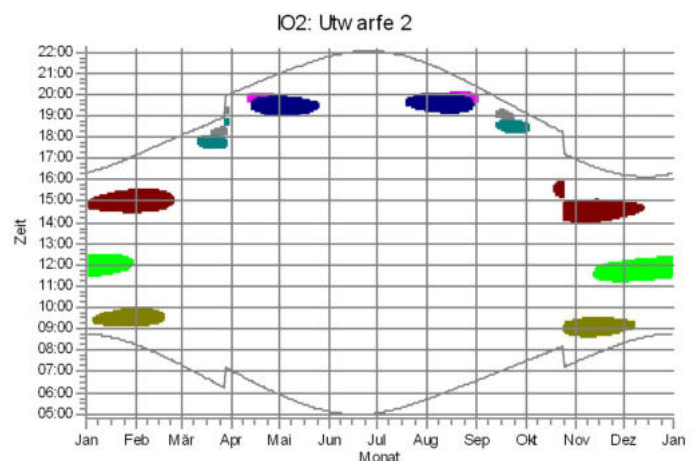
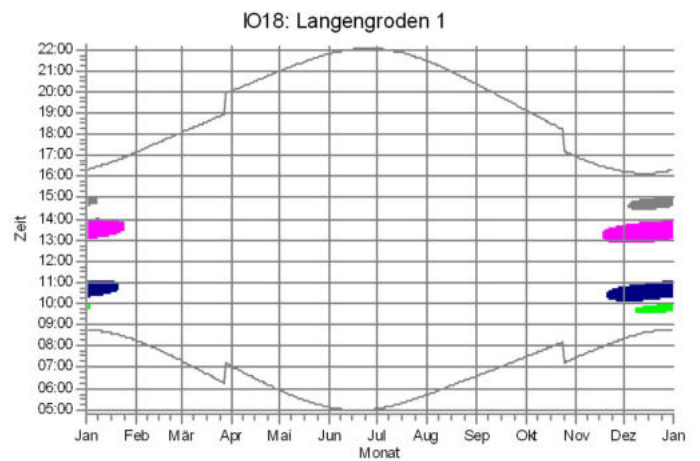
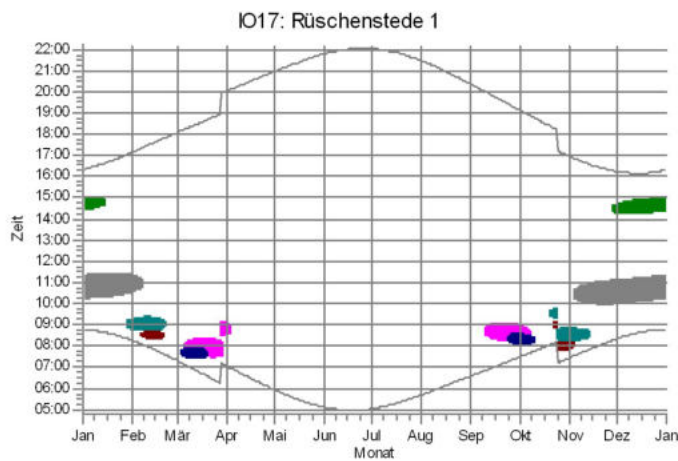
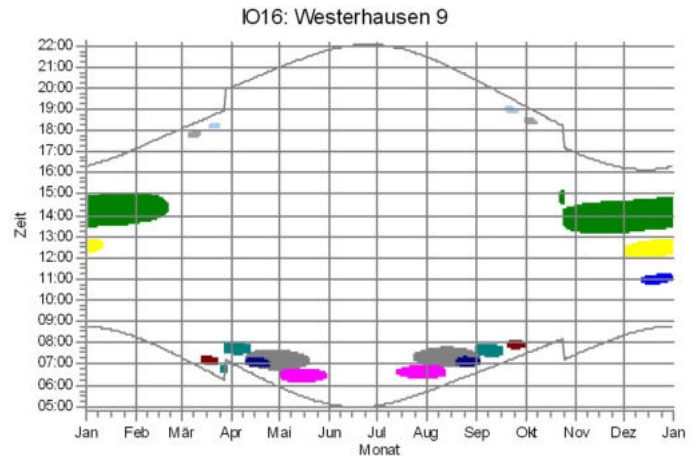
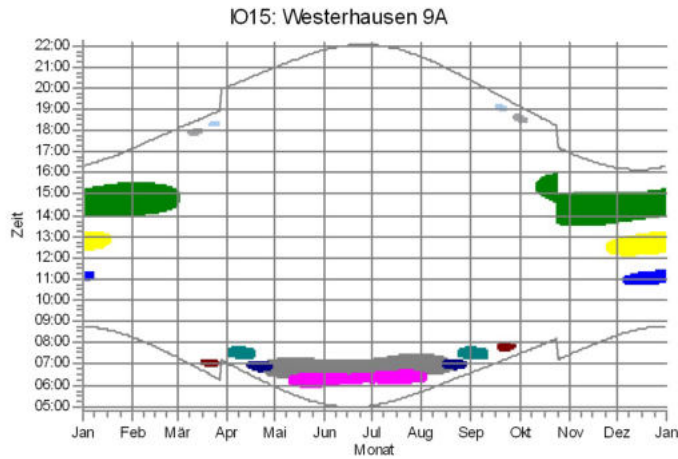
Felix Bergholz / Felix.Bergholz@mbbm-ind.com

Berechnet:

17.09.2024 16:15/4.0.531

SHADOW - Grafischer Kalender

Berechnung: M180777_02 Gesamtbelastung



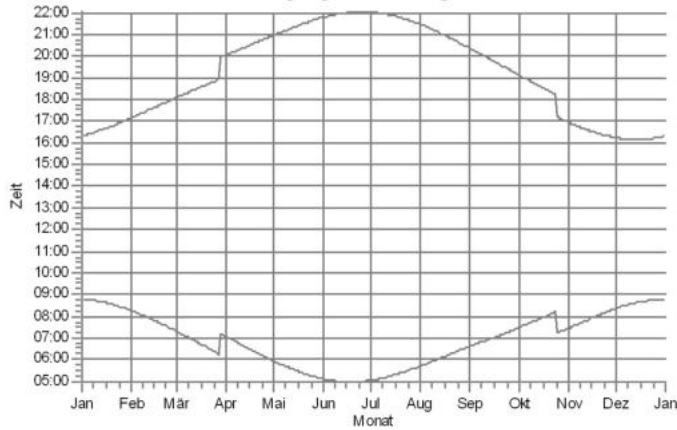
WEA

WEA ZB1: NORDEX N163/6.X 7000 163.0 IOI NH: 118,0 m (Ges:199,5 m) (1)
WEA ZB2: NORDEX N163/6.X 7000 163.0 IOI NH: 118,0 m (Ges:199,5 m) (2)
WEA ZB3: NORDEX N163/6.X 7000 163.0 IOI NH: 118,0 m (Ges:199,5 m) (3)
WEA VB1: VESTAS V112-3.3 Gridstream 3300 112.0 IOI NH: 94,0 m (Ges:150,0 m) (4)
WEA VB2: VESTAS V112-3.3 Gridstream 3300 112.0 IOI NH: 119,0 m (Ges:175,0 m) (5)
WEA VB3: VESTAS V112-3.3 Gridstream 3300 112.0 IOI NH: 119,0 m (Ges:175,0 m) (6)
WEA VB4: VESTAS V112-3.3 Gridstream 3300 112.0 IOI NH: 119,0 m (Ges:175,0 m) (7)

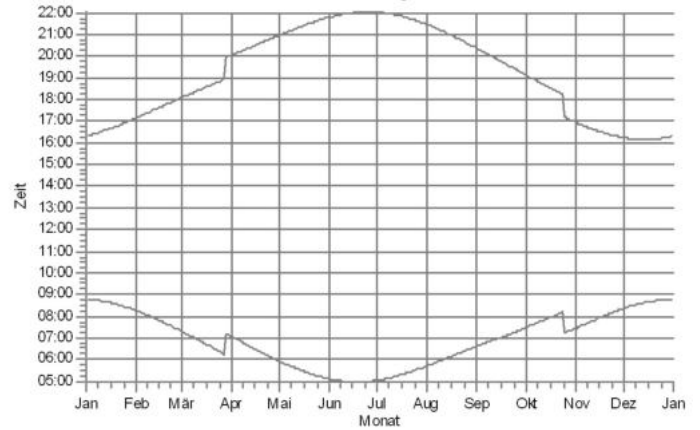
WEA VB5: VESTAS V112-3.3 Gridstream 3300 112.0 IOI NH: 119,0 m (Ges:175,0 m) (8)
WEA VB6: VESTAS V112-3.3 Gridstream 3300 112.0 IOI NH: 119,0 m (Ges:175,0 m) (9)
WEA VB7: VESTAS V112-3.3 Gridstream 3300 112.0 IOI NH: 94,0 m (Ges:150,0 m) (10)
WEA VB12: ENERCON E-101 3000 101.0 I-I NH: 99,0 m (Ges:149,5 m) (15)
WEA VB13: ENERCON E-101 3000 101.0 I-I NH: 99,0 m (Ges:149,5 m) (16)
WEA VB14: Siemens SWT-6.0 6000 154.0 IOI NH: 120,0 m (Ges:197,0 m) (17)

SHADOW - Grafischer Kalender**Berechnung:** M180777_02 Gesamtbelastung

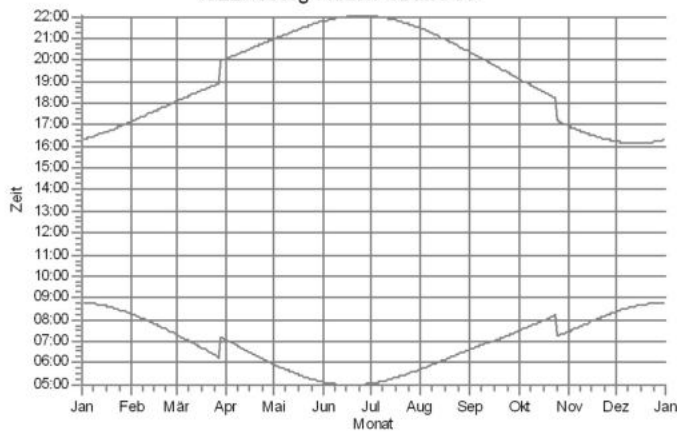
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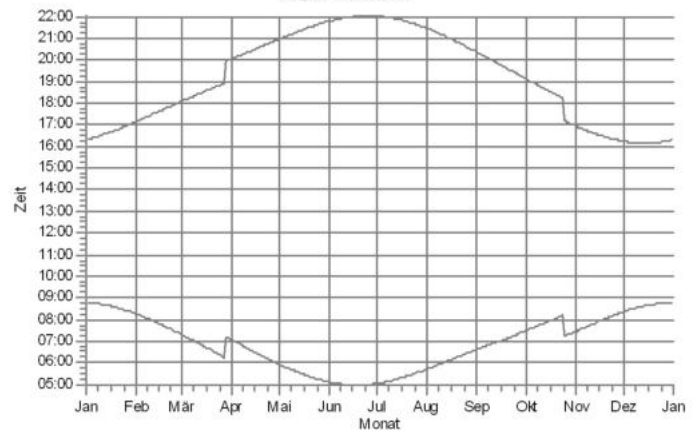
IO21: Am Sudring 15



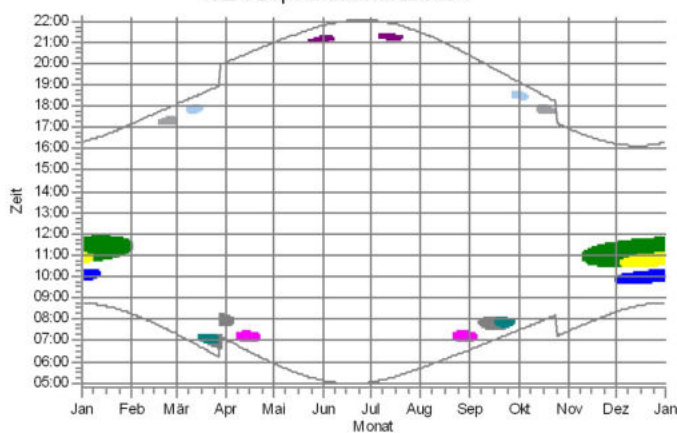
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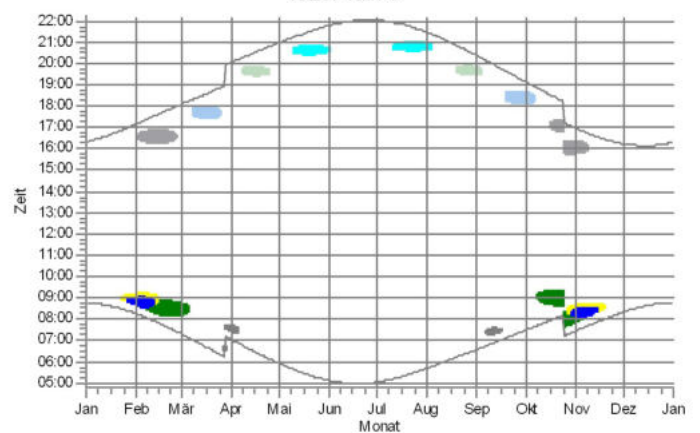
IO23: Hooksiel



IO24: Depenhhausen/Pakens 1



IO25: Tain 3



WEA

WEA ZB1: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (1)
WEA ZB2: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (2)
WEA ZB3: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (3)
WEA VB1: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 94,0 m (Ges:150,0 m) (4)
WEA VB2: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (5)
WEA VB3: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (6)

WEA VB8: MICON M1500 600-150 43.0 IO! NH: 46,0 m (Ges:67,5 m) (11)
WEA VB10: ENERCON E-82 E2 2300 82.0 IO! NH: 108,4 m (Ges:149,4 m) (13)
WEA VB11: ENERCON E-82 E2 2300 82.0 IO! NH: 108,4 m (Ges:149,4 m) (14)
WEA VB12: ENERCON E-101 3000 101.0 IO! NH: 99,0 m (Ges:149,5 m) (15)
WEA VB13: ENERCON E-101 3000 101.0 IO! NH: 99,0 m (Ges:149,5 m) (16)

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH

Helmut-A. Müller-Straße 1-5

DE-82152 Planegg / München

0049 89 85 602 0

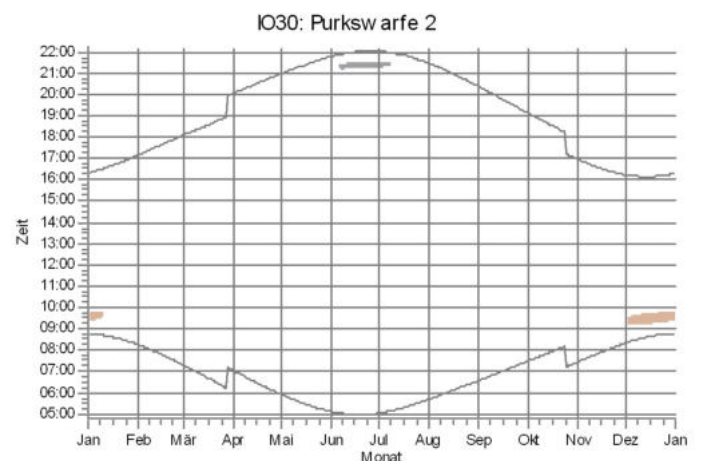
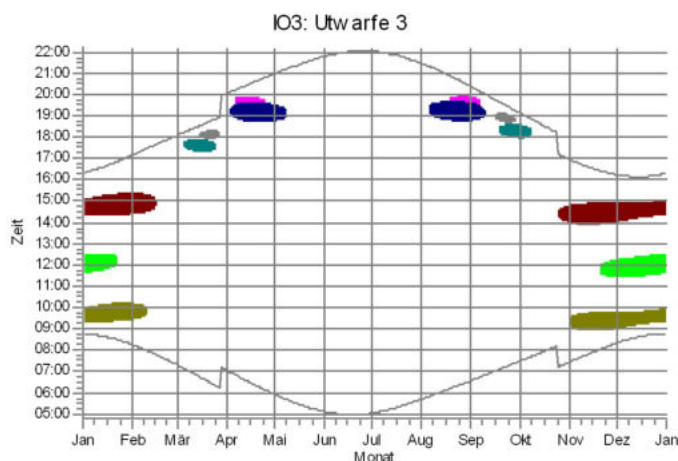
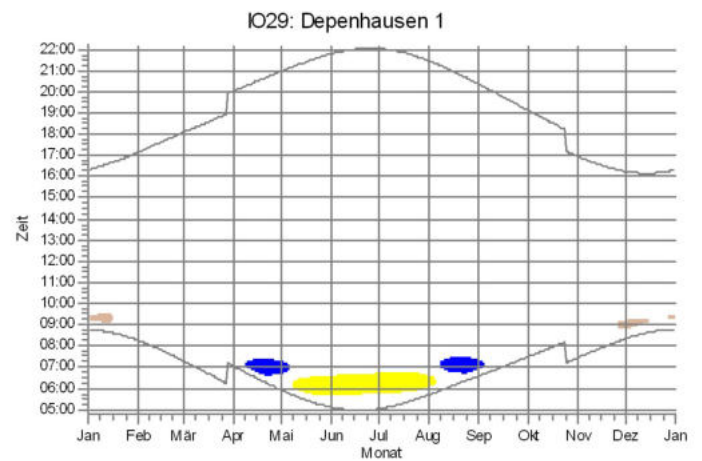
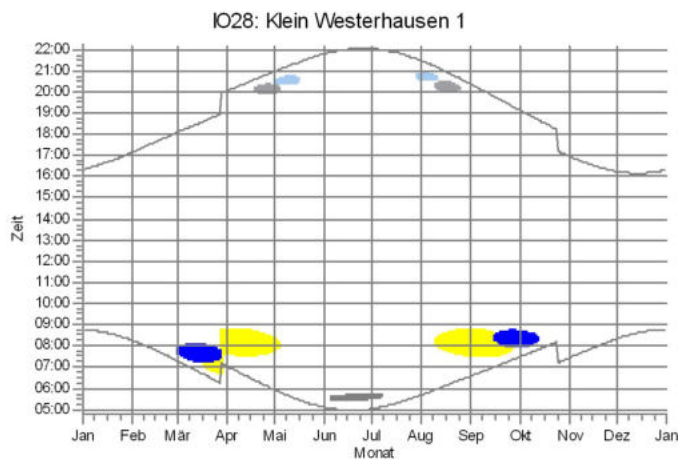
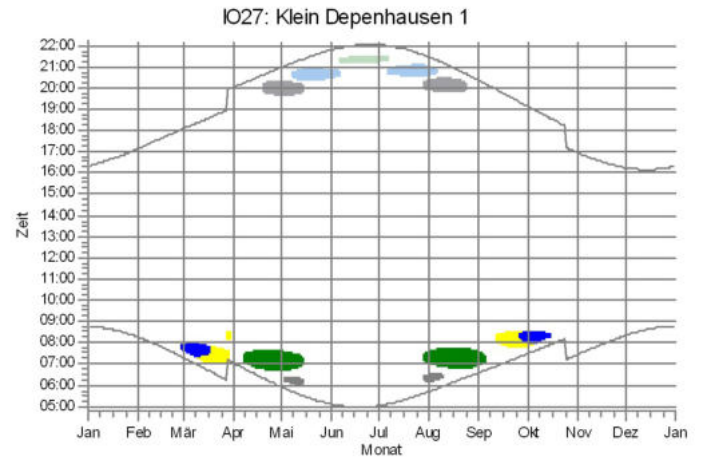
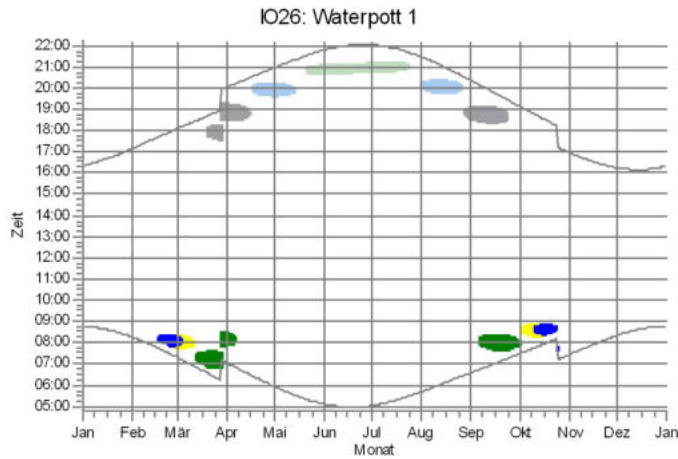
Felix Bergholz / Felix.Bergholz@mbbm-ind.com

Berechnet:

17.09.2024 16:15/4.0.531

SHADOW - Grafischer Kalender

Berechnung: M180777_02 Gesamtbelastung



WEA

WEA ZB1: NORDEX N163/6.X 7000 163.0 IOI NH: 118,0 m (Ges:199,5 m) (1)
WEA ZB2: NORDEX N163/6.X 7000 163.0 IOI NH: 118,0 m (Ges:199,5 m) (2)
WEA ZB3: NORDEX N163/6.X 7000 163.0 IOI NH: 118,0 m (Ges:199,5 m) (3)
WEA VB1: VESTAS V112-3.3 Gridstream 3300 112.0 IOI NH: 94,0 m (Ges:150,0 m) (4)
WEA VB2: VESTAS V112-3.3 Gridstream 3300 112.0 IOI NH: 119,0 m (Ges:175,0 m) (5)
WEA VB3: VESTAS V112-3.3 Gridstream 3300 112.0 IOI NH: 119,0 m (Ges:175,0 m) (6)
WEA VB4: VESTAS V112-3.3 Gridstream 3300 112.0 IOI NH: 119,0 m (Ges:175,0 m) (7)

WEA VB5: VESTAS V112-3.3 Gridstream 3300 112.0 IOI NH: 119,0 m (Ges:175,0 m) (8)
WEA VB6: VESTAS V112-3.3 Gridstream 3300 112.0 IOI NH: 119,0 m (Ges:175,0 m) (9)
WEA VB7: VESTAS V112-3.3 Gridstream 3300 112.0 IOI NH: 94,0 m (Ges:150,0 m) (10)
WEA VB11: ENERCON E-82 E2 2300 82.0 IOI NH: 108,4 m (Ges:149,4 m) (14)
WEA VB12: ENERCON E-101 3000 101.0 IOI NH: 99,0 m (Ges:149,5 m) (15)
WEA VB13: ENERCON E-101 3000 101.0 IOI NH: 99,0 m (Ges:149,5 m) (16)
WEA VB14: Siemens SWT-6.0 6000 154.0 IOI NH: 120,0 m (Ges:197,0 m) (17)

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH

Helmut-A. Müller-Straße 1-5

DE-82152 Planegg / München

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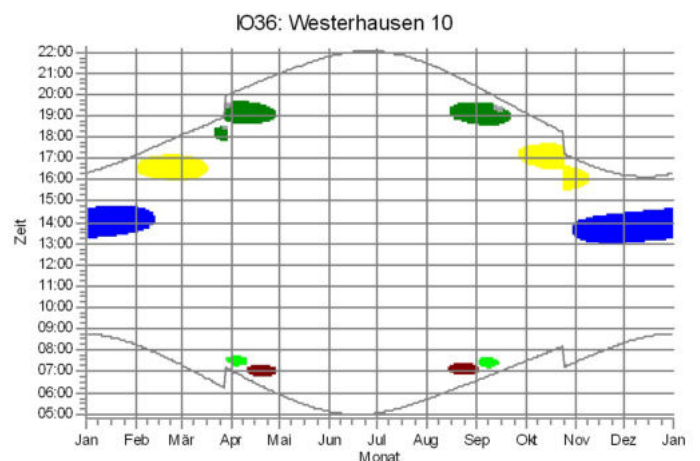
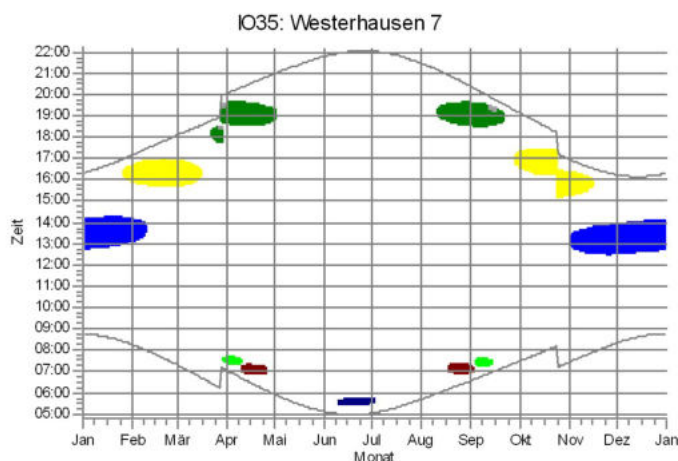
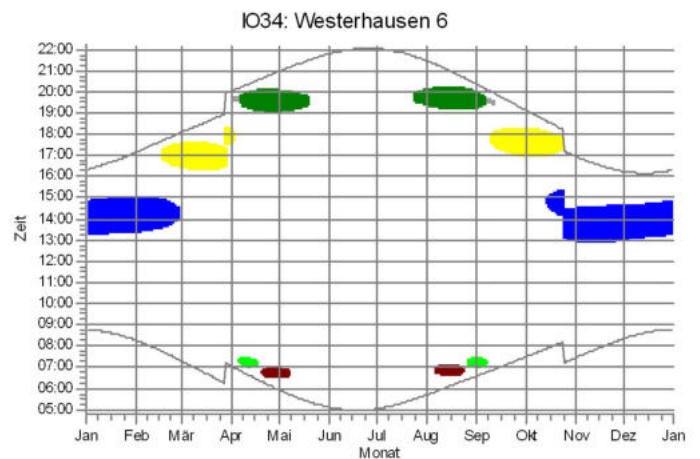
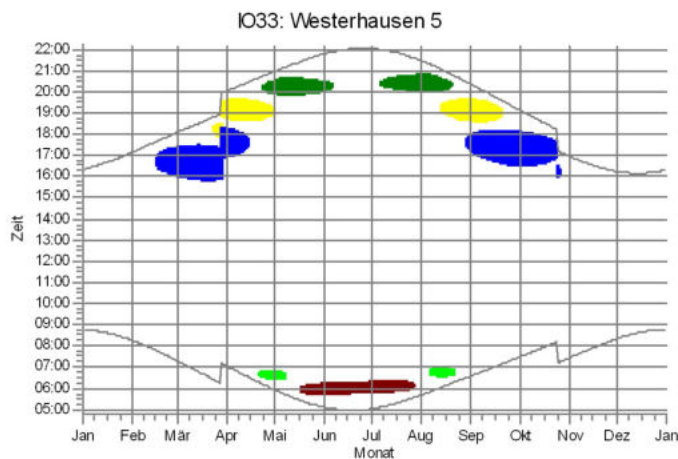
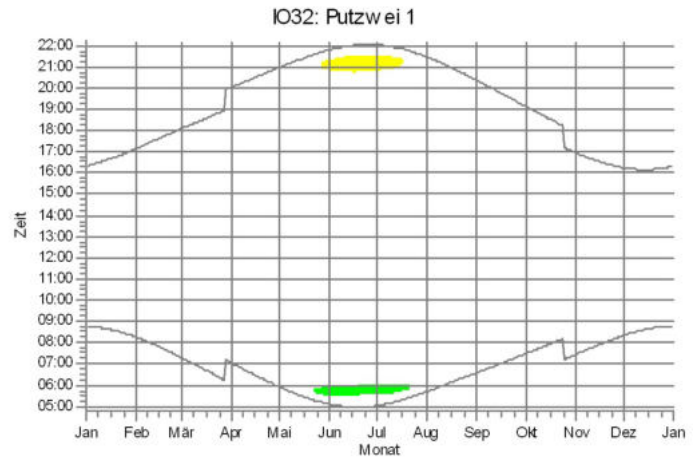
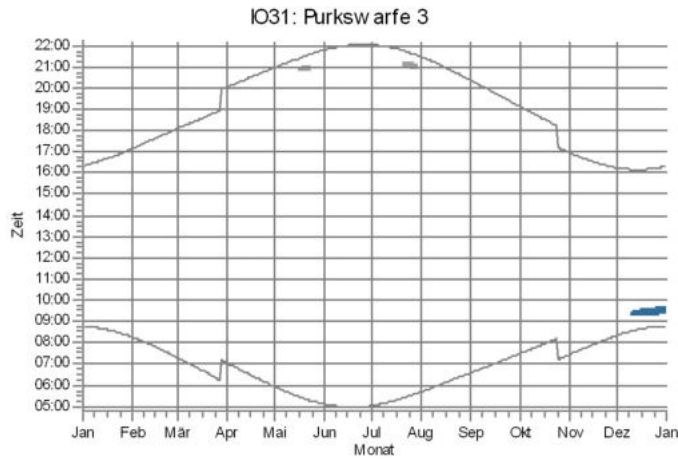
Felix Bergholz / Felix.Bergholz@mbbm-ind.com

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SHADOW - Grafischer Kalender

Berechnung: M180777_02 Gesamtbelastung



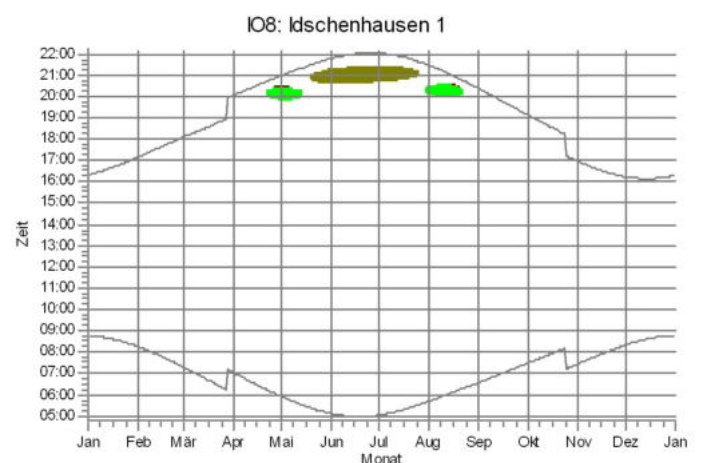
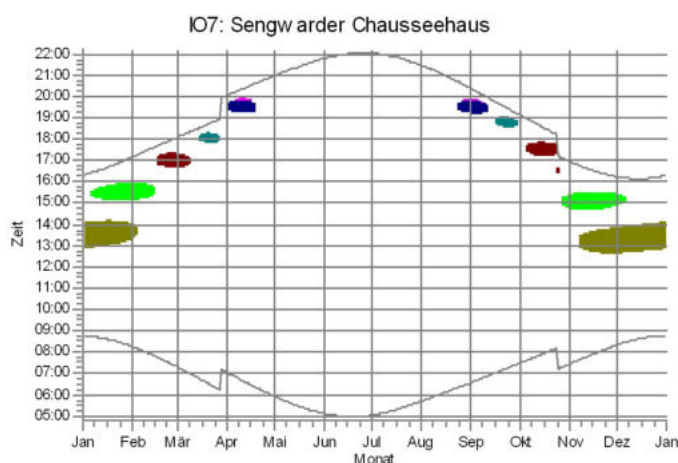
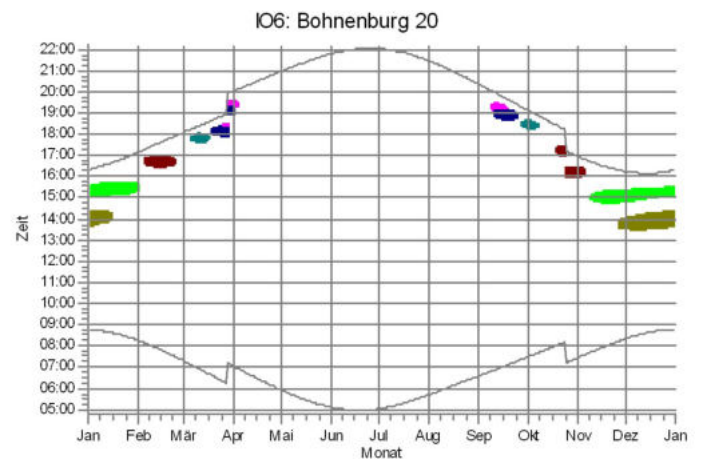
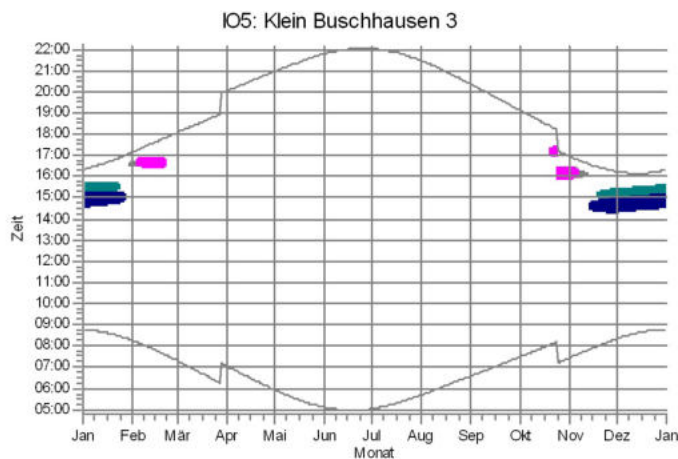
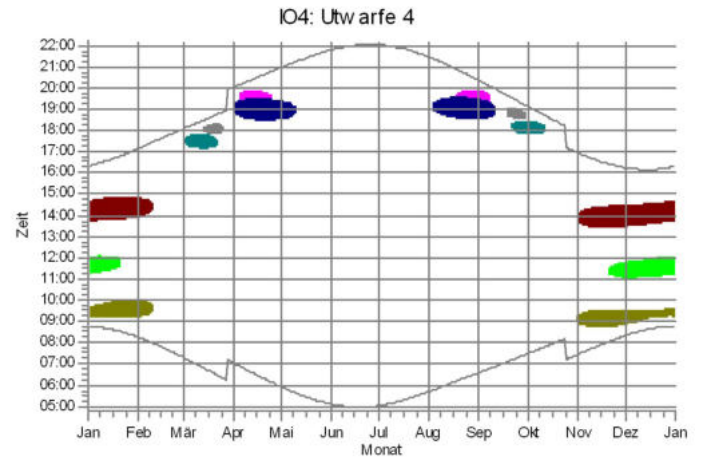
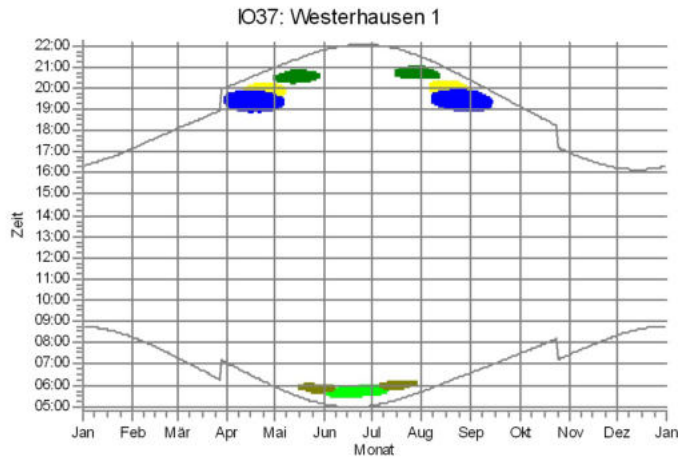
WEA

WEA ZB1: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (1)
WEA ZB2: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (2)
WEA ZB3: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (3)
WEA VB4: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (7)

WEA VB5: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (8)
WEA VB6: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (9)
WEA VB13: ENERCON E-101 3000 101.0 IO! NH: 99,0 m (Ges:149,5 m) (16)
WEA VB19: Siemens SWT-6.0 6000 154.0 IO! NH: 120,0 m (Ges:197,0 m) (22)

SHADOW - Grafischer Kalender

Berechnung: M180777_02 Gesamtbelastung



WEA

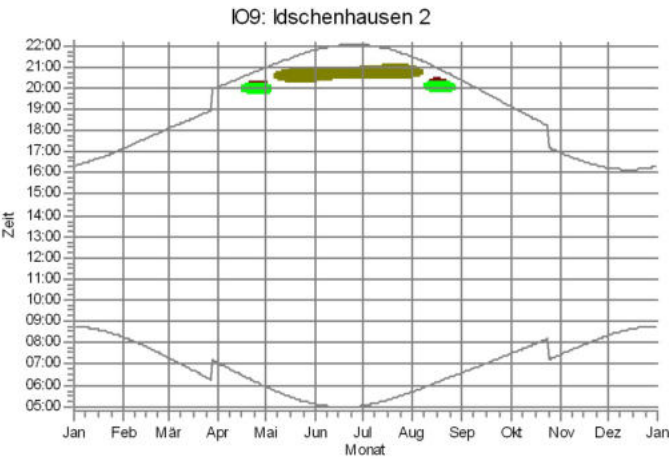
- WEA ZB1: NORDEX N163/6.X 7000 163.0 IOI NH: 118,0 m (Ges:199,5 m) (1)
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- WEA VB6: VESTAS V112-3.3 Gridstreame 3300 112.0 IOI NH: 119,0 m (Ges:175,0 m) (9)
- WEA VB7: VESTAS V112-3.3 Gridstreame 3300 112.0 IOI NH: 94,0 m (Ges:150,0 m) (10)

Projekt:
M180777

Lizenzierter Anwender:
Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Grafischer Kalender
Berechnung: M180777_02 Gesamtbelastung



WEA

WEA VB5: VESTAS V112-3.3 Gridstreame 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (8)
WEA VB6: VESTAS V112-3.3 Gridstreame 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (9)

WEA VB7: VESTAS V112-3.3 Gridstreame 3300 112.0 IO! NH: 94,0 m (Ges:150,0 m) (10)

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO1 - Utwarfe 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar		Februar		März		April		Mai		Juni	
1	08:45	11:20 (WEA VB6)	08:15	08:55 (WEA VB7)	07:18	14:55 (WEA VB5)	07:04	18:42 (WEA VB3)	05:55	19:26 (WEA VB4)	05:06	19:29 (WEA VB4)
2	16:18	11:20 (WEA VB6)	08:14	08:55 (WEA VB7)	07:16	15:28 (WEA VB5)	07:02	19:27 (WEA VB1)	05:57	19:25 (WEA VB4)	05:05	19:29 (WEA VB4)
3	08:45	11:20 (WEA VB6)	08:12	08:54 (WEA VB7)	07:14	15:38 (WEA VB5)	07:02	18:44 (WEA VB3)	05:53	19:24 (WEA VB4)	05:04	19:30 (WEA VB4)
4	16:19	11:21 (WEA VB6)	08:10	08:55 (WEA VB7)	07:12	15:03 (WEA VB5)	06:59	18:47 (WEA VB3)	05:51	19:23 (WEA VB4)	05:03	19:31 (WEA VB4)
5	08:45	11:21 (WEA VB6)	08:09	08:55 (WEA VB7)	07:09	15:20 (WEA VB5)	06:57	18:58 (WEA VB3)	05:49	19:22 (WEA VB4)	05:01	19:33 (WEA VB4)
6	16:20	11:22 (WEA VB6)	08:07	08:55 (WEA VB7)	07:07	15:41 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	19:21 (WEA VB4)	05:00	19:34 (WEA VB4)
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8	16:22	11:23 (WEA VB6)	08:03	08:55 (WEA VB7)	07:02	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	19:19 (WEA VB4)	04:57	19:36 (WEA VB4)
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12	16:30	11:24 (WEA VB6)	07:55	08:55 (WEA VB7)	06:53	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	19:15 (WEA VB4)	04:53	19:40 (WEA VB4)
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22	16:39	11:29 (WEA VB6)	07:35	09:03 (WEA VB7)	06:28	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	19:05 (WEA VB4)	04:43	19:50 (WEA VB4)
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24	16:41	11:30 (WEA VB6)	07:31	09:05 (WEA VB7)	06:23	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	19:03 (WEA VB4)	04:41	19:52 (WEA VB4)
25	08:35	11:31 (WEA VB6)	07:29	09:06 (WEA VB7)	06:20	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	19:02 (WEA VB4)	04:40	19:53 (WEA VB4)
26	16:43	11:31 (WEA VB6)	07:27	09:07 (WEA VB7)	06:18	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	19:01 (WEA VB4)	04:39	19:54 (WEA VB4)
27	08:34	11:32 (WEA VB6)	07:25	09:08 (WEA VB7)	06:15	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	19:00 (WEA VB4)	04:38	19:55 (WEA VB4)
28	16:45	11:32 (WEA VB6)	07:23	09:09 (WEA VB7)	06:13	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:59 (WEA VB4)	04:37	19:56 (WEA VB4)
29	08:33	11:33 (WEA VB6)	07:21	09:10 (WEA VB7)	06:10	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:58 (WEA VB4)	04:36	19:57 (WEA VB4)
30	16:46	11:33 (WEA VB6)	07:19	09:11 (WEA VB7)	06:08	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:57 (WEA VB4)	04:35	19:58 (WEA VB4)
31	08:32	11:34 (WEA VB6)	07:17	09:12 (WEA VB7)	06:05	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:56 (WEA VB4)	04:34	19:59 (WEA VB4)
32	16:48	11:34 (WEA VB6)	07:15	09:13 (WEA VB7)	06:03	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:55 (WEA VB4)	04:33	20:00 (WEA VB4)
33	08:31	11:35 (WEA VB6)	07:13	09:14 (WEA VB7)	06:00	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:54 (WEA VB4)	04:32	20:01 (WEA VB4)
34	16:49	11:35 (WEA VB6)	07:11	09:15 (WEA VB7)	05:58	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:53 (WEA VB4)	04:31	20:02 (WEA VB4)
35	08:30	11:36 (WEA VB6)	07:09	09:16 (WEA VB7)	05:55	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:52 (WEA VB4)	04:30	20:03 (WEA VB4)
36	16:50	11:36 (WEA VB6)	07:07	09:17 (WEA VB7)	05:53	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:51 (WEA VB4)	04:29	20:04 (WEA VB4)
37	08:29	11:37 (WEA VB6)	07:05	09:18 (WEA VB7)	05:50	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:50 (WEA VB4)	04:28	20:05 (WEA VB4)
38	16:52	11:37 (WEA VB6)	07:03	09:19 (WEA VB7)	05:48	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:49 (WEA VB4)	04:27	20:06 (WEA VB4)
39	08:28	11:38 (WEA VB6)	07:01	09:20 (WEA VB7)	05:45	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:48 (WEA VB4)	04:26	20:07 (WEA VB4)
40	16:54	11:38 (WEA VB6)	06:59	09:21 (WEA VB7)	05:43	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:47 (WEA VB4)	04:25	20:08 (WEA VB4)
41	08:26	11:39 (WEA VB6)	06:57	09:22 (WEA VB7)	05:40	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:46 (WEA VB4)	04:24	20:09 (WEA VB4)
42	16:56	11:39 (WEA VB6)	06:55	09:23 (WEA VB7)	05:38	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:45 (WEA VB4)	04:23	20:10 (WEA VB4)
43	08:25	11:40 (WEA VB6)	06:53	09:24 (WEA VB7)	05:35	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:44 (WEA VB4)	04:22	20:11 (WEA VB4)
44	16:57	11:40 (WEA VB6)	06:51	09:25 (WEA VB7)	05:33	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:43 (WEA VB4)	04:21	20:12 (WEA VB4)
45	08:23	11:41 (WEA VB6)	06:49	09:26 (WEA VB7)	05:30	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:42 (WEA VB4)	04:20	20:13 (WEA VB4)
46	16:59	11:41 (WEA VB6)	06:47	09:27 (WEA VB7)	05:28	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:41 (WEA VB4)	04:19	20:14 (WEA VB4)
47	08:22	11:42 (WEA VB6)	06:45	09:28 (WEA VB7)	05:25	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:40 (WEA VB4)	04:18	20:15 (WEA VB4)
48	17:01	11:42 (WEA VB6)	06:43	09:29 (WEA VB7)	05:23	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:39 (WEA VB4)	04:17	20:16 (WEA VB4)
49	08:20	11:43 (WEA VB6)	06:41	09:30 (WEA VB7)	05:20	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:38 (WEA VB4)	04:16	20:17 (WEA VB4)
50	17:03	11:43 (WEA VB6)	06:39	09:31 (WEA VB7)	05:18	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:37 (WEA VB4)	04:15	20:18 (WEA VB4)
51	08:19	11:44 (WEA VB6)	06:37	09:32 (WEA VB7)	05:15	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:36 (WEA VB4)	04:14	20:19 (WEA VB4)
52	17:05	11:44 (WEA VB6)	06:35	09:33 (WEA VB7)	05:13	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:35 (WEA VB4)	04:13	20:20 (WEA VB4)
53	08:17	11:45 (WEA VB6)	06:33	09:34 (WEA VB7)	05:10	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:34 (WEA VB4)	04:12	20:21 (WEA VB4)
54	17:07	11:45 (WEA VB6)	06:31	09:35 (WEA VB7)	05:08	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:33 (WEA VB4)	04:11	20:22 (WEA VB4)
55	08:15	11:46 (WEA VB6)	06:29	09:36 (WEA VB7)	05:05	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:32 (WEA VB4)	04:10	20:23 (WEA VB4)
56	17:09	11:46 (WEA VB6)	06:27	09:37 (WEA VB7)	05:03	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:31 (WEA VB4)	04:09	20:24 (WEA VB4)
57	08:13	11:47 (WEA VB6)	06:25	09:38 (WEA VB7)	05:00	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:30 (WEA VB4)	04:08	20:25 (WEA VB4)
58	17:11	11:47 (WEA VB6)	06:23	09:39 (WEA VB7)	04:58	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:29 (WEA VB4)	04:07	20:26 (WEA VB4)
59	08:11	11:48 (WEA VB6)	06:21	09:40 (WEA VB7)	04:55	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:28 (WEA VB4)	04:06	20:27 (WEA VB4)
60	17:13	11:48 (WEA VB6)	06:19	09:41 (WEA VB7)	04:53	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:27 (WEA VB4)	04:05	20:28 (WEA VB4)
61	08:09	11:49 (WEA VB6)	06:17	09:42 (WEA VB7)	04:50	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:26 (WEA VB4)	04:04	20:29 (WEA VB4)
62	17:15	11:49 (WEA VB6)	06:15	09:43 (WEA VB7)	04:48	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:25 (WEA VB4)	04:03	20:30 (WEA VB4)
63	08:07	11:50 (WEA VB6)	06:13	09:44 (WEA VB7)	04:45	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:24 (WEA VB4)	04:02	20:31 (WEA VB4)
64	17:17	11:50 (WEA VB6)	06:11	09:45 (WEA VB7)	04:43	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:23 (WEA VB4)	04:01	20:32 (WEA VB4)
65	08:05	11:51 (WEA VB6)	06:09	09:46 (WEA VB7)	04:40	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:22 (WEA VB4)	04:00	20:33 (WEA VB4)
66	17:19	11:51 (WEA VB6)	06:07	09:47 (WEA VB7)	04:38	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:21 (WEA VB4)	03:59	20:34 (WEA VB4)
67	08:03	11:52 (WEA VB6)	06:05	09:48 (WEA VB7)	04:35	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:20 (WEA VB4)	03:58	20:35 (WEA VB4)
68	17:21	11:52 (WEA VB6)	06:03	09:49 (WEA VB7)	04:33	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:19 (WEA VB4)	03:57	20:36 (WEA VB4)
69	08:01	11:53 (WEA VB6)	06:01	09:50 (WEA VB7)	04:30	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:18 (WEA VB4)	03:56	20:37 (WEA VB4)
70	17:23	11:53 (WEA VB6)	05:59	09:51 (WEA VB7)	04:28	15:42 (WEA VB5)	06:57	19:23 (WEA VB4)	05:49	18:17 (WEA VB4)	03:55	20:38 (WEA VB4)
71												

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO1 - Utwarfe 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli		August		September		Oktober		November		Dezember									
1	05:02		19:40 (WEA VB4)	05:42		19:31 (WEA VB4)	06:36		07:28		08:24 (WEA VB7)	08:21		11:06 (WEA VB6)						
	22:01	26	20:06 (WEA VB4)	21:27	48	20:19 (WEA VB4)	20:20		19:07		16:57	108	15:11 (WEA VB5)	16:13	58	12:04 (WEA VB6)				
2	05:03		19:40 (WEA VB4)	05:44		19:31 (WEA VB4)	06:37		07:30		07:28		08:24 (WEA VB7)	08:22		11:07 (WEA VB6)				
	22:01	27	20:07 (WEA VB4)	21:25	48	20:19 (WEA VB4)	20:18		19:05		16:55	108	15:11 (WEA VB5)	16:13	57	12:04 (WEA VB6)				
3	05:04		19:40 (WEA VB4)	05:45		19:31 (WEA VB4)	06:39		07:32		07:30		08:24 (WEA VB7)	08:24		11:06 (WEA VB6)				
	22:01	28	20:08 (WEA VB4)	21:23	47	20:18 (WEA VB4)	20:16		19:02		16:53	109	15:12 (WEA VB5)	16:12	58	12:04 (WEA VB6)				
4	05:05		19:39 (WEA VB4)	05:47		19:31 (WEA VB4)	06:41		07:34		07:32		08:24 (WEA VB7)	08:25		11:07 (WEA VB6)				
	22:00	29	20:08 (WEA VB4)	21:21	48	20:19 (WEA VB4)	20:13		19:00		16:51	108	15:11 (WEA VB5)	16:11	58	12:05 (WEA VB6)				
5	05:06		19:38 (WEA VB4)	05:49		19:31 (WEA VB4)	06:43		07:36		07:34		08:25 (WEA VB7)	08:26		11:07 (WEA VB6)				
	22:00	30	20:08 (WEA VB4)	21:19	47	20:18 (WEA VB4)	20:11		18:58		16:49	107	15:11 (WEA VB5)	16:11	58	12:05 (WEA VB6)				
6	05:06		19:38 (WEA VB4)	05:50		19:32 (WEA VB4)	06:44		07:37		07:36		08:25 (WEA VB7)	08:28		11:08 (WEA VB6)				
	21:59	31	20:09 (WEA VB4)	21:17	46	20:18 (WEA VB4)	20:08		18:55		16:48	115	15:10 (WEA VB5)	16:10	58	12:06 (WEA VB6)				
7	05:07		19:38 (WEA VB4)	05:52		19:32 (WEA VB4)	06:46		07:39		07:38		08:25 (WEA VB7)	08:29		11:08 (WEA VB6)				
	21:58	32	20:10 (WEA VB4)	21:15	46	20:18 (WEA VB4)	20:06		18:53		16:46	124	15:09 (WEA VB5)	16:09	58	12:06 (WEA VB6)				
8	05:08		19:38 (WEA VB4)	05:54		19:32 (WEA VB4)	06:48		07:41		07:40		08:25 (WEA VB7)	08:30		11:09 (WEA VB6)				
	21:58	33	20:11 (WEA VB4)	21:13	44	20:16 (WEA VB4)	20:04		18:50		16:44	128	15:09 (WEA VB5)	16:09	58	12:07 (WEA VB6)				
9	05:09		19:37 (WEA VB4)	05:55		19:33 (WEA VB4)	06:50		07:43		07:41		08:26 (WEA VB7)	08:32		11:09 (WEA VB6)				
	21:57	34	20:11 (WEA VB4)	21:11	43	20:16 (WEA VB4)	20:01	11	18:51 (WEA VB3)		16:42	133	15:09 (WEA VB5)	16:09	58	12:07 (WEA VB6)				
10	05:11		19:37 (WEA VB4)	05:57		19:33 (WEA VB4)	06:51		18:37 (WEA VB3)		07:45		15:41 (WEA VB5)	16:33		11:09 (WEA VB6)				
	21:56	35	20:12 (WEA VB4)	21:09	42	20:15 (WEA VB4)	19:59	24	19:18 (WEA VB1)		18:46	10	15:51 (WEA VB5)	16:40	133	15:08 (WEA VB5)	16:09	58	12:07 (WEA VB6)	
11	05:12		19:36 (WEA VB4)	05:59		19:34 (WEA VB4)	06:53		18:35 (WEA VB3)		07:46		15:34 (WEA VB5)	16:33	135	15:07 (WEA VB5)	16:08	57	12:07 (WEA VB6)	
	21:55	36	20:12 (WEA VB4)	21:07	40	20:14 (WEA VB4)	19:56	34	19:21 (WEA VB1)		18:43	22	15:56 (WEA VB5)	16:39	135	15:08 (WEA VB5)	16:08	57	12:07 (WEA VB6)	
12	05:13		19:36 (WEA VB4)	06:01		19:35 (WEA VB4)	06:55		18:33 (WEA VB3)		07:48		15:30 (WEA VB5)	16:37	135	15:07 (WEA VB5)	16:08	58	12:08 (WEA VB6)	
	21:54	37	20:13 (WEA VB4)	21:05	40	20:15 (WEA VB2)	19:54	38	19:21 (WEA VB1)		18:41	29	15:59 (WEA VB5)	16:37	135	15:07 (WEA VB5)	16:08	58	12:08 (WEA VB6)	
13	05:14		19:35 (WEA VB4)	06:02		19:35 (WEA VB4)	06:57		18:32 (WEA VB3)		07:50		15:27 (WEA VB5)	16:37	134	15:07 (WEA VB5)	16:08	58	12:09 (WEA VB6)	
	21:53	38	20:13 (WEA VB4)	21:03	39	20:14 (WEA VB2)	19:51	42	19:22 (WEA VB1)		18:39	35	16:02 (WEA VB5)	16:35	134	15:07 (WEA VB5)	16:08	58	12:09 (WEA VB6)	
14	05:15		19:35 (WEA VB4)	06:04		19:37 (WEA VB4)	06:58		18:31 (WEA VB3)		07:52		15:25 (WEA VB5)	16:37	133	15:07 (WEA VB5)	16:08	57	12:09 (WEA VB6)	
	21:52	39	20:14 (WEA VB4)	21:01	38	20:15 (WEA VB2)	19:49	43	19:21 (WEA VB1)		18:36	39	16:04 (WEA VB5)	16:34	133	15:07 (WEA VB5)	16:08	57	12:09 (WEA VB6)	
15	05:16		19:35 (WEA VB4)	06:06		19:38 (WEA VB4)	07:00		18:29 (WEA VB3)		07:53		15:23 (WEA VB5)	16:38	128	15:06 (WEA VB5)	16:08	58	12:10 (WEA VB6)	
	21:51	40	20:15 (WEA VB4)	20:59	38	20:16 (WEA VB2)	19:47	44	19:18 (WEA VB1)		18:34	42	16:05 (WEA VB5)	16:32	131	15:06 (WEA VB5)	16:08	58	12:10 (WEA VB6)	
16	05:18		19:35 (WEA VB4)	06:08		19:39 (WEA VB4)	07:02		18:28 (WEA VB3)		07:56		15:21 (WEA VB5)	16:37	128	15:05 (WEA VB5)	16:09	57	12:11 (WEA VB6)	
	21:50	41	20:16 (WEA VB4)	20:57	36	20:15 (WEA VB2)	19:44	43	19:16 (WEA VB1)		18:32	45	16:06 (WEA VB5)	16:31	128	15:05 (WEA VB5)	16:08	57	12:09 (WEA VB6)	
17	05:19		19:34 (WEA VB4)	06:09		19:41 (WEA VB4)	07:04		18:28 (WEA VB3)		07:58		15:07 (WEA VB5)	16:29	127	15:05 (WEA VB5)	16:08	57	12:10 (WEA VB6)	
	21:49	42	20:16 (WEA VB4)	20:55	34	20:15 (WEA VB2)	19:42	41	19:14 (WEA VB1)		18:29	51	16:07 (WEA VB5)	16:29	127	15:05 (WEA VB5)	16:08	57	12:10 (WEA VB6)	
18	05:20		19:34 (WEA VB4)	06:11		19:44 (WEA VB4)	07:05		18:28 (WEA VB3)		07:59		15:04 (WEA VB5)	16:28	123	15:04 (WEA VB5)	16:09	58	12:11 (WEA VB6)	
	21:48	42	20:16 (WEA VB4)	20:53	31	20:15 (WEA VB2)	19:39	38	19:12 (WEA VB1)		18:27	67	16:08 (WEA VB5)	16:28	123	15:04 (WEA VB5)	16:09	58	12:11 (WEA VB6)	
19	05:22		19:34 (WEA VB4)	06:13		19:48 (WEA VB4)	07:07		18:27 (WEA VB3)		08:01		15:03 (WEA VB5)	16:26	120	15:03 (WEA VB5)	16:09	57	12:11 (WEA VB6)	
	21:46	43	20:17 (WEA VB4)	20:50	26	20:14 (WEA VB2)	19:37	35	19:08 (WEA VB1)		18:25	76	16:09 (WEA VB5)	16:26	120	15:03 (WEA VB5)	16:09	57	12:11 (WEA VB6)	
20	05:23		19:33 (WEA VB4)	06:15		19:49 (WEA VB2)	07:09		18:27 (WEA VB3)		08:03		15:02 (WEA VB5)	16:25	115	15:02 (WEA VB5)	16:09	57	12:11 (WEA VB6)	
	21:45	44	20:17 (WEA VB4)	20:48	25	20:14 (WEA VB2)	19:34	31	19:06 (WEA VB1)		18:23	83	16:10 (WEA VB5)	16:25	115	15:02 (WEA VB5)	16:09	57	12:11 (WEA VB6)	
21	05:25		19:33 (WEA VB4)	06:16		19:49 (WEA VB2)	07:11		18:28 (WEA VB3)		08:05		15:01 (WEA VB5)	16:24	110	15:01 (WEA VB5)	16:10	57	12:12 (WEA VB6)	
	21:44	44	20:17 (WEA VB4)	20:46	23	20:12 (WEA VB2)	19:32	27	18:55 (WEA VB3)		18:20	87	16:11 (WEA VB5)	16:24	110	15:01 (WEA VB5)	16:10	57	12:12 (WEA VB6)	
22	05:26		19:33 (WEA VB4)	06:18		19:50 (WEA VB2)	07:12		18:28 (WEA VB3)		08:07		15:00 (WEA VB5)	16:23	103	15:00 (WEA VB5)	16:10	57	12:12 (WEA VB6)	
	21:42	45	20:18 (WEA VB4)	20:44	22	20:12 (WEA VB2)	19:29	26	18:54 (WEA VB3)		18:18	91	16:10 (WEA VB5)	16:22	103	15:00 (WEA VB5)	16:10	57	12:12 (WEA VB6)	
23	05:28		19:32 (WEA VB4)	06:20		19:51 (WEA VB2)	07:14		18:28 (WEA VB3)		08:16		14:58 (WEA VB5)	16:21	93	14:58 (WEA VB5)	16:11	57	12:13 (WEA VB6)	
	21:41	46	20:18 (WEA VB4)	20:41	20	20:11 (WEA VB2)	19:27	24	18:52 (WEA VB3)		18:16	95	16:11 (WEA VB5)	16:21	93	14:58 (WEA VB5)	16:11	57	12:13 (WEA VB6)	
24	05:29		19:32 (WEA VB4)	06:22		19:51 (WEA VB2)	07:16		18:29 (WEA VB3)		08:11		15:05 (WEA VB5)	16:14	82	15:05 (WEA VB5)	16:11	57	12:13 (WEA VB6)	
	21:40	46	20:18 (WEA VB4)	20:39	18	20:09 (WEA VB2)	19:24	22	18:51 (WEA VB3)		18:14	98	16:11 (WEA VB5)	16:20	82	15:04 (WEA VB5)	16:11	57	12:13 (WEA VB6)	
25	05:31		19:32 (WEA VB4)	06:23		19:53 (WEA VB2)	07:18		18:30 (WEA VB3)		08:13		14:57 (WEA VB5)	16:11	78	14:57 (WEA VB5)	16:12	57	12:13 (WEA VB6)	
	21:38	47	20:19 (WEA VB4)	20:37	14	20:07 (WEA VB2)	19:22	19	18:49 (WEA VB3)		17:12	101	15:11 (WEA VB5)	16:19	78	14:54 (WEA VB5)	16:12	57	12:13 (WEA VB6)	
26	05:32		19:31 (WEA VB4)	06:25		19:56 (WEA VB2)	07:19		18:33 (WEA VB3)		07:15		15:11 (WEA VB5)	16:18	72	14:52 (WEA VB5)	16:12	57	12:15 (WEA VB6)	
	21:37	48	20:19 (WEA VB4)	20:35	8	20:04 (WEA VB2)	19:19	14	18:47 (WEA VB3)		17:10	103	15:11 (WEA VB5)	16:18	72	14:52 (WEA VB5)	16:12	57	12:15 (WEA VB6)	
27	05:34		19:32 (WEA VB4)	06:27			07:21		18:36 (WEA VB3)		07:16		15:11 (WEA VB5)	16:18	72	14:52 (WEA VB5)	16:12	57	12:15 (WEA VB6)	
	21:35	47	20:19 (WEA VB4)	20:32			07:23	5	18:41 (WEA VB3)		17:07	105	15:12 (WEA VB5)	16:17	66	14:49 (WEA VB5)	16:13	57	12:15 (WEA VB6)	
28	05:35		19:31 (WEA VB4)	06:29			07:25				17:08		15:12 (WEA VB5)	16:17	66	14:49 (WEA VB5)	16:13	57	12:15 (WEA VB6)	
	21:33	48	20:19 (WEA VB4)	20:30			07:25				17:05	107	15:12 (WEA VB5)	16:16	58	12:03 (WEA VB6)	16:14	58	12:16 (WEA VB6)	
29	05:37		19:32 (WEA VB4)	06:30			07:25				17:20		15:12 (WEA VB5)	16:15	57	12:03 (WEA VB6)	16:15	57	12:16 (WEA VB6)	
	21:32	48	20:20 (WEA VB4)	20:28			07:27				17:03	108	15:12 (WEA VB5)	16:15	57	12:03 (WEA VB6)	16:15	57	12:16 (WEA VB6)	
30	05:39		19:31 (WEA VB4)	06:32			07:27				17:22		15:12 (WEA VB5)	16:14	58	12:03 (WEA VB6)	16:16	58	12:17 (WEA VB6)	
	21:30	48	20:19 (WEA VB4)	20:25			07:28				17:01	108	15:11 (WEA VB5)	16:14	58	12:03 (WEA VB6)	16:16	58	12:17 (WEA VB6)	
31	05:40		19:31 (WEA VB4)	06:34			07:24				17:24		15:11 (WEA VB5)	16:14	58	12:03 (WEA VB6)	16:16	58	12:17 (WEA VB6)	
	21:28	49	20:20 (WEA VB4)	20:23			07:24				16:59	108	15:11 (WEA VB5)	16:14	58	12:03 (WEA VB6)	16:16	58	12:17 (WEA VB6)	
Sonnenscheinstunden		511	459	382	561	1610	329	1610	329	1610	329	1610	329	1610	329	1610	329	1610	329	1610
astr.max.mögl.Beschattung		1273	911	561	1610	329	1610	329	1610	329	1610	329	1610	329	1610	329	1610	329	1610	329

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)
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Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO10 - Remmelhausen 4
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	June	July	August	September	Oktober	November	Dezember
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02	05:55 20:57	05:06 21:47	21:02 (WEA VB3) 22:01	21:07 (WEA VB3) 22:26	05:42 20:20	06:36 19:07	07:28 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:01 20:04	05:53 20:59	05:05 21:48	21:01 (WEA VB3) 22:01	21:07 (WEA VB3) 22:44	05:44 20:18	06:37 19:05	07:28 16:55	08:22 16:13
3	08:45 16:21	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	21:01 (WEA VB3) 22:00	21:08 (WEA VB3) 22:23	05:45 20:16	06:39 19:02	07:32 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:02	05:04 21:50	21:02 (WEA VB3) 22:00	21:07 (WEA VB3) 22:21	05:47 20:13	06:41 19:00	07:34 16:51	08:25 16:11
5	08:44 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	21:02 (WEA VB3) 21:59	21:07 (WEA VB3) 22:19	05:49 20:11	06:43 18:58	07:34 16:49	08:26 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11	05:45 21:06	05:02 21:52	21:01 (WEA VB3) 21:59	21:08 (WEA VB3) 22:17	05:50 20:08	06:44 18:55	07:37 16:48	08:28 16:10
7	08:44 16:26	08:05 17:21	07:04 18:16	06:49 20:13	05:43 21:08	05:02 21:53	21:02 (WEA VB3) 21:58	21:08 (WEA VB3) 22:15	05:52 20:06	06:46 18:53	07:39 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	21:02 (WEA VB3) 21:58	21:08 (WEA VB3) 22:13	05:54 20:04	06:48 18:50	07:41 16:44	08:30 16:09
9	08:42 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	21:02 (WEA VB3) 21:57	21:08 (WEA VB3) 22:11	05:55 20:01	06:50 18:48	07:43 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:21	06:42 20:19	05:38 21:13	05:00 21:56	21:03 (WEA VB3) 21:56	21:09 (WEA VB3) 22:09	05:57 19:59	06:51 18:46	07:45 16:40	08:33 16:09
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	21:03 (WEA VB3) 21:55	21:09 (WEA VB3) 22:07	05:59 19:56	06:53 18:43	07:46 16:39	08:34 16:08
12	08:40 16:33	07:55 17:31	06:53 18:25	06:38 20:22	05:34 21:16	04:59 21:57	21:03 (WEA VB3) 21:54	21:09 (WEA VB3) 22:05	06:01 19:54	06:55 18:41	07:48 16:37	08:35 16:08
13	08:40 16:35	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	21:04 (WEA VB3) 21:53	21:10 (WEA VB3) 22:03	06:02 19:51	06:57 18:39	07:50 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	21:04 (WEA VB3) 21:52	21:10 (WEA VB3) 22:01	06:04 19:49	06:58 18:36	07:52 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 21:59	21:03 (WEA VB3) 21:51	21:11 (WEA VB3) 22:05	06:06 19:46	07:00 18:34	07:54 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	21:04 (WEA VB3) 21:50	21:12 (WEA VB3) 22:07	06:08 19:44	07:02 18:32	07:56 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:40 18:35	06:26 20:32	05:26 21:25	04:58 22:00	21:04 (WEA VB3) 21:49	21:12 (WEA VB3) 22:05	06:09 19:42	07:04 18:29	07:58 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:36	06:24 20:33	05:24 21:26	04:58 22:01	21:04 (WEA VB3) 21:48	21:13 (WEA VB3) 22:05	06:11 19:39	07:05 18:27	07:59 16:28	08:41 16:09
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:23 21:28	04:58 22:01	21:04 (WEA VB3) 21:46	21:14 (WEA VB3) 22:07	06:13 19:37	07:07 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:01	21:06 (WEA VB3) 21:45	21:16 (WEA VB3) 22:08	06:15 19:34	07:09 18:23	08:03 16:25	08:42 16:09
21	08:31 16:48	07:36 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	21:06 (WEA VB3) 21:44	21:21 (WEA VB3) 22:09	06:16 19:32	07:11 18:20	08:05 16:24	08:43 16:10
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	21:06 (WEA VB3) 21:42	21:22 (WEA VB3) 22:14	06:18 19:29	07:12 18:18	08:07 16:23	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:59 22:02	21:05 (WEA VB3) 21:41	21:24 (WEA VB3) 22:16	06:20 19:27	07:14 18:16	08:09 16:21	08:44 16:11
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	21:06 (WEA VB3) 21:39	21:22 (WEA VB3) 22:24	06:22 19:24	07:16 18:14	08:11 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	21:06 (WEA VB3) 21:38	21:23 (WEA VB3) 22:30	06:23 19:22	07:18 17:12	08:11 16:19	08:44 16:12
26	08:25 16:57	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	21:06 (WEA VB3) 22:02	21:24 (WEA VB3) 22:34	06:25 19:19	07:19 17:10	08:12 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	21:03 (WEA VB3) 22:01	21:22 (WEA VB3) 22:35	06:27 19:17	07:21 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:10 21:41	05:01 22:02	21:02 (WEA VB3) 22:02	21:23 (WEA VB3) 22:33	06:29 19:15	07:23 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03	07:11 19:57	05:59 20:53	05:09 21:43	05:09 21:43	05:01 22:02	21:02 (WEA VB3) 22:02	21:24 (WEA VB3) 22:33	06:30 19:15	07:25 17:03	08:17 16:15	08:45 16:15
30	08:19 17:05	07:09 19:59	05:57 20:55	05:08 21:44	05:08 21:44	05:02 22:02	21:03 (WEA VB3) 22:02	21:25 (WEA VB3) 22:33	06:32 19:10	07:27 17:01	08:19 16:14	08:45 16:16
31	08:17 17:07	07:06 20:00	05:56 21:45	05:07 21:45	05:07 21:45	05:00 22:02	21:01 (WEA VB3) 22:02	21:26 (WEA VB3) 22:33	06:34 19:10	07:24 16:59	08:20 16:17	08:45 16:17
Sonnenscheinstunden	251	274	367	419	493	509	511	459	382	329	260	235
astr.max.mögl.Beschattung					36	467	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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO11 - Westerhausen 3

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März		April		Mai		Juni				
1	08:45	08:15	07:19		07:04	19:05 (WEA ZB2)	05:55		05:06	05:51 (WEA VB6)			
	16:18	17:09	18:04		20:02	25	19:30 (WEA ZB2)	20:57	21:47	23	06:14 (WEA VB7)		
2	08:45	08:14	07:16		07:02		19:05 (WEA ZB2)	05:53	05:05	05:50 (WEA VB6)			
	16:19	17:11	18:06		20:04	24	19:29 (WEA ZB2)	20:59	21:48	23	06:13 (WEA VB7)		
3	08:45	08:12	07:14		06:59		19:07 (WEA ZB2)	05:51	05:05	05:49 (WEA VB6)			
	16:21	17:13	18:08		20:06	22	19:29 (WEA ZB2)	21:01	21:49	23	06:12 (WEA VB7)		
4	08:45	08:10	07:12		06:57		19:07 (WEA ZB2)	05:49	05:04	05:48 (WEA VB6)			
	16:22	17:15	18:10		20:08	19	19:26 (WEA ZB2)	21:03	21:50	23	06:11 (WEA VB7)		
5	08:44	08:09	07:09		06:54		19:09 (WEA ZB2)	05:47	05:03	05:47 (WEA VB6)			
	16:23	17:17	18:12		20:10	16	19:25 (WEA ZB2)	21:04	21:51	22	06:09 (WEA VB6)		
6	08:44	08:07	07:07		17:46 (WEA ZB3)	06:52		19:11 (WEA ZB2)	05:45	05:02	05:47 (WEA VB6)		
	16:24	17:19	18:14	1	17:47 (WEA ZB3)	20:11	10	19:21 (WEA ZB2)	21:06	21:52	22	06:09 (WEA VB6)	
7	08:44	08:05	07:05		17:42 (WEA ZB3)	06:50			05:43	06:10 (WEA VB7)	05:02	05:47 (WEA VB6)	
	16:26	17:21	18:16	8	17:50 (WEA ZB3)	20:13			21:08	2	06:12 (WEA VB7)	23	06:10 (WEA VB6)
8	08:43	08:03	07:02		17:39 (WEA ZB3)	06:47			05:41	06:08 (WEA VB7)	05:01	05:46 (WEA VB6)	
	16:27	17:23	18:18	12	17:51 (WEA ZB3)	20:15			21:10	5	06:13 (WEA VB7)	25	06:11 (WEA VB6)
9	08:43	08:01	07:00		17:37 (WEA ZB3)	06:45		19:46 (WEA ZB1)	05:40	06:06 (WEA VB7)	05:00	05:46 (WEA VB6)	
	16:28	17:25	18:20	16	17:53 (WEA ZB3)	20:17	3	19:49 (WEA ZB1)	21:11	9	06:15 (WEA VB7)	26	06:12 (WEA VB6)
10	08:42	07:59	06:57		17:35 (WEA ZB3)	06:42		19:45 (WEA ZB1)	05:38	06:05 (WEA VB7)	05:00	05:46 (WEA VB6)	
	16:30	17:27	18:22	20	17:55 (WEA ZB3)	20:19	6	19:51 (WEA ZB1)	21:13	11	06:16 (WEA VB7)	27	06:13 (WEA VB6)
11	08:41	07:57	06:55		17:34 (WEA ZB3)	06:40		19:44 (WEA ZB1)	05:36	06:03 (WEA VB7)	04:59	05:45 (WEA VB6)	
	16:31	17:29	18:23	23	17:57 (WEA ZB3)	20:21	10	19:54 (WEA ZB1)	21:15	14	06:17 (WEA VB7)	28	06:13 (WEA VB6)
12	08:40	07:55	06:53		17:32 (WEA ZB3)	06:38		19:42 (WEA ZB1)	05:34	06:01 (WEA VB7)	04:59	05:45 (WEA VB6)	
	16:33	17:31	18:25	26	17:58 (WEA ZB3)	20:22	13	19:55 (WEA ZB1)	21:17	16	06:17 (WEA VB7)	28	06:13 (WEA VB6)
13	08:40	07:53	06:50		17:32 (WEA ZB3)	06:35		19:42 (WEA ZB1)	05:32	06:00 (WEA VB7)	04:59	05:46 (WEA VB6)	
	16:35	17:33	18:27	29	18:01 (WEA ZB3)	20:24	15	19:57 (WEA ZB1)	21:18	18	06:18 (WEA VB7)	28	06:14 (WEA VB6)
14	08:39	07:51	06:48		17:31 (WEA ZB3)	06:33		19:41 (WEA ZB1)	05:31	05:58 (WEA VB7)	04:58	05:46 (WEA VB6)	
	16:36	17:35	18:29	31	18:02 (WEA ZB3)	20:26	18	19:59 (WEA ZB1)	21:20	20	06:18 (WEA VB7)	29	06:15 (WEA VB6)
15	08:38	07:49	06:45		17:30 (WEA ZB3)	06:31		19:41 (WEA ZB1)	05:29	05:57 (WEA VB7)	04:58	05:45 (WEA VB6)	
	16:38	17:37	18:31	35	18:05 (WEA ZB3)	20:28	20	20:01 (WEA ZB1)	21:22	22	06:19 (WEA VB7)	29	06:14 (WEA VB6)
16	08:37	07:47	06:43		17:30 (WEA ZB3)	06:28		19:40 (WEA ZB1)	05:27	05:55 (WEA VB7)	04:58	05:45 (WEA VB6)	
	16:40	17:39	18:33	35	18:05 (WEA ZB3)	20:30	22	20:02 (WEA ZB1)	21:23	24	06:19 (WEA VB7)	29	06:14 (WEA VB6)
17	08:36	07:45	06:41		17:30 (WEA ZB3)	06:26		19:41 (WEA ZB1)	05:26	05:54 (WEA VB7)	04:58	05:45 (WEA VB6)	
	16:41	17:41	18:35	35	18:05 (WEA ZB3)	20:32	23	20:04 (WEA ZB1)	21:25	25	06:19 (WEA VB7)	30	06:15 (WEA VB6)
18	08:35	07:43	06:38		17:30 (WEA ZB3)	06:24		19:41 (WEA ZB1)	05:24	05:53 (WEA VB7)	04:58	05:45 (WEA VB6)	
	16:43	17:43	18:37	35	18:05 (WEA ZB3)	20:33	22	20:03 (WEA ZB1)	21:27	26	06:19 (WEA VB7)	30	06:15 (WEA VB6)
19	08:34	07:41	06:36		17:29 (WEA ZB3)	06:21		19:42 (WEA ZB1)	05:23	05:54 (WEA VB7)	04:58	05:45 (WEA VB6)	
	16:45	17:45	18:38	35	18:04 (WEA ZB3)	20:35	21	20:03 (WEA ZB1)	21:28	25	06:19 (WEA VB7)	30	06:15 (WEA VB6)
20	08:33	07:39	06:33		17:30 (WEA ZB3)	06:19		19:43 (WEA ZB1)	05:21	05:53 (WEA VB7)	04:58	05:46 (WEA VB6)	
	16:46	17:47	18:40	33	18:03 (WEA ZB3)	20:37	19	20:02 (WEA ZB1)	21:30	25	06:18 (WEA VB7)	30	06:16 (WEA VB6)
21	08:31	07:36	06:31		17:30 (WEA ZB3)	06:17		19:43 (WEA ZB1)	05:20	05:54 (WEA VB7)	04:58	05:46 (WEA VB6)	
	16:48	17:49	18:42	32	18:02 (WEA ZB3)	20:39	16	19:59 (WEA ZB1)	21:31	24	06:18 (WEA VB7)	31	06:17 (WEA VB6)
22	08:30	07:34	06:28		17:30 (WEA ZB3)	06:15		19:45 (WEA ZB1)	05:18	05:54 (WEA VB7)	04:58	05:46 (WEA VB6)	
	16:50	17:51	18:44	36	18:18 (WEA ZB2)	20:41	13	19:58 (WEA ZB1)	21:33	25	06:19 (WEA VB7)	30	06:16 (WEA VB6)
23	08:29	07:32	06:26		17:31 (WEA ZB3)	06:12		19:47 (WEA ZB1)	05:17	05:55 (WEA VB7)	04:59	05:46 (WEA VB6)	
	16:52	17:53	18:46	38	18:19 (WEA ZB2)	20:43	8	19:55 (WEA ZB1)	21:34	24	06:19 (WEA VB7)	30	06:16 (WEA VB6)
24	08:28	07:30	06:23		17:32 (WEA ZB3)	06:10			05:15	05:55 (WEA VB7)	04:59	05:47 (WEA VB6)	
	16:54	17:55	18:48	39	18:21 (WEA ZB2)	20:44			21:36	23	06:18 (WEA VB7)	30	06:17 (WEA VB6)
25	08:26	07:28	06:21		17:33 (WEA ZB3)	06:08			05:14	05:55 (WEA VB7)	04:59	05:47 (WEA VB6)	
	16:56	17:57	18:49	39	18:23 (WEA ZB2)	20:46			21:37	22	06:17 (WEA VB7)	30	06:17 (WEA VB6)
26	08:25	07:25	06:19		17:35 (WEA ZB3)	06:06			05:13	05:55 (WEA VB7)	05:00	05:47 (WEA VB6)	
	16:58	17:59	18:51	37	18:25 (WEA ZB2)	20:48			21:39	22	06:17 (WEA VB7)	30	06:17 (WEA VB6)
27	08:23	07:23	06:16		17:38 (WEA ZB3)	06:04			05:12	05:56 (WEA VB7)	05:00	05:48 (WEA VB6)	
	16:59	18:01	18:53	35	18:27 (WEA ZB2)	20:50			21:40	21	06:17 (WEA VB7)	29	06:17 (WEA VB6)
28	08:22	07:21	06:14		18:05 (WEA ZB2)	06:02			05:11	05:57 (WEA VB7)	05:01	05:48 (WEA VB6)	
	17:01	18:02	18:55	23	18:28 (WEA ZB2)	20:52			21:41	19	06:16 (WEA VB7)	29	06:17 (WEA VB6)
29	08:20		07:11		19:05 (WEA ZB2)	05:59			05:09	05:57 (WEA VB7)	05:01	05:49 (WEA VB6)	
	17:03		19:57	26	19:31 (WEA ZB2)	20:54			21:43	19	06:16 (WEA VB7)	28	06:17 (WEA VB6)
30	08:19		07:09		19:05 (WEA ZB2)	05:57			05:08	05:58 (WEA VB7)	05:02	05:50 (WEA VB6)	
	17:05		19:59	27	19:32 (WEA ZB2)	20:55			21:44	17	06:15 (WEA VB7)	28	06:18 (WEA VB6)
31	08:17		07:06		19:05 (WEA ZB2)				05:07	05:54 (WEA VB6)			
	17:07		20:00	26	19:31 (WEA ZB2)				21:45	21	06:15 (WEA VB7)		
Sonnenscheinstunden	251	274	367		419			493		509			
astr.max.mögl.Beschattung				732		345		479		823			

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO11 - Westerhausen 3

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember	
1	05:02	05:49 (WEA VB6)	05:42	06:12 (WEA VB7)	06:36	19:43 (WEA ZB1)	07:28	18:12 (WEA ZB3)	07:26	08:21	
	22:01	28 06:17 (WEA VB6)	21:27	15 06:27 (WEA VB7)	20:20	9 19:52 (WEA ZB1)	19:07	27 18:39 (WEA ZB3)	16:57	16:13	
2	05:03	05:50 (WEA VB6)	05:44	06:14 (WEA VB7)	06:37	19:44 (WEA ZB1)	07:30	18:12 (WEA ZB3)	07:28	08:22	
	22:01	27 06:17 (WEA VB6)	21:25	13 06:27 (WEA VB7)	20:18	6 19:50 (WEA ZB1)	19:05	24 18:36 (WEA ZB3)	16:55	16:13	
3	05:04	05:51 (WEA VB6)	05:45	06:15 (WEA VB7)	06:39	19:44 (WEA ZB1)	07:32	18:12 (WEA ZB3)	07:30	08:24	
	22:01	26 06:17 (WEA VB6)	21:23	10 06:25 (WEA VB7)	20:16	3 19:47 (WEA ZB1)	19:02	22 18:34 (WEA ZB3)	16:53	16:12	
4	05:05	05:52 (WEA VB6)	05:47	06:17 (WEA VB7)	06:41		07:34	18:13 (WEA ZB3)	07:32	08:25	
	22:00	25 06:17 (WEA VB6)	21:21	7 06:24 (WEA VB7)	20:13		19:00	18 18:31 (WEA ZB3)	16:51	16:11	
5	05:06	05:52 (WEA VB6)	05:49	06:19 (WEA VB7)	06:43		07:36	18:15 (WEA ZB3)	07:34	08:26	
	22:00	24 06:16 (WEA VB6)	21:19	4 06:23 (WEA VB7)	20:11		18:58	14 18:29 (WEA ZB3)	16:50	16:11	
6	05:07	05:53 (WEA VB6)	05:50		06:44	19:07 (WEA ZB2)	07:37	18:17 (WEA ZB3)	07:36	08:28	
	21:59	23 06:16 (WEA VB6)	21:17		20:09	19:17 (WEA ZB2)	18:55	10 18:27 (WEA ZB3)	16:48	16:10	
7	05:08	05:53 (WEA VB6)	05:52		06:46	19:04 (WEA ZB2)	07:39	18:19 (WEA ZB3)	07:38	08:29	
	21:58	22 06:15 (WEA VB6)	21:15		20:06	19:20 (WEA ZB2)	18:53	5 18:24 (WEA ZB3)	16:46	16:10	
8	05:09	05:54 (WEA VB6)	05:54		06:48	19:02 (WEA ZB2)	07:41		07:40	08:30	
	21:58	23 06:17 (WEA VB7)	21:13		20:04	19:21 (WEA ZB2)	18:50		16:44	16:09	
9	05:10	05:55 (WEA VB6)	05:55		06:50	19:00 (WEA ZB2)	07:43		07:41	08:32	
	21:57	24 06:19 (WEA VB7)	21:11		20:01	19:22 (WEA ZB2)	18:48		16:42	16:09	
10	05:11	05:57 (WEA VB6)	05:57		06:51	18:59 (WEA ZB2)	07:45		07:43	08:33	
	21:56	23 06:20 (WEA VB7)	21:09		19:59	19:23 (WEA ZB2)	18:46		16:41	16:09	
11	05:12	05:58 (WEA VB6)	05:59		06:53	18:58 (WEA ZB2)	07:47		07:45	08:34	
	21:55	23 06:21 (WEA VB7)	21:07		19:56	19:23 (WEA ZB2)	18:43		16:39	16:08	
12	05:13	06:00 (WEA VB6)	06:01		06:55	18:56 (WEA ZB2)	07:48		07:47	08:35	
	21:54	22 06:22 (WEA VB7)	21:05		19:54	19:23 (WEA ZB2)	18:41		16:37	16:08	
13	05:14	06:03 (WEA VB6)	06:02		06:57	18:56 (WEA ZB2)	07:50		07:49	08:36	
	21:53	20 06:23 (WEA VB7)	21:03		19:51	19:23 (WEA ZB2)	18:39		16:35	16:08	
14	05:15	06:06 (WEA VB6)	06:04		06:58	18:56 (WEA ZB2)	07:52		07:51	08:37	
	21:52	18 06:24 (WEA VB7)	21:01		19:49	19:21 (WEA ZB2)	18:36		16:34	16:08	
15	05:17	06:06 (WEA VB6)	06:06		07:00	18:56 (WEA ZB2)	07:54		07:53	08:38	
	21:51	20 06:26 (WEA VB7)	20:59		19:47	19:19 (WEA ZB2)	18:34		16:32	16:08	
16	05:18	06:06 (WEA VB6)	06:08		07:02	18:27 (WEA ZB3)	07:56		07:55	08:39	
	21:50	20 06:26 (WEA VB7)	20:57		19:44	19:16 (WEA ZB2)	18:32		16:31	16:08	
17	05:19	06:05 (WEA VB6)	06:09		07:04	18:24 (WEA ZB3)	07:58		07:57	08:40	
	21:49	21 06:26 (WEA VB7)	20:55		19:42	19:14 (WEA ZB2)	18:29		16:29	16:08	
18	05:21	06:05 (WEA VB6)	06:11		07:05	18:22 (WEA ZB3)	07:59		07:58	08:41	
	21:48	22 06:27 (WEA VB7)	20:53		19:39	19:12 (WEA ZB2)	18:27		16:28	16:09	
19	05:22	06:05 (WEA VB6)	06:13		07:07	18:19 (WEA ZB3)	08:01		08:00	08:41	
	21:46	23 06:28 (WEA VB7)	20:50		19:37	19:08 (WEA ZB2)	18:25		16:26	16:09	
20	05:23	06:04 (WEA VB6)	06:15		07:09	18:17 (WEA ZB3)	08:03		08:02	08:42	
	21:45	24 06:28 (WEA VB7)	20:48	9 20:01 (WEA ZB1)	19:34	19:06 (WEA ZB2)	18:23		16:25	16:09	
21	05:25	06:04 (WEA VB6)	06:16		07:11	18:16 (WEA ZB3)	08:05		08:04	08:43	
	21:44	24 06:28 (WEA VB7)	20:46	14 20:04 (WEA ZB1)	19:32	19:04 (WEA ZB2)	18:20		16:24	16:10	
22	05:26	06:04 (WEA VB6)	06:18		07:12	18:15 (WEA ZB3)	08:07		08:06	08:43	
	21:42	25 06:29 (WEA VB7)	20:44	17 20:04 (WEA ZB1)	19:29	19:02 (WEA ZB2)	18:18		16:23	16:10	
23	05:28	06:04 (WEA VB6)	06:20		07:14	18:14 (WEA ZB3)	08:09		08:07	08:44	
	21:41	25 06:29 (WEA VB7)	20:41	20 20:06 (WEA ZB1)	19:27	18:47 (WEA ZB3)	18:16		16:21	16:11	
24	05:29	06:03 (WEA VB6)	06:22		07:16	18:13 (WEA ZB3)	08:11		08:09	08:44	
	21:40	26 06:29 (WEA VB7)	20:39	21 20:06 (WEA ZB1)	19:24	18:47 (WEA ZB3)	18:14		16:20	16:11	
25	05:31	06:04 (WEA VB6)	06:23		07:18	18:13 (WEA ZB3)	07:13		08:11	08:44	
	21:38	25 06:29 (WEA VB7)	20:37	22 20:06 (WEA ZB1)	19:22	18:47 (WEA ZB3)	17:12		16:19	16:12	
26	05:32	06:04 (WEA VB6)	06:25		07:19	18:12 (WEA ZB3)	07:15		08:13	08:45	
	21:37	25 06:29 (WEA VB7)	20:35	23 20:06 (WEA ZB1)	19:19	18:47 (WEA ZB3)	17:10		16:18	16:13	
27	05:34	06:05 (WEA VB6)	06:27		07:21	18:11 (WEA ZB3)	07:16		08:14	08:45	
	21:35	24 06:29 (WEA VB7)	20:32	21 20:04 (WEA ZB1)	19:17	18:46 (WEA ZB3)	17:07		16:17	16:13	
28	05:35	06:06 (WEA VB6)	06:29		07:23	18:11 (WEA ZB3)	07:18		08:16	08:45	
	21:33	23 06:29 (WEA VB7)	20:30	19 20:01 (WEA ZB1)	19:15	18:46 (WEA ZB3)	17:05		16:16	16:14	
29	05:37	06:08 (WEA VB6)	06:30		07:25	18:11 (WEA ZB3)	07:20		08:17	08:45	
	21:32	21 06:29 (WEA VB7)	20:28	17 19:59 (WEA ZB1)	19:12	18:44 (WEA ZB3)	17:03		16:15	16:15	
30	05:39	06:09 (WEA VB6)	06:32		07:27	18:11 (WEA ZB3)	07:22		08:19	08:45	
	21:30	19 06:28 (WEA VB7)	20:25	14 19:57 (WEA ZB1)	19:10	18:42 (WEA ZB3)	17:01		16:14	16:16	
31	05:40	06:11 (WEA VB6)	06:34				07:24			08:45	
	21:28	17 06:28 (WEA VB7)	20:23	12 19:54 (WEA ZB1)			16:59			16:17	
Sonnenscheinstunden		511	459		382		329		260	234	
astr.max.mögl.Beschattung		712	258		763	120					

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO12 - Westerhausen 4
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni	
1	08:45 08:16 16:18 17:09			07:19 18:04	16:41 (WEA ZB3) 07:04 17:10 (WEA ZB3) 20:02	24	19:11 (WEA ZB1) 05:55 19:35 (WEA ZB1) 20:57	26	07:02 (WEA VB6) 05:06 07:28 (WEA VB6) 21:47		
2	08:45 08:14 16:19 17:11			07:16 18:06	16:43 (WEA ZB3) 07:02 17:09 (WEA ZB3) 20:04	26	19:11 (WEA ZB1) 05:53 19:37 (WEA ZB1) 20:59	23	07:03 (WEA VB6) 05:05 07:26 (WEA VB6) 21:48		
3	08:45 08:12 16:21 17:13			07:14 18:08	16:44 (WEA ZB3) 06:59 17:41 (WEA ZB2) 20:06	25	19:12 (WEA ZB1) 05:51 19:37 (WEA ZB1) 21:01	20	07:05 (WEA VB6) 05:05 07:25 (WEA VB6) 21:49		
4	08:45 08:10 16:22 17:15			07:12 18:10	16:47 (WEA ZB3) 06:57 17:43 (WEA ZB2) 20:08	25	19:11 (WEA ZB1) 05:49 19:36 (WEA ZB1) 21:03	16	07:06 (WEA VB6) 05:04 07:22 (WEA VB6) 21:50		
5	08:44 08:09 16:23 17:17			07:09 18:12	16:50 (WEA ZB3) 06:54 17:32 (WEA ZB2) 20:10	23	19:12 (WEA ZB1) 05:47 19:35 (WEA ZB1) 21:04	11	07:08 (WEA VB6) 05:03 07:19 (WEA VB6) 21:51		
6	08:44 08:07 16:24 17:19			07:07 18:14	17:32 (WEA ZB2) 06:52 17:47 (WEA ZB2) 20:11	21	19:12 (WEA ZB1) 05:45 19:33 (WEA ZB1) 21:06		05:02 21:52	4	06:10 (WEA VB5) 06:14 (WEA VB5)
7	08:44 08:05 16:26 17:21			07:05 18:16	17:31 (WEA ZB2) 06:50 17:50 (WEA ZB2) 20:13	18	19:14 (WEA ZB1) 05:43 19:32 (WEA ZB1) 21:08		05:02 21:53	11	06:07 (WEA VB5) 06:18 (WEA VB5)
8	08:43 08:03 16:27 17:23	1	16:52 (WEA ZB3) 18:18	07:02 18:18	17:30 (WEA ZB2) 06:47 17:51 (WEA ZB2) 20:15	14	19:16 (WEA ZB1) 05:41 19:30 (WEA ZB1) 21:10		05:01 21:54	15	06:05 (WEA VB5) 06:20 (WEA VB5)
9	08:43 08:01 16:28 17:25	6	16:49 (WEA ZB3) 18:20	07:00 18:20	17:30 (WEA ZB2) 06:45 17:53 (WEA ZB2) 20:17	8	19:18 (WEA ZB1) 05:40 19:26 (WEA ZB1) 21:11		05:00 21:55	17	06:04 (WEA VB5) 06:21 (WEA VB5)
10	08:42 07:59 16:30 17:27	11	16:55 (WEA ZB3) 18:22	06:57 18:22	17:28 (WEA ZB2) 06:42 17:55 (WEA ZB2) 20:19	4	07:06 (WEA VB7) 05:38 07:10 (WEA VB7) 21:13		05:00 21:56	19	06:04 (WEA VB5) 06:23 (WEA VB5)
11	08:41 07:57 16:31 17:29	15	16:58 (WEA ZB3) 18:22	06:55 18:23	17:29 (WEA ZB2) 06:40 17:57 (WEA ZB2) 20:21	16	07:04 (WEA VB7) 05:36 07:24 (WEA VB6) 21:15		04:59 21:57	20	06:03 (WEA VB5) 06:23 (WEA VB5)
12	08:40 07:55 16:33 17:31	18	16:43 (WEA ZB3) 18:25	06:53 18:25	16:43 (WEA ZB3) 06:53 17:28 (WEA ZB2) 20:22	26	07:01 (WEA VB7) 05:34 07:27 (WEA VB6) 21:17		04:59 21:57	23	06:02 (WEA VB5) 06:25 (WEA VB5)
13	08:40 07:53 16:35 17:33	21	16:42 (WEA ZB3) 18:27	06:50 18:27	17:28 (WEA ZB2) 06:35 17:57 (WEA ZB2) 20:24	30	06:59 (WEA VB7) 05:32 07:29 (WEA VB6) 21:18		04:59 21:58	24	06:02 (WEA VB5) 06:26 (WEA VB5)
14	08:39 07:51 16:36 17:35	25	16:41 (WEA ZB3) 18:29	06:48 18:29	16:41 (WEA ZB3) 06:48 17:57 (WEA ZB2) 20:26	34	06:57 (WEA VB7) 05:31 07:31 (WEA VB6) 21:20		04:58 21:59	25	06:02 (WEA VB5) 06:27 (WEA VB5)
15	08:38 07:49 16:38 17:37	28	17:06 (WEA ZB3) 18:31	06:45 18:31	16:40 (WEA ZB3) 06:45 17:56 (WEA ZB2) 20:28	37	06:55 (WEA VB7) 05:29 07:32 (WEA VB6) 21:22		04:58 21:59	25	06:01 (WEA VB5) 06:27 (WEA VB5)
16	08:37 07:47 16:39 17:39	30	16:40 (WEA ZB3) 18:33	06:43 18:33	16:40 (WEA ZB3) 06:43 17:55 (WEA ZB2) 20:30	40	06:52 (WEA VB7) 05:27 07:32 (WEA VB6) 21:23		04:58 22:00	26	06:01 (WEA VB5) 06:27 (WEA VB5)
17	08:36 07:45 16:41 17:41	34	16:39 (WEA ZB3) 18:35	06:41 18:35	16:39 (WEA ZB3) 06:41 17:53 (WEA ZB2) 20:32	43	06:50 (WEA VB7) 05:26 07:33 (WEA VB6) 21:25		04:58 22:01	26	06:01 (WEA VB5) 06:28 (WEA VB5)
18	08:35 07:43 16:43 17:43	36	16:38 (WEA ZB3) 18:37	06:38 18:37	16:38 (WEA ZB3) 06:38 17:52 (WEA ZB2) 20:33	44	06:50 (WEA VB7) 05:24 07:34 (WEA VB6) 21:27		04:58 22:01	27	06:01 (WEA VB5) 06:28 (WEA VB5)
19	08:34 07:41 16:45 17:45	37	16:38 (WEA ZB3) 18:38	06:36 18:38	16:38 (WEA ZB3) 06:36 17:53 (WEA ZB2) 20:35	43	06:51 (WEA VB7) 05:23 07:34 (WEA VB6) 21:28		04:58 22:01	27	06:01 (WEA VB5) 06:28 (WEA VB5)
20	08:33 07:39 16:46 17:47	37	16:38 (WEA ZB3) 18:40	06:33 18:40	16:38 (WEA ZB3) 06:33 17:53 (WEA ZB2) 20:37	43	06:51 (WEA VB7) 05:21 07:34 (WEA VB6) 21:30		04:58 22:02	27	06:02 (WEA VB5) 06:29 (WEA VB5)
21	08:32 07:36 16:48 17:49	38	16:38 (WEA ZB3) 18:42	06:31 18:42	16:38 (WEA ZB3) 06:31 17:53 (WEA ZB2) 20:39	42	06:51 (WEA VB7) 05:20 07:33 (WEA VB6) 21:31		04:58 22:02	27	06:02 (WEA VB5) 06:29 (WEA VB5)
22	08:30 07:34 16:50 17:51	38	16:37 (WEA ZB3) 18:44	06:28 18:44	16:37 (WEA ZB3) 06:28 17:53 (WEA ZB2) 20:41	42	06:52 (WEA VB7) 05:18 07:34 (WEA VB6) 21:33		04:58 22:02	27	06:02 (WEA VB5) 06:29 (WEA VB5)
23	08:29 07:32 16:52 17:53	37	16:38 (WEA ZB3) 18:46	06:26 18:46	16:38 (WEA ZB3) 06:26 17:53 (WEA ZB2) 20:43	40	06:53 (WEA VB7) 05:17 07:33 (WEA VB6) 21:34		04:59 22:02	27	06:02 (WEA VB5) 06:29 (WEA VB5)
24	08:28 07:30 16:54 17:55	37	16:38 (WEA ZB3) 18:48	06:23 18:48	16:38 (WEA ZB3) 06:23 17:53 (WEA ZB2) 20:44	38	06:55 (WEA VB7) 05:15 07:33 (WEA VB6) 21:36		04:59 22:02	27	06:03 (WEA VB5) 06:30 (WEA VB5)
25	08:26 07:28 16:56 17:57	35	16:38 (WEA ZB3) 18:49	06:21 18:49	16:38 (WEA ZB3) 06:21 17:53 (WEA ZB2) 20:46	34	06:59 (WEA VB6) 05:14 07:33 (WEA VB6) 21:37		04:59 22:02	27	06:03 (WEA VB5) 06:30 (WEA VB5)
26	08:25 07:25 16:58 17:59	34	16:39 (WEA ZB3) 18:51	06:19 18:51	16:39 (WEA ZB3) 06:19 17:53 (WEA ZB2) 20:48	32	07:00 (WEA VB6) 05:13 07:32 (WEA VB6) 21:39		05:00 22:02	26	06:03 (WEA VB5) 06:29 (WEA VB5)
27	08:23 07:23 16:59 18:01	32	16:40 (WEA ZB3) 18:53	06:16 18:53	16:40 (WEA ZB3) 06:16 17:53 (WEA ZB2) 20:50	32	07:00 (WEA VB6) 05:12 07:32 (WEA VB6) 21:40		05:00 22:02	26	06:04 (WEA VB5) 06:30 (WEA VB5)
28	08:22 07:21 17:01 18:02	31	16:40 (WEA ZB3) 18:55	06:14 18:55	16:40 (WEA ZB3) 06:14 17:53 (WEA ZB2) 20:52	31	07:00 (WEA VB6) 05:11 07:31 (WEA VB6) 21:41		05:01 22:02	25	06:04 (WEA VB5) 06:05 (WEA VB5)
29	08:20 17:03 17:03 17:03		17:11 (WEA ZB3) 19:07	07:11 19:07	17:11 (WEA ZB3) 07:11 19:14 (WEA ZB1) 20:54	29	07:01 (WEA VB6) 05:09 07:30 (WEA VB6) 21:43		05:01 22:02	24	06:05 (WEA VB5) 06:29 (WEA VB5)
30	08:19 17:05 17:05 17:05			07:09 19:09	19:12 (WEA ZB1) 20:57 19:32 (WEA ZB1) 20:55	27	07:02 (WEA VB6) 05:08 07:29 (WEA VB6) 21:44		05:02 22:02	23	06:06 (WEA VB5) 06:29 (WEA VB5)
31	08:17 17:07 17:07 17:07			07:06 20:00	19:12 (WEA ZB1) 20:55 19:34 (WEA ZB1) 20:55		05:07 21:45				
Sonnenscheinstunden		251	274	367	367	419	493	493	509	575	
astr.max.mögl.Beschattung			581	564	564	891	96	96			

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO12 - Westerhausen 4

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli			August			September			Oktober			November			Dezember	
1	05:02	06:07 (WEA VB5)	05:42			06:36	07:03 (WEA VB7)	07:28	18:08 (WEA ZB2)	07:26	16:15 (WEA ZB3)	08:21					
2	22:01	21	06:28 (WEA VB5)	21:27		20:21	16	07:23 (WEA VB6)	19:07	29	18:37 (WEA ZB2)	16:57	11	16:26 (WEA ZB3)	16:13		
	05:03		06:08 (WEA VB5)	05:44		06:37		07:05 (WEA VB7)	07:30		18:06 (WEA ZB2)	07:28			08:22		
	22:01	20	06:28 (WEA VB5)	21:25		20:18	4	07:09 (WEA VB7)	19:05	30	18:36 (WEA ZB2)	16:55	6	16:24 (WEA ZB3)	16:13		
3	05:04		06:09 (WEA VB5)	05:45		06:39		19:16 (WEA ZB1)	07:32		18:06 (WEA ZB2)	07:30			08:24		
	22:01	18	06:27 (WEA VB5)	21:23		20:16	8	19:24 (WEA ZB1)	19:02	28	18:34 (WEA ZB2)	16:53			16:12		
4	05:05		06:11 (WEA VB5)	05:47		06:41		19:13 (WEA ZB1)	07:34		18:06 (WEA ZB2)	07:32			08:25		
	22:00	15	06:26 (WEA VB5)	21:21		20:13	14	19:27 (WEA ZB1)	19:00	25	18:31 (WEA ZB2)	16:51			16:11		
5	05:06		06:12 (WEA VB5)	05:49		06:43		19:11 (WEA ZB1)	07:36		18:07 (WEA ZB2)	07:34			08:26		
	22:00	12	06:24 (WEA VB5)	21:19		20:11	18	19:29 (WEA ZB1)	18:58	22	18:29 (WEA ZB2)	16:50			16:11		
6	05:07		06:14 (WEA VB5)	05:50		06:44		19:08 (WEA ZB1)	07:37		18:07 (WEA ZB2)	07:36			08:28		
	21:59	8	06:22 (WEA VB5)	21:17		20:09	21	19:29 (WEA ZB1)	18:55	20	18:27 (WEA ZB2)	16:48			16:10		
7	05:08			05:52		07:22 (WEA VB6)		19:07 (WEA ZB1)	07:39		18:08 (WEA ZB2)	07:38			08:29		
	21:58			21:15	4	07:26 (WEA VB6)	23	19:30 (WEA ZB1)	18:53	16	18:24 (WEA ZB2)	16:46			16:10		
8	05:08			05:54		06:48		19:07 (WEA ZB1)	07:41		18:09 (WEA ZB2)	07:40			08:30		
	21:58			21:13	13	07:30 (WEA VB6)	24	19:31 (WEA ZB1)	18:50	13	18:22 (WEA ZB2)	16:44			16:09		
9	05:10			05:55		06:50		19:05 (WEA ZB1)	07:43		17:23 (WEA ZB3)	07:42			08:32		
	21:57			21:11	17	07:32 (WEA VB6)	26	19:31 (WEA ZB1)	18:48	23	18:19 (WEA ZB2)	16:42			16:09		
10	05:11			05:57		06:51		19:05 (WEA ZB1)	07:45		17:19 (WEA ZB3)	07:43			08:33		
	21:56			21:09	20	07:34 (WEA VB6)	26	19:31 (WEA ZB1)	18:46	26	18:16 (WEA ZB2)	16:41			16:09		
11	05:12			05:59		06:53		19:04 (WEA ZB1)	07:47		17:17 (WEA ZB3)	07:45			08:34		
	21:55			21:07	24	07:35 (WEA VB6)	25	19:29 (WEA ZB1)	18:43	25	18:14 (WEA ZB2)	16:39			16:08		
12	05:13			06:01		06:55		19:03 (WEA ZB1)	07:48		17:15 (WEA ZB3)	07:47			08:35		
	21:54			21:05	26	07:37 (WEA VB6)	23	19:26 (WEA ZB1)	18:41	27	17:42 (WEA ZB3)	16:37			16:08		
13	05:14			06:02		06:57		19:03 (WEA ZB1)	07:50		17:14 (WEA ZB3)	07:49			08:36		
	21:53			21:03	28	07:37 (WEA VB6)	20	19:23 (WEA ZB1)	18:39	29	17:43 (WEA ZB3)	16:35			16:08		
14	05:15			06:04		06:58		19:04 (WEA ZB1)	07:52		17:12 (WEA ZB3)	07:51			08:37		
	21:52			21:01	30	07:38 (WEA VB6)	17	19:21 (WEA ZB1)	18:36	32	17:44 (WEA ZB3)	16:34			16:08		
15	05:17			06:06		07:00		19:04 (WEA ZB1)	07:54		17:11 (WEA ZB3)	07:53			08:38		
	21:51			20:59	31	07:39 (WEA VB6)	15	19:19 (WEA ZB1)	18:34	34	17:45 (WEA ZB3)	16:32			16:08		
16	05:18			06:08		07:02		19:04 (WEA ZB1)	07:56		17:10 (WEA ZB3)	07:55			08:39		
	21:50			20:57	32	07:38 (WEA VB6)	12	19:16 (WEA ZB1)	18:32	35	17:45 (WEA ZB3)	16:31			16:08		
17	05:19			06:09		07:04		19:05 (WEA ZB1)	07:58		17:10 (WEA ZB3)	07:57			08:40		
	21:49			20:55	33	07:39 (WEA VB6)	9	19:14 (WEA ZB1)	18:29	36	17:46 (WEA ZB3)	16:29			16:08		
18	05:21			06:11		07:05		19:07 (WEA ZB1)	07:59		17:09 (WEA ZB3)	07:58			08:41		
	21:48			20:53	35	07:39 (WEA VB6)	5	19:12 (WEA ZB1)	18:27	37	17:46 (WEA ZB3)	16:28			16:09		
19	05:22			06:13		07:07			08:01		17:09 (WEA ZB3)	08:00			08:41		
	21:46			20:50	39	07:39 (WEA VB6)			18:25	37	17:46 (WEA ZB3)	16:26			16:09		
20	05:23			06:15		06:58 (WEA VB7)			08:03		17:08 (WEA ZB3)	08:02			08:42		
	21:45			20:48	41	07:39 (WEA VB6)			18:23	38	17:46 (WEA ZB3)	16:25			16:09		
21	05:25			06:16		06:57 (WEA VB7)			08:05		17:08 (WEA ZB3)	08:04			08:43		
	21:44			20:46	42	07:39 (WEA VB6)			18:20	38	17:46 (WEA ZB3)	16:24			16:10		
22	05:26			06:18		06:55 (WEA VB7)			08:07		17:08 (WEA ZB3)	08:06			08:43		
	21:42			20:44	43	07:38 (WEA VB6)			18:18	38	17:46 (WEA ZB3)	16:23			16:10		
23	05:28			06:20		06:55 (WEA VB7)		18:21 (WEA ZB2)	08:09		17:08 (WEA ZB3)	08:07			08:44		
	21:41			20:41	43	07:38 (WEA VB6)	8	18:29 (WEA ZB2)	18:16	37	17:45 (WEA ZB3)	16:21			16:11		
24	05:29			06:22		06:54 (WEA VB7)		18:17 (WEA ZB2)	08:11		17:08 (WEA ZB3)	08:09			08:44		
	21:40			20:39	44	07:38 (WEA VB6)	15	18:32 (WEA ZB2)	18:14	36	17:44 (WEA ZB3)	16:20			16:11		
25	05:31			06:23		06:53 (WEA VB7)		18:15 (WEA ZB2)	07:13		16:09 (WEA ZB3)	08:11			08:44		
	21:38			20:37	43	07:36 (WEA VB6)	19	18:34 (WEA ZB2)	17:12	33	16:42 (WEA ZB3)	16:19			16:12		
26	05:32			06:25		06:53 (WEA VB7)		18:13 (WEA ZB2)	07:15		16:09 (WEA ZB3)	08:13			08:45		
	21:37			20:35	43	07:36 (WEA VB6)	23	18:36 (WEA ZB2)	17:10	30	16:39 (WEA ZB3)	16:18			16:13		
27	05:34			06:27		06:55 (WEA VB7)		18:11 (WEA ZB2)	07:17		16:10 (WEA ZB3)	08:14			08:45		
	21:35			20:32	40	07:35 (WEA VB6)	25	18:36 (WEA ZB2)	17:07	27	16:37 (WEA ZB3)	16:17			16:13		
28	05:35			06:29		06:56 (WEA VB7)		18:10 (WEA ZB2)	07:18		16:10 (WEA ZB3)	08:16			08:45		
	21:33			20:30	37	07:33 (WEA VB6)	26	18:36 (WEA ZB2)	17:05	25	16:35 (WEA ZB3)	16:16			16:14		
29	05:37			06:30		06:58 (WEA VB7)		18:09 (WEA ZB2)	07:20		16:11 (WEA ZB3)	08:17			08:45		
	21:32			20:28	34	07:32 (WEA VB6)	28	18:37 (WEA ZB2)	17:03	21	16:32 (WEA ZB3)	16:15			16:15		
30	05:39			06:32		07:00 (WEA VB7)		18:08 (WEA ZB2)	07:22		16:12 (WEA ZB3)	08:19			08:45		
	21:30			20:25	30	07:30 (WEA VB6)	29	18:37 (WEA ZB2)	17:01	18	16:30 (WEA ZB3)	16:14			16:16		
31	05:40			06:34		07:01 (WEA VB7)			07:24		16:14 (WEA ZB3)				08:45		
	21:28			20:23	26	07:27 (WEA VB6)			16:59	14	16:28 (WEA ZB3)				16:17		
Sonnenscheinstunden	511			459		382			329		260				234		
astr.max.mögl.Beschattung	94			798		479			879		17						

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)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO13 - Westerhausen 11

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar		Februar		März		April		Mai		Juni			
1	08:45	14:18 (WEA ZB3)	08:16	14:37 (WEA ZB3)	07:19	16:22 (WEA ZB2)	07:04	07:27 (WEA VB7)	05:55	05:06				
	16:18	55	15:13 (WEA ZB3)	17:09	38	15:15 (WEA ZB3)	18:04	35	16:57 (WEA ZB2)	20:02	63	19:10 (WEA ZB1)	20:57	21:47
2	08:45	14:18 (WEA ZB3)	08:14	14:39 (WEA ZB3)	07:16	16:24 (WEA ZB2)	07:02	07:25 (WEA VB7)	05:53	05:05				
	16:19	56	15:14 (WEA ZB3)	17:11	37	16:39 (WEA ZB2)	18:06	32	16:56 (WEA ZB2)	20:04	62	19:09 (WEA ZB1)	20:59	21:48
3	08:45	14:18 (WEA ZB3)	08:12	14:41 (WEA ZB3)	07:14	16:25 (WEA ZB2)	06:59	07:23 (WEA VB7)	05:51	05:05				
	16:21	56	15:14 (WEA ZB3)	17:13	40	16:41 (WEA ZB2)	18:08	29	16:54 (WEA ZB2)	20:06	61	19:08 (WEA ZB1)	21:01	21:49
4	08:45	14:19 (WEA ZB3)	08:10	14:44 (WEA ZB3)	07:12	16:27 (WEA ZB2)	06:57	07:23 (WEA VB7)	05:49	05:04				
	16:22	56	15:15 (WEA ZB3)	17:15	41	16:44 (WEA ZB2)	18:10	25	16:52 (WEA ZB2)	20:08	52	19:06 (WEA ZB1)	21:03	21:50
5	08:44	14:20 (WEA ZB3)	08:09	14:47 (WEA ZB3)	07:09	16:29 (WEA ZB2)	06:54	07:25 (WEA VB7)	05:47	05:03				
	16:23	56	15:16 (WEA ZB3)	17:17	41	16:47 (WEA ZB2)	18:12	19	16:48 (WEA ZB2)	20:10	40	19:04 (WEA ZB1)	21:04	21:51
6	08:44	14:20 (WEA ZB3)	08:07	14:51 (WEA ZB3)	07:07	16:34 (WEA ZB2)	06:52	18:42 (WEA ZB1)	05:45	05:02				
	16:24	56	15:16 (WEA ZB3)	17:19	37	16:49 (WEA ZB2)	18:14	10	16:44 (WEA ZB2)	20:12	20	19:02 (WEA ZB1)	21:06	21:52
7	08:44	14:20 (WEA ZB3)	08:05	16:25 (WEA ZB2)	07:05		06:50	07:18 (WEA VB5)	05:43	05:02				
	16:26	56	15:16 (WEA ZB3)	17:21	26	16:51 (WEA ZB2)	18:16	22	18:58 (WEA ZB1)	21:08			21:53	
8	08:43	14:21 (WEA ZB3)	08:03	16:23 (WEA ZB2)	07:02		06:47	07:15 (WEA VB5)	05:42	05:01				
	16:27	56	15:17 (WEA ZB3)	17:23	30	16:53 (WEA ZB2)	18:18	15	07:30 (WEA VB5)	21:10			21:54	
9	08:43	14:21 (WEA ZB3)	08:01	16:22 (WEA ZB2)	07:00		06:45	07:12 (WEA VB5)	05:40	05:00				
	16:29	57	15:18 (WEA ZB3)	17:25	33	16:55 (WEA ZB2)	18:20	19	07:31 (WEA VB5)	21:11			21:55	
10	08:42	14:21 (WEA ZB3)	07:59	16:22 (WEA ZB2)	06:57		06:42	07:11 (WEA VB5)	05:38	05:00				
	16:30	57	15:18 (WEA ZB3)	17:27	36	16:58 (WEA ZB2)	18:22	21	07:32 (WEA VB5)	21:13			21:56	
11	08:41	14:21 (WEA ZB3)	07:57	16:20 (WEA ZB2)	06:55		06:40	07:10 (WEA VB5)	05:36	04:59				
	16:31	57	15:18 (WEA ZB3)	17:29	39	16:59 (WEA ZB2)	18:23	23	07:33 (WEA VB5)	21:15			21:57	
12	08:41	14:22 (WEA ZB3)	07:55	16:19 (WEA ZB2)	06:53		06:38	07:08 (WEA VB5)	05:34	04:59				
	16:33	56	15:18 (WEA ZB3)	17:31	42	17:01 (WEA ZB2)	18:25	25	07:33 (WEA VB5)	21:17			21:58	
13	08:40	14:22 (WEA ZB3)	07:53	16:19 (WEA ZB2)	06:50		06:35	07:07 (WEA VB5)	05:32	04:59				
	16:35	57	15:19 (WEA ZB3)	17:33	43	17:02 (WEA ZB2)	18:27	10	18:01 (WEA ZB1)	20:24	26	07:33 (WEA VB5)	21:18	21:58
14	08:39	14:23 (WEA ZB3)	07:51	16:18 (WEA ZB2)	06:48		06:33	07:07 (WEA VB5)	05:31	04:58				
	16:36	56	15:19 (WEA ZB3)	17:35	44	17:02 (WEA ZB2)	18:29	15	18:03 (WEA ZB1)	20:26	27	07:34 (WEA VB5)	21:20	21:59
15	08:38	14:23 (WEA ZB3)	07:49	16:18 (WEA ZB2)	06:45		06:31	07:07 (WEA VB5)	05:29	04:58				
	16:38	56	15:19 (WEA ZB3)	17:37	45	17:03 (WEA ZB2)	18:31	20	18:05 (WEA ZB1)	20:28	27	07:34 (WEA VB5)	21:22	21:59
16	08:37	14:24 (WEA ZB3)	07:47	16:18 (WEA ZB2)	06:43		06:28	07:06 (WEA VB5)	05:27	04:58				
	16:40	56	15:20 (WEA ZB3)	17:39	45	17:03 (WEA ZB2)	18:33	24	18:07 (WEA ZB1)	20:30	27	07:33 (WEA VB5)	21:23	22:00
17	08:36	14:25 (WEA ZB3)	07:45	16:18 (WEA ZB2)	06:41		06:26	07:06 (WEA VB5)	05:26	04:58				
	16:41	55	15:20 (WEA ZB3)	17:41	46	17:04 (WEA ZB2)	18:35	27	18:08 (WEA ZB1)	20:32	27	07:33 (WEA VB5)	21:25	22:01
18	08:35	14:24 (WEA ZB3)	07:43	16:17 (WEA ZB2)	06:38		06:24	07:06 (WEA VB5)	05:24	04:58				
	16:43	56	15:20 (WEA ZB3)	17:43	46	17:03 (WEA ZB2)	18:37	31	18:11 (WEA ZB1)	20:34	26	07:32 (WEA VB5)	21:27	22:01
19	08:34	14:25 (WEA ZB3)	07:41	16:17 (WEA ZB2)	06:36		06:21	07:07 (WEA VB5)	05:23	04:58				
	16:45	55	15:20 (WEA ZB3)	17:45	46	17:03 (WEA ZB2)	18:38	34	18:12 (WEA ZB1)	20:35	25	07:32 (WEA VB5)	21:28	22:01
20	08:33	14:26 (WEA ZB3)	07:39	16:17 (WEA ZB2)	06:33		06:19	07:07 (WEA VB5)	05:21	04:58				
	16:46	55	15:21 (WEA ZB3)	17:47	47	17:04 (WEA ZB2)	18:40	36	18:14 (WEA ZB1)	20:37	24	07:31 (WEA VB5)	21:30	22:02
21	08:32	14:26 (WEA ZB3)	07:37	16:18 (WEA ZB2)	06:31		06:17	07:07 (WEA VB5)	05:20	04:58				
	16:48	54	15:20 (WEA ZB3)	17:49	46	17:04 (WEA ZB2)	18:42	39	18:15 (WEA ZB1)	20:39	22	07:29 (WEA VB5)	21:31	22:02
22	08:30	14:27 (WEA ZB3)	07:34	16:17 (WEA ZB2)	06:28		06:15	07:08 (WEA VB5)	05:18	04:58				
	16:50	53	15:20 (WEA ZB3)	17:51	46	17:03 (WEA ZB2)	18:44	40	18:16 (WEA ZB1)	20:41	20	07:28 (WEA VB5)	21:33	22:02
23	08:29	14:28 (WEA ZB3)	07:32	16:18 (WEA ZB2)	06:26		06:12	07:09 (WEA VB5)	05:17	04:59				
	16:52	52	15:20 (WEA ZB3)	17:53	45	17:03 (WEA ZB2)	18:46	41	18:16 (WEA ZB1)	20:43	18	07:27 (WEA VB5)	21:34	22:02
24	08:28	14:29 (WEA ZB3)	07:30	16:18 (WEA ZB2)	06:24		06:10	07:11 (WEA VB5)	05:15	04:59				
	16:54	51	15:20 (WEA ZB3)	17:55	44	17:02 (WEA ZB2)	18:48	45	18:16 (WEA ZB1)	20:44	14	07:25 (WEA VB5)	21:36	22:02
25	08:26	14:29 (WEA ZB3)	07:28	16:18 (WEA ZB2)	06:21		06:08	07:14 (WEA VB5)	05:14	04:59				
	16:56	51	15:20 (WEA ZB3)	17:57	43	17:01 (WEA ZB2)	18:49	50	18:16 (WEA ZB1)	20:46	7	07:21 (WEA VB5)	21:37	22:02
26	08:25	14:31 (WEA ZB3)	07:25	16:19 (WEA ZB2)	06:19		06:06		05:13	05:00				
	16:58	49	15:20 (WEA ZB3)	17:59	41	17:00 (WEA ZB2)	18:51	55	18:16 (WEA ZB1)	20:48			21:39	22:02
27	08:23	14:31 (WEA ZB3)	07:23	16:20 (WEA ZB2)	06:16		06:04		05:12	05:00				
	16:59	48	15:19 (WEA ZB3)	18:01	40	17:00 (WEA ZB2)	18:53	58	18:15 (WEA ZB1)	20:50			21:40	22:02
28	08:22	14:32 (WEA ZB3)	07:21	16:20 (WEA ZB2)	06:14		06:02		05:11	05:01				
	17:01	46	15:18 (WEA ZB3)	18:02	38	16:58 (WEA ZB2)	18:55	59	18:14 (WEA ZB1)	20:52			21:42	22:02
29	08:20	14:34 (WEA ZB3)					07:11		05:09	05:01				
	17:03	44	15:18 (WEA ZB3)				19:57		21:43	22:02				
30	08:19	14:35 (WEA ZB3)					07:09		05:08	05:02				
	17:05	42	15:17 (WEA ZB3)				19:59		21:44	22:02				
31	08:17	14:36 (WEA ZB3)					07:06		05:07					
	17:07	40	15:16 (WEA ZB3)				20:01		21:45					
Sonnenscheinstunden		251	274	367	419	713	493	509						
astr.max.mögl.Beschattung		1650	1145	922	713									

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

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

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO13 - Westerhausen 11
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Jul	August	September	Oktober	November	Dezember
1	05:02 22:01	05:42 21:27	06:36 20:21	07:09 (WEA VB5) 19:07 07:10 (WEA VB5) 19:07	18:33 (WEA ZB1) 07:26 18:39 (WEA ZB1) 16:57	15:50 (WEA ZB2) 08:21 16:26 (WEA ZB2) 16:13
2	05:03 22:01	05:44 21:25	06:37 20:18	07:10 (WEA VB5) 19:07 07:31 (WEA VB5) 19:05	18:39 (WEA ZB1) 07:28 16:55 33 16:25 (WEA ZB2) 16:13	15:52 (WEA ZB2) 08:22 16:25 (WEA ZB2) 16:13
3	05:04 22:01	05:45 21:23	06:39 20:16	07:10 (WEA VB5) 19:07 07:29 (WEA VB5) 19:02	16:55 33 16:25 (WEA ZB2) 16:13 16:53 29 16:22 (WEA ZB2) 16:12	15:53 (WEA ZB2) 08:24 16:22 (WEA ZB2) 16:12
4	05:05 22:00	05:47 21:21	06:41 20:13	07:12 (WEA VB5) 19:04 07:15 (WEA VB5) 19:02	16:53 29 16:22 (WEA ZB2) 16:12 16:32 26 16:20 (WEA ZB2) 16:11	15:54 (WEA ZB2) 08:25 16:20 (WEA ZB2) 16:11
5	05:06 22:00	05:49 21:19	06:43 20:11	07:15 (WEA VB5) 19:02 18:54 (WEA ZB1) 18:58	16:34 26 16:20 (WEA ZB2) 16:11 16:50 38 16:18 (WEA ZB2) 16:11	14:20 (WEA ZB3) 08:27 16:18 (WEA ZB2) 16:11
6	05:07 21:59	05:50 21:17	06:44 20:09	18:38 (WEA ZB1) 18:58 18:57 (WEA ZB1) 18:55	16:36 38 16:18 (WEA ZB2) 16:11 16:48 41 16:16 (WEA ZB2) 16:10	14:16 (WEA ZB3) 08:28 16:16 (WEA ZB2) 16:10
7	05:08 21:58	05:52 21:15	06:46 20:06	07:21 (WEA VB7) 19:03 18:59 (WEA ZB1) 18:53	16:38 41 16:16 (WEA ZB2) 16:10 16:46 42 16:14 (WEA ZB2) 16:10	14:13 (WEA ZB3) 08:29 16:14 (WEA ZB2) 16:10
8	05:09 21:58	05:54 21:13	06:48 20:04	07:18 (WEA VB7) 19:01 19:01 (WEA ZB1) 18:50	16:46 42 16:14 (WEA ZB2) 16:10 17:07 (WEA ZB2) 07:40 17:22 (WEA ZB2) 16:44	14:11 (WEA ZB3) 08:31 16:12 (WEA ZB2) 16:09
9	05:10 21:57	05:55 21:11	06:50 20:01	07:16 (WEA VB7) 19:01 19:01 (WEA ZB1) 18:48	17:00 (WEA ZB2) 07:43 17:25 (WEA ZB2) 16:42	14:09 (WEA ZB3) 08:32 14:45 (WEA ZB3) 16:09
10	05:11 21:56	05:57 21:09	06:51 19:59	07:18 (WEA VB7) 19:01 19:03 (WEA ZB1) 18:46	17:00 (WEA ZB2) 07:43 17:27 (WEA ZB2) 16:41	14:08 (WEA ZB3) 08:33 14:46 (WEA ZB3) 16:09
11	05:12 21:55	05:59 21:07	06:53 19:56	07:20 (WEA VB7) 19:04 19:04 (WEA ZB1) 18:43	16:58 (WEA ZB2) 07:45 17:28 (WEA ZB2) 16:39	14:07 (WEA ZB3) 08:34 14:47 (WEA ZB3) 16:08
12	05:13 21:54	06:01 21:05	06:55 19:54	07:21 (WEA VB7) 19:04 19:03 (WEA ZB1) 18:41	16:56 (WEA ZB2) 07:47 17:30 (WEA ZB2) 16:37	14:06 (WEA ZB3) 08:35 14:48 (WEA ZB3) 16:08
13	05:14 21:53	06:02 21:03	06:57 19:52	07:23 (WEA VB7) 19:04 19:04 (WEA ZB1) 18:39	16:54 (WEA ZB2) 07:49 17:31 (WEA ZB2) 16:36	14:06 (WEA ZB3) 08:36 14:50 (WEA ZB3) 16:08
14	05:15 21:52	06:04 21:01	06:58 19:49	07:25 (WEA VB7) 19:04 19:04 (WEA ZB1) 18:36	16:53 (WEA ZB2) 07:51 17:32 (WEA ZB2) 16:34	14:05 (WEA ZB3) 08:37 14:51 (WEA ZB3) 16:08
15	05:17 21:51	06:06 20:59	07:00 19:47	07:27 (WEA VB7) 19:04 19:05 (WEA ZB1) 18:34	16:52 (WEA ZB2) 07:53 17:32 (WEA ZB2) 16:32	14:04 (WEA ZB3) 08:38 14:52 (WEA ZB3) 16:08
16	05:18 21:50	06:08 20:57	07:02 19:44	07:28 (WEA VB6) 19:04 19:04 (WEA ZB1) 18:32	16:51 (WEA ZB2) 07:55 17:33 (WEA ZB2) 16:31	14:04 (WEA ZB3) 08:39 14:53 (WEA ZB3) 16:08
17	05:19 21:49	06:09 20:55	07:04 19:42	07:30 (WEA VB6) 19:04 19:04 (WEA ZB1) 18:29	16:50 (WEA ZB2) 07:57 17:33 (WEA ZB2) 16:29	14:03 (WEA ZB3) 08:40 14:54 (WEA ZB3) 16:08
18	05:21 21:48	06:11 20:53	07:05 19:39	07:32 (WEA VB6) 19:04 19:04 (WEA ZB1) 18:27	16:49 (WEA ZB2) 07:58 17:34 (WEA ZB2) 16:28	14:03 (WEA ZB3) 08:41 14:54 (WEA ZB3) 16:09
19	05:22 21:47	06:13 20:50	07:07 19:37	07:33 (WEA VB6) 19:03 19:03 (WEA ZB1) 18:25	16:49 (WEA ZB2) 08:00 17:34 (WEA ZB2) 16:27	14:03 (WEA ZB3) 08:41 14:55 (WEA ZB3) 16:09
20	05:23 21:45	06:15 20:48	07:09 19:34	07:15 (WEA VB5) 19:09 19:02 (WEA ZB1) 18:23	16:48 (WEA ZB2) 08:02 17:34 (WEA ZB2) 16:25	14:02 (WEA ZB3) 08:42 14:55 (WEA ZB3) 16:09
21	05:25 21:44	06:16 20:46	07:11 19:32	07:13 (WEA VB5) 19:11 19:02 (WEA ZB1) 18:20	16:48 (WEA ZB2) 08:04 17:34 (WEA ZB2) 16:24	14:02 (WEA ZB3) 08:43 14:56 (WEA ZB3) 16:10
22	05:26 21:42	06:18 20:44	07:12 19:29	07:11 (WEA VB5) 19:12 19:01 (WEA ZB1) 18:18	16:48 (WEA ZB2) 08:06 17:34 (WEA ZB2) 16:23	14:02 (WEA ZB3) 08:43 14:57 (WEA ZB3) 16:10
23	05:28 21:41	06:20 20:41	07:14 19:27	07:11 (WEA VB5) 19:14 18:58 (WEA ZB1) 18:16	16:47 (WEA ZB2) 08:07 17:34 (WEA ZB2) 16:21	14:02 (WEA ZB3) 08:44 14:57 (WEA ZB3) 16:11
24	05:29 21:40	06:22 20:39	07:16 19:24	07:10 (WEA VB5) 19:16 18:56 (WEA ZB1) 18:14	16:47 (WEA ZB2) 08:09 17:34 (WEA ZB2) 16:20	14:03 (WEA ZB3) 08:44 14:58 (WEA ZB3) 16:11
25	05:31 21:38	06:23 20:37	07:18 19:22	07:09 (WEA VB5) 19:18 18:54 (WEA ZB1) 17:12	15:47 (WEA ZB2) 08:11 16:33 (WEA ZB2) 16:19	14:02 (WEA ZB3) 08:45 14:57 (WEA ZB3) 16:12
26	05:32 21:37	06:25 20:35	07:20 19:20	07:09 (WEA VB5) 19:20 18:52 (WEA ZB1) 17:10	15:48 (WEA ZB2) 08:13 16:33 (WEA ZB2) 16:18	14:02 (WEA ZB3) 08:45 14:58 (WEA ZB3) 16:13
27	05:34 21:35	06:27 20:32	07:21 19:17	07:09 (WEA VB5) 19:21 18:48 (WEA ZB1) 17:07	15:48 (WEA ZB2) 08:14 16:32 (WEA ZB2) 16:17	14:02 (WEA ZB3) 08:45 14:59 (WEA ZB3) 16:13
28	05:35 21:33	06:29 20:30	07:23 19:15	07:08 (WEA VB5) 19:23 18:46 (WEA ZB1) 17:05	15:48 (WEA ZB2) 08:16 16:32 (WEA ZB2) 16:16	14:03 (WEA ZB3) 08:45 14:59 (WEA ZB3) 16:14
29	05:37 21:32	06:30 20:28	07:25 19:12	07:08 (WEA VB5) 19:25 18:27 (WEA ZB1) 17:02	15:48 (WEA ZB2) 08:18 16:31 (WEA ZB2) 16:15	14:03 (WEA ZB3) 08:45 15:00 (WEA ZB3) 16:15
30	05:39 21:30	06:32 20:25	07:27 19:10	07:08 (WEA VB5) 19:27 18:29 (WEA ZB1) 17:02	15:49 (WEA ZB2) 08:19 16:30 (WEA ZB2) 16:14	14:03 (WEA ZB3) 08:45 14:59 (WEA ZB3) 16:16
31	05:40 21:28	06:34 20:23	07:28 19:03	07:08 (WEA VB5) 19:28 18:42 (WEA ZB1) 17:01	15:50 (WEA ZB2) 08:20 16:28 (WEA ZB2) 16:14	14:04 (WEA ZB3) 08:45 15:00 (WEA ZB3) 16:16
Sonnenscheinstunden	511	459	382	329	260	234
astr.max.mögl.Beschattung		321	1188	958	1392	1724

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO14 - Westerhausen 12
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni	
1	08:45	13:48 (WEA ZB3)	08:16	16:00 (WEA ZB2)	07:19	16:16 (WEA ZB2)	07:04	07:42 (WEA VB6)	05:55	05:06	
2	16:18	57 14:45 (WEA ZB3)	17:09	37 16:37 (WEA ZB2)	18:04	10 16:26 (WEA ZB2)	20:02	46 18:59 (WEA ZB1)	20:57	21:47	
3	08:45	13:48 (WEA ZB3)	08:14	16:00 (WEA ZB2)	07:16		07:02	07:45 (WEA VB6)	05:53	05:05	
4	16:19	57 14:46 (WEA ZB3)	17:11	39 16:39 (WEA ZB2)	18:06		20:04	36 18:57 (WEA ZB1)	20:59	21:48	
5	08:45	13:48 (WEA ZB3)	08:12	15:59 (WEA ZB2)	07:14		06:59	07:25 (WEA VB5)	05:51	05:05	
6	16:21	58 14:46 (WEA ZB3)	17:13	42 16:41 (WEA ZB2)	18:08		20:06	35 18:55 (WEA ZB1)	21:01	21:49	
7	08:45	13:49 (WEA ZB3)	08:10	15:59 (WEA ZB2)	07:12		06:57	07:21 (WEA VB5)	05:49	05:04	
8	16:22	58 14:47 (WEA ZB3)	17:15	45 16:44 (WEA ZB2)	18:10		20:08	36 18:52 (WEA ZB1)	21:03	21:50	
9	08:44	13:51 (WEA ZB3)	08:09	15:59 (WEA ZB2)	07:09		06:54	07:20 (WEA VB5)	05:47	05:03	
10	16:23	56 14:47 (WEA ZB3)	17:17	45 16:44 (WEA ZB2)	18:12		20:10	31 18:48 (WEA ZB1)	21:04	21:51	
11	08:44	13:51 (WEA ZB3)	08:07	15:58 (WEA ZB2)	07:07		06:52	07:19 (WEA VB5)	05:45	05:02	
12	16:24	56 14:47 (WEA ZB3)	17:19	47 16:45 (WEA ZB2)	18:14		20:12	21 07:40 (WEA VB5)	21:06	21:52	
13	08:44	13:51 (WEA ZB3)	08:05	15:58 (WEA ZB2)	07:05		06:50	07:17 (WEA VB5)	05:43	05:02	
14	16:26	56 14:47 (WEA ZB3)	17:21	47 16:45 (WEA ZB2)	18:16		20:13	23 07:40 (WEA VB5)	21:08	21:53	
15	08:43	13:52 (WEA ZB3)	08:03	15:58 (WEA ZB2)	07:02		06:47	07:16 (WEA VB5)	05:42	05:01	
16	16:27	56 14:48 (WEA ZB3)	17:23	48 16:46 (WEA ZB2)	18:18	7 17:51 (WEA ZB1)	20:15	24 07:40 (WEA VB5)	21:10	21:54	
17	08:43	13:53 (WEA ZB3)	08:01	15:57 (WEA ZB2)	07:00	17:44 (WEA ZB1)	06:45	07:15 (WEA VB5)	05:40	05:00	
18	16:29	55 14:48 (WEA ZB3)	17:25	49 16:46 (WEA ZB2)	18:20	13 17:53 (WEA ZB1)	20:17	25 07:40 (WEA VB5)	21:11	21:55	
19	08:42	13:53 (WEA ZB3)	07:59	15:57 (WEA ZB2)	06:57	17:36 (WEA ZB1)	06:42	07:15 (WEA VB5)	05:38	05:00	
20	16:30	55 14:48 (WEA ZB3)	17:27	50 16:47 (WEA ZB2)	18:22	19 17:55 (WEA ZB1)	20:19	25 07:40 (WEA VB5)	21:13	21:56	
21	08:41	13:54 (WEA ZB3)	07:57	15:57 (WEA ZB2)	06:55	17:34 (WEA ZB1)	06:40	07:15 (WEA VB5)	05:36	04:59	
22	16:31	54 14:48 (WEA ZB3)	17:29	50 16:47 (WEA ZB2)	18:23	23 17:57 (WEA ZB1)	20:21	25 07:40 (WEA VB5)	21:15	21:57	
23	08:41	13:54 (WEA ZB3)	07:55	15:56 (WEA ZB2)	06:53	17:32 (WEA ZB1)	06:38	07:14 (WEA VB5)	05:34	04:59	
24	16:33	54 14:48 (WEA ZB3)	17:31	50 16:46 (WEA ZB2)	18:25	26 17:58 (WEA ZB1)	20:23	25 07:39 (WEA VB5)	21:17	21:58	
25	08:40	13:55 (WEA ZB3)	07:53	15:57 (WEA ZB2)	06:50	17:30 (WEA ZB1)	06:35	07:14 (WEA VB5)	05:32	04:59	
26	16:35	53 14:48 (WEA ZB3)	17:33	49 16:46 (WEA ZB2)	18:27	31 18:01 (WEA ZB1)	20:24	24 07:38 (WEA VB5)	21:18	21:58	
27	08:39	13:56 (WEA ZB3)	07:51	15:57 (WEA ZB2)	06:48	17:29 (WEA ZB1)	06:33	07:15 (WEA VB5)	05:31	04:59	
28	16:36	53 14:49 (WEA ZB3)	17:35	49 16:46 (WEA ZB2)	18:29	34 18:03 (WEA ZB1)	20:26	23 07:38 (WEA VB5)	21:20	21:59	
29	08:38	13:56 (WEA ZB3)	07:49	15:57 (WEA ZB2)	06:45	17:28 (WEA ZB1)	06:31	07:16 (WEA VB5)	05:29	04:58	
30	16:38	53 14:49 (WEA ZB3)	17:37	49 16:46 (WEA ZB2)	18:31	37 18:05 (WEA ZB1)	20:28	21 07:37 (WEA VB5)	21:22	21:59	
31	08:37	13:57 (WEA ZB3)	07:47	15:58 (WEA ZB2)	06:43	17:27 (WEA ZB1)	06:28	07:16 (WEA VB5)	05:27	04:58	05:37 (WEA VB4)
32	16:40	52 14:49 (WEA ZB3)	17:39	48 16:46 (WEA ZB2)	18:33	40 18:07 (WEA ZB1)	20:30	19 07:35 (WEA VB5)	21:23	22:00	3 05:40 (WEA VB4)
33	08:36	13:58 (WEA ZB3)	07:45	15:58 (WEA ZB2)	06:41	17:25 (WEA ZB1)	06:26	07:17 (WEA VB5)	05:26	04:58	05:36 (WEA VB4)
34	16:41	51 14:49 (WEA ZB3)	17:41	48 16:46 (WEA ZB2)	18:35	43 18:08 (WEA ZB1)	20:32	16 07:33 (WEA VB5)	21:25	22:01	5 05:41 (WEA VB4)
35	08:35	13:59 (WEA ZB3)	07:43	15:58 (WEA ZB2)	06:38	17:25 (WEA ZB1)	06:24	07:19 (WEA VB5)	05:24	04:58	05:36 (WEA VB4)
36	16:43	49 14:48 (WEA ZB3)	17:43	47 16:45 (WEA ZB2)	18:37	44 18:09 (WEA ZB1)	20:34	12 07:31 (WEA VB5)	21:27	22:01	6 05:42 (WEA VB4)
37	08:34	14:00 (WEA ZB3)	07:41	15:58 (WEA ZB2)	06:36	17:24 (WEA ZB1)	06:21	07:23 (WEA VB5)	05:23	04:58	05:37 (WEA VB4)
38	16:45	48 14:48 (WEA ZB3)	17:45	47 16:45 (WEA ZB2)	18:38	44 18:08 (WEA ZB1)	20:35	4 07:27 (WEA VB5)	21:28	22:01	6 05:43 (WEA VB4)
39	08:33	14:01 (WEA ZB3)	07:39	15:59 (WEA ZB2)	06:33	17:24 (WEA ZB1)	06:19		05:21	04:58	05:36 (WEA VB4)
40	16:46	47 14:48 (WEA ZB3)	17:47	45 16:44 (WEA ZB2)	18:40	45 18:09 (WEA ZB1)	20:37		21:30	22:02	8 05:44 (WEA VB4)
41	08:32	14:02 (WEA ZB3)	07:37	16:00 (WEA ZB2)	06:31	17:23 (WEA ZB1)	06:17		05:20	04:58	05:36 (WEA VB4)
42	16:48	45 14:47 (WEA ZB3)	17:49	44 16:44 (WEA ZB2)	18:42	45 18:08 (WEA ZB1)	20:39		21:31	22:02	8 05:44 (WEA VB4)
43	08:30	14:03 (WEA ZB3)	07:34	16:00 (WEA ZB2)	06:28	06:52 (WEA VB6)	06:15		05:18	04:58	05:36 (WEA VB4)
44	16:50	44 14:47 (WEA ZB3)	17:51	42 16:42 (WEA ZB2)	18:44	50 18:08 (WEA ZB1)	20:41		21:33	22:02	8 05:44 (WEA VB4)
45	08:29	14:04 (WEA ZB3)	07:32	16:02 (WEA ZB2)	06:26	06:49 (WEA VB6)	06:12		05:17	04:59	05:37 (WEA VB4)
46	16:52	43 16:18 (WEA ZB2)	17:53	39 16:41 (WEA ZB2)	18:46	54 18:07 (WEA ZB1)	20:43		21:34	22:02	6 05:43 (WEA VB4)
47	08:28	14:06 (WEA ZB3)	07:30	16:03 (WEA ZB2)	06:24	06:47 (WEA VB6)	06:10		05:15	04:59	05:38 (WEA VB4)
48	16:54	49 16:21 (WEA ZB2)	17:55	37 16:40 (WEA ZB2)	18:48	57 18:07 (WEA ZB1)	20:44		21:36	22:02	6 05:44 (WEA VB4)
49	08:26	14:07 (WEA ZB3)	07:28	16:04 (WEA ZB2)	06:21	06:45 (WEA VB6)	06:08		05:14	04:59	05:38 (WEA VB4)
50	16:56	50 16:22 (WEA ZB2)	17:57	34 16:38 (WEA ZB2)	18:49	59 18:07 (WEA ZB1)	20:46		21:37	22:02	5 05:43 (WEA VB4)
51	08:25	14:09 (WEA ZB3)	07:25	16:06 (WEA ZB2)	06:19	06:42 (WEA VB6)	06:06		05:13	05:00	05:39 (WEA VB4)
52	16:58	52 16:25 (WEA ZB2)	17:59	30 16:36 (WEA ZB2)	18:51	62 18:06 (WEA ZB1)	20:48		21:39	22:02	3 05:42 (WEA VB4)
53	08:23	14:11 (WEA ZB3)	07:23	16:09 (WEA ZB2)	06:16	06:42 (WEA VB6)	06:04		05:12	05:00	
54	16:59	52 16:27 (WEA ZB2)	18:01	25 16:34 (WEA ZB2)	18:53	61 18:06 (WEA ZB1)	20:50		21:40	22:02	
55	08:22	14:13 (WEA ZB3)	07:21	16:11 (WEA ZB2)	06:14	06:41 (WEA VB6)	06:02		05:11	05:01	
56	17:01	52 16:29 (WEA ZB2)	18:02	20 16:31 (WEA ZB2)	18:55	60 18:04 (WEA ZB1)	20:52		21:42	22:02	
57	08:20	14:17 (WEA ZB3)			07:11	07:41 (WEA VB6)	06:00		05:09	05:01	
58	17:03	49 16:31 (WEA ZB2)			19:57	58 19:04 (WEA ZB1)	20:54		21:43	22:02	
59	08:19	14:20 (WEA ZB3)			07:09	07:41 (WEA VB6)	05:57		05:08	05:02	
60	17:05	46 16:33 (WEA ZB2)			19:59	55 19:02 (WEA ZB1)	20:55		21:44	22:02	
61	08:17	16:01 (WEA ZB2)			07:06	07:42 (WEA VB6)			05:07		
62	17:07	34 16:35 (WEA ZB2)			20:01	51 19:01 (WEA ZB1)			21:45		
Sonnenscheinstunden		251		274	367		419		493	509	64
astr.max.mögl.Beschattung		1594		1202	1028		471				

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO14 - Westerhausen 12
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	July	August	September	Oktober	November	Dezember
1	05:02 22:01	05:42 21:27	06:36 20:21	07:14 (WEA VB5) 07:28 19:07	18:11 (WEA ZB1) 07:26 16:57	15:26 (WEA ZB2) 08:21 16:13
2	05:03 22:01	05:44 21:25	06:37 20:18	07:14 (WEA VB5) 07:30 19:05	18:11 (WEA ZB1) 07:28 16:55	15:27 (WEA ZB2) 08:22 16:13
3	05:04 22:01	05:45 21:23	06:39 20:16	07:13 (WEA VB5) 07:32 19:02	18:13 (WEA ZB1) 07:30 16:53	15:27 (WEA ZB2) 08:24 16:12
4	05:05 22:00	05:47 21:21	06:41 20:13	07:13 (WEA VB5) 07:34 19:00	18:15 (WEA ZB1) 07:32 16:51	15:28 (WEA ZB2) 08:25 16:11
5	05:06 22:00	05:49 21:19	06:43 20:11	07:14 (WEA VB5) 07:36 18:58	18:19 (WEA ZB1) 07:34 16:50	15:28 (WEA ZB2) 08:27 16:11
6	05:07 21:59	05:50 21:17	06:44 20:09	07:14 (WEA VB5) 07:37 18:55	18:29 (WEA ZB1) 07:36 16:48	15:29 (WEA ZB2) 08:28 16:10
7	05:08 21:58	05:52 21:15	06:46 20:06	07:15 (WEA VB5) 07:39 18:53	18:31 (WEA ZB1) 07:38 16:46	15:29 (WEA ZB2) 08:29 16:10
8	05:09 21:58	05:54 21:13	06:48 20:04	07:16 (WEA VB5) 07:41 18:50	18:34 (WEA ZB1) 07:40 16:44	15:30 (WEA ZB2) 08:31 16:09
9	05:10 21:57	05:55 21:11	06:50 20:01	07:18 (WEA VB5) 07:43 18:48	18:37 (WEA ZB1) 07:42 16:42	15:30 (WEA ZB2) 08:32 16:09
10	05:11 21:56	05:57 21:09	06:51 19:59	07:18 (WEA VB6) 07:45 18:46	18:40 (WEA ZB1) 07:43 16:41	15:31 (WEA ZB2) 08:33 16:08
11	05:12 21:55	05:59 21:07	06:53 19:56	07:36 (WEA VB6) 07:47 18:43	18:43 (WEA ZB1) 07:45 16:39	15:32 (WEA ZB2) 08:34 16:08
12	05:13 21:54	06:01 21:05	06:55 19:54	07:33 (WEA VB6) 07:48 18:41	18:46 (WEA ZB1) 07:47 16:37	15:31 (WEA ZB2) 08:35 16:08
13	05:14 21:53	06:02 21:03	06:57 19:52	07:32 (WEA VB6) 07:50 18:39	16:47 (WEA ZB2) 07:49 16:36	15:31 (WEA ZB2) 08:36 16:08
14	05:15 21:52	06:04 21:01	06:58 19:49	07:32 (WEA VB6) 07:52 18:36	16:43 (WEA ZB2) 07:51 16:34	15:32 (WEA ZB2) 08:37 16:08
15	05:17 21:51	06:06 20:59	07:00 19:47	07:31 (WEA VB6) 07:54 18:34	16:40 (WEA ZB2) 07:53 16:32	15:34 (WEA ZB2) 08:38 16:08
16	05:18 21:50	06:08 20:57	07:02 19:44	07:30 (WEA VB6) 07:56 18:32	16:38 (WEA ZB2) 07:55 16:31	15:34 (WEA ZB2) 08:39 16:08
17	05:19 21:49	06:09 20:55	07:04 19:42	07:30 (WEA VB6) 07:58 18:29	16:36 (WEA ZB2) 07:57 16:29	15:35 (WEA ZB2) 08:40 16:08
18	05:21 21:48	06:11 20:53	07:05 19:39	07:32 (WEA VB6) 08:00 18:27	16:34 (WEA ZB2) 07:58 16:28	15:36 (WEA ZB2) 08:41 16:09
19	05:22 21:47	06:13 20:50	07:07 19:37	07:33 (WEA VB6) 08:01 18:25	16:33 (WEA ZB2) 08:00 16:27	15:37 (WEA ZB2) 08:41 16:09
20	05:23 21:45	06:15 20:48	07:09 19:34	07:35 (WEA VB6) 08:03 18:23	16:31 (WEA ZB2) 08:02 16:25	15:38 (WEA ZB2) 08:42 16:09
21	05:25 21:44	06:16 20:46	07:11 19:32	07:37 (WEA VB6) 08:05 18:20	16:30 (WEA ZB2) 08:04 16:24	15:39 (WEA ZB2) 08:43 16:10
22	05:26 21:42	06:18 20:44	07:12 19:29	07:38 (WEA ZB1) 08:07 18:18	16:29 (WEA ZB2) 08:06 16:23	15:40 (WEA ZB2) 08:43 16:10
23	05:28 21:41	06:20 20:41	07:14 19:27	07:39 (WEA ZB1) 08:09 18:16	16:28 (WEA ZB2) 08:07 16:21	15:41 (WEA ZB2) 08:44 16:11
24	05:29 21:40	06:22 20:39	07:16 19:24	07:40 (WEA ZB1) 08:11 18:14	16:27 (WEA ZB2) 08:09 16:20	15:42 (WEA ZB2) 08:44 16:11
25	05:31 21:38	06:23 20:37	07:18 19:22	07:42 (WEA ZB1) 08:13 17:12	15:27 (WEA ZB2) 08:11 16:19	15:43 (WEA ZB2) 08:45 16:12
26	05:32 21:37	06:25 20:35	07:20 (WEA VB5) 07:20 19:20	07:44 (WEA ZB1) 07:15 17:10	15:27 (WEA ZB2) 08:13 16:18	15:44 (WEA ZB2) 08:45 16:13
27	05:34 21:35	06:27 20:32	07:21 (WEA VB5) 07:21 19:17	07:46 (WEA ZB1) 07:17 17:07	15:27 (WEA ZB2) 08:14 16:17	15:45 (WEA ZB2) 08:45 16:13
28	05:35 21:33	06:29 20:30	07:23 (WEA VB5) 07:23 19:15	07:48 (WEA ZB1) 07:18 17:05	15:26 (WEA ZB2) 08:16 16:16	15:46 (WEA ZB2) 08:45 16:14
29	05:37 21:32	06:30 20:28	07:25 (WEA VB5) 07:25 19:12	07:50 (WEA ZB1) 07:20 17:03	15:26 (WEA ZB2) 08:18 16:15	15:47 (WEA ZB2) 08:45 16:15
30	05:39 21:30	06:32 20:25	07:27 (WEA VB5) 07:27 19:10	07:52 (WEA ZB1) 07:22 17:01	15:26 (WEA ZB2) 08:19 16:14	15:48 (WEA ZB2) 08:45 16:16
31	05:40 21:28	06:34 20:23	07:29 (WEA VB5) 07:29 19:08	07:54 (WEA ZB1) 07:24 16:59	15:26 (WEA ZB2) 08:20 16:15	15:49 (WEA ZB2) 08:45 16:17
Sonnenscheinstunden	511	459	382	329	260	234
astr.max.mögl.Beschattung		146	1267	879	1421	1776

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO15 - Westerhausen 9A

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni	
1	08:45	10:57 (WEA VB3)	08:16	14:03 (WEA ZB1)	07:19	14:38 (WEA ZB1)	07:04	05:55	06:28 (WEA VB1)	05:06	06:02 (WEA VB2)
	16:18	15:11 (WEA ZB1)	17:09	15:29 (WEA ZB1)	18:04	15:01 (WEA ZB1)	20:02	20:57	07:09 (WEA VB1)	21:47	07:09 (WEA VB1)
2	08:45	10:59 (WEA ZB3)	08:14	14:03 (WEA ZB1)	07:16		07:02	05:53	06:27 (WEA VB1)	05:05	06:02 (WEA VB2)
	16:19	15:12 (WEA ZB1)	17:11	15:29 (WEA ZB1)	18:06		20:04	20:59	07:10 (WEA VB1)	21:48	07:08 (WEA VB1)
3	08:45	11:00 (WEA ZB3)	08:12	14:04 (WEA ZB1)	07:14		06:59	05:51	06:26 (WEA VB1)	05:05	06:02 (WEA VB2)
	16:21	15:13 (WEA ZB1)	17:13	15:30 (WEA ZB1)	18:08		20:06	21:01	07:10 (WEA VB1)	21:49	07:07 (WEA VB1)
4	08:45	11:01 (WEA ZB3)	08:10	14:04 (WEA ZB1)	07:12		06:57	05:49	06:25 (WEA VB1)	05:04	06:03 (WEA VB2)
	16:22	15:13 (WEA ZB1)	17:15	15:30 (WEA ZB1)	18:10		20:08	21:03	07:11 (WEA VB1)	21:50	07:08 (WEA VB1)
5	08:45	11:04 (WEA ZB3)	08:09	14:04 (WEA ZB1)	07:09		06:54	05:47	06:25 (WEA VB1)	05:03	06:03 (WEA VB2)
	16:23	15:14 (WEA ZB1)	17:17	15:30 (WEA ZB1)	18:12		20:10	21:04	07:11 (WEA VB1)	21:51	07:07 (WEA VB1)
6	08:44	11:06 (WEA ZB3)	08:07	14:05 (WEA ZB1)	07:07		06:52	05:45	06:25 (WEA VB1)	05:02	06:04 (WEA VB2)
	16:24	15:15 (WEA ZB1)	17:19	15:30 (WEA ZB1)	18:14		20:12	21:06	07:12 (WEA VB1)	21:52	07:06 (WEA VB1)
7	08:44	12:27 (WEA ZB2)	08:05	14:05 (WEA ZB1)	07:05		06:50	05:43	06:24 (WEA VB1)	05:02	06:05 (WEA VB2)
	16:26	15:15 (WEA ZB1)	17:21	15:30 (WEA ZB1)	18:16		20:13	21:08	07:12 (WEA VB1)	21:53	07:07 (WEA VB1)
8	08:43	12:29 (WEA ZB2)	08:03	14:05 (WEA ZB1)	07:02		06:47	05:42	06:24 (WEA VB1)	05:01	06:04 (WEA VB2)
	16:27	15:17 (WEA ZB1)	17:23	15:30 (WEA ZB1)	18:18		20:15	21:10	07:12 (WEA VB1)	21:54	07:06 (WEA VB1)
9	08:43	12:30 (WEA ZB2)	08:01	14:06 (WEA ZB1)	07:00		17:52 (WEA VB13)	05:40	06:23 (WEA VB1)	05:00	06:05 (WEA VB2)
	16:29	15:17 (WEA ZB1)	17:25	15:29 (WEA ZB1)	18:20	1	17:53 (WEA VB13)	20:17	07:12 (WEA VB1)	21:55	07:06 (WEA VB1)
10	08:42	12:31 (WEA ZB2)	07:59	14:06 (WEA ZB1)	06:57		17:51 (WEA VB13)	06:42	07:18 (WEA VB1)	05:38	06:06 (WEA VB2)
	16:30	15:18 (WEA ZB1)	17:27	15:29 (WEA ZB1)	18:22	4	17:55 (WEA VB13)	20:19	07:14 (WEA VB1)	21:13	07:06 (WEA VB1)
11	08:41	12:32 (WEA ZB2)	07:57	14:07 (WEA ZB1)	06:55		17:51 (WEA VB13)	06:40	07:18 (WEA VB1)	05:36	06:06 (WEA VB2)
	16:32	15:18 (WEA ZB1)	17:29	15:29 (WEA ZB1)	18:24	6	17:57 (WEA VB13)	20:21	07:14 (WEA VB1)	21:15	07:05 (WEA VB1)
12	08:41	12:33 (WEA ZB2)	07:55	14:07 (WEA ZB1)	06:53		17:50 (WEA VB13)	06:38	07:19 (WEA VB1)	05:34	06:07 (WEA VB2)
	16:33	15:19 (WEA ZB1)	17:31	15:28 (WEA ZB1)	18:25	8	17:58 (WEA VB13)	20:23	07:12 (WEA VB1)	21:17	07:05 (WEA VB1)
13	08:40	12:35 (WEA ZB2)	07:53	14:07 (WEA ZB1)	06:50		17:51 (WEA VB13)	06:35	07:18 (WEA VB1)	05:32	06:08 (WEA VB2)
	16:35	15:20 (WEA ZB1)	17:33	15:27 (WEA ZB1)	18:27	10	18:01 (WEA VB13)	20:24	07:12 (WEA VB1)	21:18	07:05 (WEA VB1)
14	08:39	12:37 (WEA ZB2)	07:51	14:08 (WEA ZB1)	06:48		17:52 (WEA VB13)	06:33	07:19 (WEA VB1)	05:31	06:08 (WEA VB2)
	16:36	15:20 (WEA ZB1)	17:35	15:27 (WEA ZB1)	18:29	10	18:02 (WEA VB13)	20:26	07:12 (WEA VB1)	21:20	07:05 (WEA VB1)
15	08:38	12:39 (WEA ZB2)	07:49	14:09 (WEA ZB1)	06:45		17:53 (WEA VB13)	06:31	06:55 (WEA VB4)	05:29	06:08 (WEA VB2)
	16:38	15:21 (WEA ZB1)	17:37	15:26 (WEA ZB1)	18:31	6	17:59 (WEA VB13)	20:28	07:41 (WEA VB1)	21:22	07:05 (WEA VB1)
16	08:37	12:42 (WEA ZB2)	07:47	14:10 (WEA ZB1)	06:43		06:28	05:27	06:52 (WEA VB4)	05:27	06:08 (WEA VB2)
	16:40	15:22 (WEA ZB1)	17:39	15:26 (WEA ZB1)	18:33		20:30	21:23	07:38 (WEA VB1)	21:23	07:05 (WEA VB1)
17	08:36	12:46 (WEA ZB2)	07:45	14:11 (WEA ZB1)	06:41		07:04 (WEA VB5)	06:26	06:50 (WEA VB4)	05:26	06:09 (WEA VB2)
	16:41	15:23 (WEA ZB1)	17:41	15:25 (WEA ZB1)	18:35	4	07:08 (WEA VB5)	20:32	07:37 (WEA VB1)	21:25	07:05 (WEA VB1)
18	08:35	14:01 (WEA ZB1)	07:43	14:12 (WEA ZB1)	06:38		07:02 (WEA VB5)	06:24	06:48 (WEA VB4)	05:24	06:09 (WEA VB2)
	16:43	15:23 (WEA ZB1)	17:43	15:24 (WEA ZB1)	18:37	8	07:10 (WEA VB5)	20:34	07:34 (WEA VB1)	21:27	07:12 (WEA VB1)
19	08:34	14:02 (WEA ZB1)	07:41	14:13 (WEA ZB1)	06:36		06:59 (WEA VB5)	06:21	06:46 (WEA VB4)	05:23	06:10 (WEA VB2)
	16:45	15:24 (WEA ZB1)	17:45	15:23 (WEA ZB1)	18:38	11	07:10 (WEA VB5)	20:35	07:03 (WEA VB4)	21:28	07:12 (WEA VB1)
20	08:33	14:02 (WEA ZB1)	07:39	14:15 (WEA ZB1)	06:33		06:57 (WEA VB5)	06:19	06:45 (WEA VB4)	05:21	06:10 (WEA VB2)
	16:47	15:25 (WEA ZB1)	17:47	15:22 (WEA ZB1)	18:40	13	07:10 (WEA VB5)	20:37	07:04 (WEA VB4)	21:30	07:12 (WEA VB1)
21	08:32	14:02 (WEA ZB1)	07:37	14:16 (WEA ZB1)	06:31		06:54 (WEA VB5)	06:17	06:43 (WEA VB4)	05:20	06:10 (WEA VB2)
	16:48	15:25 (WEA ZB1)	17:49	15:21 (WEA ZB1)	18:42	16	07:10 (WEA VB5)	20:39	07:03 (WEA VB4)	21:31	07:11 (WEA VB1)
22	08:30	14:02 (WEA ZB1)	07:34	14:17 (WEA ZB1)	06:28		06:54 (WEA VB5)	06:15	06:43 (WEA VB4)	05:18	06:10 (WEA VB2)
	16:50	15:26 (WEA ZB1)	17:51	15:19 (WEA ZB1)	18:44	19	18:18 (WEA VB12)	20:41	07:03 (WEA VB4)	21:33	07:11 (WEA VB1)
23	08:29	14:02 (WEA ZB1)	07:32	14:19 (WEA ZB1)	06:26		06:54 (WEA VB5)	06:13	06:44 (WEA VB4)	05:17	06:10 (WEA VB2)
	16:52	15:26 (WEA ZB1)	17:53	15:18 (WEA ZB1)	18:46	19	18:19 (WEA VB12)	20:43	07:02 (WEA VB4)	21:34	07:11 (WEA VB1)
24	08:28	14:02 (WEA ZB1)	07:30	14:21 (WEA ZB1)	06:24		06:55 (WEA VB5)	06:10	06:42 (WEA VB1)	05:16	06:11 (WEA VB2)
	16:54	15:27 (WEA ZB1)	17:55	15:16 (WEA ZB1)	18:48	19	18:21 (WEA VB12)	20:45	07:02 (WEA VB4)	21:36	07:11 (WEA VB1)
25	08:26	14:02 (WEA ZB1)	07:28	14:23 (WEA ZB1)	06:21		06:56 (WEA VB5)	06:08	06:38 (WEA VB1)	05:14	06:11 (WEA VB2)
	16:56	15:27 (WEA ZB1)	17:57	15:14 (WEA ZB1)	18:50	19	18:24 (WEA VB12)	20:46	07:01 (WEA VB1)	21:37	07:10 (WEA VB1)
26	08:25	14:03 (WEA ZB1)	07:25	14:26 (WEA ZB1)	06:19		07:00 (WEA VB5)	06:06	06:36 (WEA VB1)	05:13	06:11 (WEA VB2)
	16:58	15:28 (WEA ZB1)	17:59	15:12 (WEA ZB1)	18:51	8	18:23 (WEA VB12)	20:48	07:03 (WEA VB1)	21:39	07:10 (WEA VB1)
27	08:23	14:02 (WEA ZB1)	07:23	14:29 (WEA ZB1)	06:16		06:04	05:12	06:34 (WEA VB1)	05:12	06:11 (WEA VB2)
	16:59	15:28 (WEA ZB1)	18:01	15:09 (WEA ZB1)	18:53		20:50	21:40	07:05 (WEA VB1)	21:40	07:08 (WEA VB1)
28	08:22	14:02 (WEA ZB1)	07:21	14:32 (WEA ZB1)	06:14		06:02	05:11	06:32 (WEA VB1)	05:11	06:11 (WEA VB2)
	17:01	15:28 (WEA ZB1)	18:03	15:05 (WEA ZB1)	18:55		20:52	21:42	07:06 (WEA VB1)	21:42	07:08 (WEA VB1)
29	08:20	14:03 (WEA ZB1)			07:11		06:00	05:09	06:31 (WEA VB1)	05:09	06:11 (WEA VB2)
	17:03	15:29 (WEA ZB1)			17:57		20:54	21:43	07:07 (WEA VB1)	21:43	07:08 (WEA VB1)
30	08:19	14:03 (WEA ZB1)			07:09		05:57	05:08	06:29 (WEA VB1)	05:08	06:11 (WEA VB2)
	17:05	15:29 (WEA ZB1)			17:59		20:55	21:44	07:08 (WEA VB1)	21:44	07:09 (WEA VB1)
31	08:17	14:03 (WEA ZB1)			07:06			05:07	06:02 (WEA VB2)		
	17:07	15:29 (WEA ZB1)			20:01			21:45	07:09 (WEA VB1)		
Sonnenscheinstunden		251	274	367	419	493	509	1526			
astr.max.mögl.Beschattung		3155	2020	204	700	1937					

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO15 - Westerhausen 9A

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

		Juli		August		September		Oktober		November		Dezember						
1	05:03	06:10 (WEA VB2)	05:42	06:16 (WEA VB2)	06:36	07:17 (WEA VB3)	07:28	18:30 (WEA VB13)	07:26	13:35 (WEA ZB1)	08:21	12:14 (WEA ZB2)						
	22:01	51	07:09 (WEA VB1)	21:27	66	07:23 (WEA VB1)	20:21	26	07:43 (WEA VB3)	19:07	83	14:58 (WEA ZB1)	16:13	110	15:00 (WEA ZB1)			
2	05:03	06:11 (WEA VB2)	05:44	06:18 (WEA VB2)	06:37	07:17 (WEA VB3)	07:30	18:29 (WEA VB13)	07:28	13:35 (WEA ZB1)	08:22	12:14 (WEA ZB2)						
	22:01	51	07:10 (WEA VB1)	21:25	62	07:23 (WEA VB1)	20:18	26	07:43 (WEA VB3)	19:05	8	14:37 (WEA ZB1)	16:55	84	14:59 (WEA ZB1)	16:12	112	15:01 (WEA ZB1)
3	05:04	06:11 (WEA VB2)	05:45	06:21 (WEA VB2)	06:39	07:16 (WEA VB3)	07:32	18:28 (WEA VB13)	07:30	13:35 (WEA ZB1)	08:24	12:13 (WEA ZB2)						
	22:01	53	07:11 (WEA VB1)	21:23	54	07:22 (WEA VB1)	20:16	26	07:42 (WEA VB3)	19:03	6	14:34 (WEA ZB1)	16:53	84	14:59 (WEA ZB1)	16:12	113	15:00 (WEA ZB1)
4	05:05	06:11 (WEA VB2)	05:47	06:23 (WEA VB1)	06:41	07:16 (WEA VB3)	07:34	18:29 (WEA VB13)	07:32	13:35 (WEA ZB1)	08:25	12:13 (WEA ZB2)						
	22:00	55	07:12 (WEA VB1)	21:21	49	07:22 (WEA VB1)	20:13	26	07:42 (WEA VB3)	19:00	2	14:31 (WEA ZB1)	16:51	84	14:59 (WEA ZB1)	16:11	114	15:01 (WEA ZB1)
5	05:06	06:10 (WEA VB2)	05:49	06:24 (WEA VB1)	06:43	07:17 (WEA VB3)	07:36		07:34			12:12 (WEA ZB2)						
	22:00	57	07:12 (WEA VB1)	21:19	49	07:23 (WEA VB1)	20:11	24	07:41 (WEA VB3)	18:58		15:00 (WEA ZB1)	16:11	115	15:00 (WEA ZB1)			
6	05:07	06:10 (WEA VB2)	05:50	06:24 (WEA VB1)	06:44	07:16 (WEA VB3)	07:37		07:36			15:01 (WEA ZB1)	16:08	139	15:02 (WEA ZB1)			
	21:59	58	07:13 (WEA VB1)	21:17	48	07:22 (WEA VB1)	20:09	24	07:40 (WEA VB3)	18:55		15:00 (WEA ZB1)	16:10	123	15:01 (WEA ZB1)			
7	05:08	06:10 (WEA VB2)	05:52	06:24 (WEA VB1)	06:46	07:17 (WEA VB3)	07:39		07:38			15:01 (WEA ZB1)	16:08	141	15:02 (WEA ZB1)			
	21:58	59	07:13 (WEA VB1)	21:15	47	07:21 (WEA VB1)	20:06	22	07:39 (WEA VB3)	18:53		15:00 (WEA ZB1)	16:10	127	15:00 (WEA ZB1)			
8	05:09	06:10 (WEA VB2)	05:54	06:24 (WEA VB1)	06:48	07:18 (WEA VB3)	07:41		07:40			15:01 (WEA ZB1)	16:08	142	15:03 (WEA ZB1)			
	21:58	61	07:14 (WEA VB1)	21:14	46	07:20 (WEA VB1)	20:04	20	07:38 (WEA VB3)	18:50		15:00 (WEA ZB1)	16:09	131	15:01 (WEA ZB1)			
9	05:10	06:10 (WEA VB2)	05:55	06:25 (WEA VB1)	06:50	07:19 (WEA VB3)	07:43		07:42			15:01 (WEA ZB1)	16:08	144	15:04 (WEA ZB1)			
	21:57	63	07:15 (WEA VB1)	21:12	45	07:20 (WEA VB1)	20:01	16	07:35 (WEA VB3)	18:48		15:00 (WEA ZB1)	16:09	134	15:01 (WEA ZB1)			
10	05:11	06:10 (WEA VB2)	05:57	06:26 (WEA VB1)	06:51	07:21 (WEA VB3)	07:45		07:44			15:01 (WEA ZB1)	16:08	145	15:03 (WEA ZB1)			
	21:56	63	07:15 (WEA VB1)	21:10	44	07:20 (WEA VB1)	19:59	12	07:33 (WEA VB3)	18:46		15:00 (WEA ZB1)	16:09	135	15:01 (WEA ZB1)			
11	05:12	06:09 (WEA VB2)	05:59	06:26 (WEA VB1)	06:53		07:47		07:45			15:01 (WEA ZB1)	16:08	144	15:04 (WEA ZB1)			
	21:55	67	07:16 (WEA VB1)	21:07	42	07:18 (WEA VB1)	19:56		18:43			15:00 (WEA ZB1)	16:08	138	15:01 (WEA ZB1)			
12	05:13	06:09 (WEA VB2)	06:01	06:27 (WEA VB1)	06:55		07:48			15:15 (WEA ZB1)	07:47	13:35 (WEA ZB1)	08:35	148	15:08 (WEA ZB1)			
	21:54	67	07:16 (WEA VB1)	21:05	40	07:17 (WEA VB1)	19:54		18:41	15	15:30 (WEA ZB1)	16:37	86	15:01 (WEA ZB1)	16:08	139	15:02 (WEA ZB1)	
13	05:14	06:09 (WEA VB2)	06:02	06:27 (WEA VB1)	06:57		07:50		07:50		15:08 (WEA ZB1)	16:37	86	15:01 (WEA ZB1)	16:08	140	15:02 (WEA ZB1)	
	21:53	68	07:17 (WEA VB1)	21:03	39	07:16 (WEA VB1)	19:52		18:39	28	15:36 (WEA ZB1)	16:36	86	15:01 (WEA ZB1)	16:08	139	15:02 (WEA ZB1)	
14	05:15	06:10 (WEA VB2)	06:04	06:29 (WEA VB1)	06:58		07:52		07:52		15:04 (WEA ZB1)	16:36	86	15:01 (WEA ZB1)	16:08	140	15:02 (WEA ZB1)	
	21:52	68	07:18 (WEA VB1)	21:01	36	07:15 (WEA VB1)	19:49		18:36	36	15:40 (WEA ZB1)	16:34	86	15:01 (WEA ZB1)	16:08	141	15:02 (WEA ZB1)	
15	05:17	06:10 (WEA VB2)	06:06	06:30 (WEA VB1)	07:00		07:54		07:54		15:00 (WEA ZB1)	16:37	86	15:01 (WEA ZB1)	16:08	141	15:02 (WEA ZB1)	
	21:51	69	07:19 (WEA VB1)	20:59	34	07:14 (WEA VB1)	19:47		18:34	42	15:42 (WEA ZB1)	16:32	86	15:01 (WEA ZB1)	16:08	142	15:03 (WEA ZB1)	
16	05:18	06:09 (WEA VB2)	06:08	06:31 (WEA VB1)	07:02		07:56		07:56		15:47 (WEA ZB1)	16:35	86	15:01 (WEA ZB1)	16:08	143	15:04 (WEA ZB1)	
	21:50	70	07:19 (WEA VB1)	20:57	30	07:11 (WEA VB1)	19:44		18:32	48	15:45 (WEA ZB1)	16:31	86	15:01 (WEA ZB1)	16:08	142	15:03 (WEA ZB1)	
17	05:19	06:09 (WEA VB2)	06:09	06:31 (WEA VB1)	07:04		07:58		07:58		15:44 (WEA ZB1)	16:31	86	15:01 (WEA ZB1)	16:08	143	15:04 (WEA ZB1)	
	21:49	70	07:19 (WEA VB1)	20:55	26	07:09 (WEA VB1)	19:42	6	19:11 (WEA VB12)	18:29	52	15:46 (WEA ZB1)	16:29	85	15:01 (WEA ZB1)	16:08	145	15:03 (WEA ZB1)
18	05:21	06:09 (WEA VB2)	06:11	06:32 (WEA VB1)	07:05		07:59		07:59		15:42 (WEA ZB1)	16:31	86	15:01 (WEA ZB1)	16:08	144	15:04 (WEA ZB1)	
	21:48	71	07:20 (WEA VB1)	20:53	22	07:06 (WEA VB4)	19:39	18	19:12 (WEA VB12)	18:27	56	15:48 (WEA ZB1)	16:28	85	15:01 (WEA ZB1)	16:09	144	15:03 (WEA ZB1)
19	05:22	06:10 (WEA VB2)	06:13	06:33 (WEA VB1)	07:07		08:01		08:01		15:40 (WEA ZB1)	16:30	86	15:01 (WEA ZB1)	16:08	144	15:04 (WEA ZB1)	
	21:47	71	07:21 (WEA VB1)	20:50	20	07:08 (WEA VB4)	19:37	19	19:08 (WEA VB12)	18:25	59	15:49 (WEA ZB1)	16:27	84	15:01 (WEA ZB1)	16:09	144	15:04 (WEA ZB1)
20	05:23	06:10 (WEA VB2)	06:15	06:34 (WEA VB1)	07:09		08:03		08:03		15:48 (WEA ZB1)	16:30	86	15:01 (WEA ZB1)	16:08	144	15:04 (WEA ZB1)	
	21:45	71	07:21 (WEA VB1)	20:48	19	07:08 (WEA VB4)	19:34	20	19:06 (WEA VB12)	18:23	63	15:51 (WEA ZB1)	16:25	84	15:01 (WEA ZB1)	16:09	146	15:04 (WEA ZB1)
21	05:25	06:09 (WEA VB2)	06:16	06:35 (WEA VB1)	07:11		08:05		08:05		15:46 (WEA ZB1)	16:30	86	15:01 (WEA ZB1)	16:08	145	15:04 (WEA ZB1)	
	21:44	72	07:21 (WEA VB1)	20:46	19	07:09 (WEA VB4)	19:32	19	19:04 (WEA VB12)	18:20	66	15:52 (WEA ZB1)	16:24	83	15:01 (WEA ZB1)	16:10	144	15:05 (WEA ZB1)
22	05:26	06:10 (WEA VB2)	06:18	06:36 (WEA VB1)	07:12		08:07		08:07		15:45 (WEA ZB1)	16:30	86	15:01 (WEA ZB1)	16:08	145	15:05 (WEA ZB1)	
	21:43	72	07:22 (WEA VB1)	20:44	19	07:07 (WEA VB4)	19:29	17	19:02 (WEA VB12)	18:18	68	15:53 (WEA ZB1)	16:23	83	15:01 (WEA ZB1)	16:10	143	15:04 (WEA ZB1)
23	05:28	06:10 (WEA VB2)	06:20	06:37 (WEA VB1)	07:14		08:09		08:09		15:43 (WEA ZB1)	16:31	86	15:01 (WEA ZB1)	16:08	146	15:06 (WEA ZB1)	
	21:41	72	07:22 (WEA VB1)	20:42	18	07:07 (WEA VB4)	19:27	14	19:04 (WEA VB12)	18:16	71	15:54 (WEA ZB1)	16:21	82	15:01 (WEA ZB1)	16:11	146	15:06 (WEA ZB1)
24	05:29	06:10 (WEA VB2)	06:22	06:38 (WEA VB1)	07:16		08:11		08:11		15:42 (WEA ZB1)	16:30	86	15:01 (WEA ZB1)	16:08	147	15:07 (WEA ZB1)	
	21:40	72	07:22 (WEA VB1)	20:39	17	07:07 (WEA VB4)	19:24	12	19:04 (WEA VB12)	18:14	72	15:54 (WEA ZB1)	16:20	81	15:01 (WEA ZB1)	16:11	145	15:06 (WEA ZB1)
25	05:31	06:11 (WEA VB2)	06:23	06:39 (WEA VB1)	07:18		08:13		08:13		15:41 (WEA ZB1)	16:29	86	15:01 (WEA ZB1)	16:08	148	15:08 (WEA ZB1)	
	21:38	72	07:23 (WEA VB1)	20:37	25	07:37 (WEA VB3)	19:22	9	07:53 (WEA VB5)	17:12	74	15:55 (WEA ZB1)	16:19	93	15:00 (WEA ZB1)	16:12	144	15:06 (WEA ZB1)
26	05:32	06:11 (WEA VB2)	06:25	06:53 (WEA VB4)	07:20		08:15		08:15		15:40 (WEA ZB1)	16:28	86	15:01 (WEA ZB1)	16:08	149	15:09 (WEA ZB1)	
	21:37	71	07:22 (WEA VB1)	20:35	27	07:40 (WEA VB3)	19:20	5	07:51 (WEA VB5)	17:10	76	15:56 (WEA ZB1)	16:18	99	15:00 (WEA ZB1)	16:13	144	15:07 (WEA ZB1)
27	05:34	06:12 (WEA VB2)	06:27	06:55 (WEA VB4)	07:21		08:17		08:17		15:49 (WEA ZB1)	16:28	86	15:01 (WEA ZB1)	16:08	150	15:09 (WEA ZB1)	
	21:35	71	07:23 (WEA VB1)	20:32	26	07:41 (WEA VB3)	19:17	1	07:49 (WEA VB5)	17:09	77	15:56 (WEA ZB1)	16:17	102	15:00 (WEA ZB1)	16:13	142	15:08 (WEA ZB1)
28	05:35	06:12 (WEA VB2)	06:29	06:56 (WEA VB4)	07:23		08:19		08:19		15:48 (WEA ZB1)	16:27	86	15:01 (WEA ZB1)	16:08	151	15:10 (WEA ZB1)	
	21:33	71	07:23 (WEA VB1)	20:30	25	07:42 (WEA VB3)	19:15	2	18:38 (WEA VB13)	17:05	78	15:56 (WEA ZB1)	16:16	106	15:01 (WEA ZB1)	16:14	141	15:08 (WEA ZB1)
29	05:37	06:13 (WEA VB2)	06:30	07:20 (WEA VB3)	07:25		08:21		08:21		15:47 (WEA ZB1)	16:27	86	15:01 (WEA ZB1)	16:08	152	15:11 (WEA ZB1)	
	21:32	70	07:23 (WEA VB1)	20:28	23	07:43 (WEA VB3)	19:12	9	18:41 (WEA VB13)	17:03	80	15:57 (WEA ZB1)	16:15	108	15:01 (WEA ZB1)	16:15	142	15:09 (WEA ZB1)
30	05:38	06:14 (WEA VB2)	06:32	07:19 (WEA VB3)	07:27		08:23		08:23		15:48 (WEA ZB1)	16:28	86	15:01 (WEA ZB1)	16:08	153	15:12 (WEA ZB1)	
	21:30	69	07:23 (WEA VB1)	20:25	24	07:43 (WEA VB3)	19:10	11	18:42 (WEA VB13)	17:01	81	15:57 (WEA ZB1)	16:14	109	15:00 (WEA ZB1)	16:16	141	15:10 (WEA ZB1)
31	05:40	06:15 (WEA VB2)	06:34	07:17 (WEA VB3)	07:24		08:25		08:25		15:49 (WEA ZB1)	16:29	86	15:01 (WEA ZB1)	16:08	154	15:13 (WEA ZB1)	
	21:28	68	07:23 (WEA VB1)	20:23	26	07:43 (WEA VB3)	19:11		18:43 (WEA VB13)	17:04	83	15:58 (WEA ZB1)	16:17	110	15:01 (WEA ZB1)	16:17	140	15:11 (WEA ZB1)
Sonnenscheinstunden	511		459			382		3239</										

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO16 - Westerhausen 9

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar			Februar			März			April			Mai			Juni		
1	08:45	12:17 (WEA VB2)	08:16	13:42 (WEA ZB1)	07:19				07:04	07:33 (WEA VB3)	05:55	06:47 (WEA VB1)	05:06				
	16:18	110	14:48 (WEA ZB1)	17:09	76	14:58 (WEA ZB1)	18:04		20:02	24	07:57 (WEA VB3)	20:57	47	07:34 (WEA VB1)	21:47		
2	08:45		12:18 (WEA ZB2)	08:14		13:42 (WEA ZB1)	07:16		07:02		07:32 (WEA VB3)	05:53		06:23 (WEA VB2)	05:05		
	16:19	109	14:49 (WEA ZB1)	17:11	76	14:58 (WEA ZB1)	18:06		20:04	25	07:57 (WEA VB3)	20:59	58	07:34 (WEA VB1)	21:48		
3	08:45		12:19 (WEA ZB2)	08:12		13:44 (WEA ZB1)	07:14		06:59		07:32 (WEA VB3)	05:51		06:20 (WEA VB2)	05:05		
	16:21	108	14:50 (WEA ZB1)	17:13	74	14:58 (WEA ZB1)	18:08		20:06	25	07:57 (WEA VB3)	21:01	61	07:33 (WEA VB1)	21:49		
4	08:45		12:20 (WEA ZB2)	08:10		13:44 (WEA ZB1)	07:12		06:57		07:31 (WEA VB3)	05:49		06:19 (WEA VB2)	05:04		
	16:22	106	14:50 (WEA ZB1)	17:15	74	14:58 (WEA ZB1)	18:10		20:08	25	07:56 (WEA VB3)	21:03	63	07:33 (WEA VB1)	21:50		
5	08:45		12:22 (WEA ZB2)	08:09		13:45 (WEA ZB1)	07:09		06:54		07:31 (WEA VB3)	05:47		06:17 (WEA VB2)	05:03		
	16:23	105	14:51 (WEA ZB1)	17:17	72	14:57 (WEA ZB1)	18:12		20:10	25	07:56 (WEA VB3)	21:04	65	07:32 (WEA VB1)	21:51		
6	08:44		12:23 (WEA ZB2)	08:07		13:46 (WEA ZB1)	07:07	17:45 (WEA VB13)	06:52		07:31 (WEA VB3)	05:45		06:17 (WEA VB2)	05:02		
	16:24	103	14:51 (WEA ZB1)	17:19	71	14:57 (WEA ZB1)	18:14	2	17:47 (WEA VB13)	25	07:56 (WEA VB3)	21:06	66	07:32 (WEA VB1)	21:52		
7	08:44		12:24 (WEA ZB2)	08:05		13:47 (WEA ZB1)	07:05	17:45 (WEA VB13)	06:50		07:31 (WEA VB3)	05:43		06:16 (WEA VB2)	05:02		
	16:26	101	14:51 (WEA ZB1)	17:21	69	14:56 (WEA ZB1)	18:16	5	17:50 (WEA VB13)	23	07:54 (WEA VB3)	21:08	66	07:31 (WEA VB1)	21:53		
8	08:43		12:27 (WEA ZB2)	08:03		13:48 (WEA ZB1)	07:02	17:44 (WEA VB13)	06:47		07:32 (WEA VB3)	05:42		06:15 (WEA VB2)	05:01		
	16:27	98	14:53 (WEA ZB1)	17:23	67	14:55 (WEA ZB1)	18:18	7	17:51 (WEA VB13)	22	07:54 (WEA VB3)	21:10	65	07:30 (WEA VB1)	21:54		
9	08:43		12:29 (WEA ZB2)	08:01		13:49 (WEA ZB1)	07:00	17:44 (WEA VB13)	06:45		07:32 (WEA VB3)	05:40		06:14 (WEA VB2)	05:00		
	16:29	95	14:53 (WEA ZB1)	17:25	65	14:54 (WEA ZB1)	18:20	9	17:53 (WEA VB13)	19	07:51 (WEA VB3)	21:11	65	07:29 (WEA VB1)	21:55		
10	08:42		12:33 (WEA ZB2)	07:59		13:51 (WEA ZB1)	06:57	17:44 (WEA VB13)	06:42		07:33 (WEA VB3)	05:38		06:14 (WEA VB2)	05:00		
	16:30	87	14:53 (WEA ZB1)	17:27	62	14:53 (WEA ZB1)	18:22	11	17:55 (WEA VB13)	17	07:50 (WEA VB3)	21:13	64	07:29 (WEA VB1)	21:56		
11	08:41		13:34 (WEA ZB1)	07:57		13:52 (WEA ZB1)	06:55	17:45 (WEA VB13)	06:40		07:04 (WEA VB4)	05:36		06:14 (WEA VB2)	05:00		
	16:32	80	14:54 (WEA ZB1)	17:29	60	14:52 (WEA ZB1)	18:24	10	17:55 (WEA VB13)	25	07:48 (WEA VB3)	21:15	62	07:27 (WEA VB1)	21:57		
12	08:41		13:34 (WEA ZB1)	07:55		13:53 (WEA ZB1)	06:53	17:47 (WEA VB13)	06:38		07:02 (WEA VB4)	05:34		06:13 (WEA VB2)	04:59		
	16:33	80	14:54 (WEA ZB1)	17:31	57	14:50 (WEA ZB1)	18:25	5	17:52 (WEA VB13)	27	07:44 (WEA VB3)	21:17	61	07:26 (WEA VB1)	21:58		
13	08:40		13:34 (WEA ZB1)	07:53		13:55 (WEA ZB1)	06:50		06:35		06:59 (WEA VB4)	05:32		06:14 (WEA VB2)	04:59		
	16:35	81	14:55 (WEA ZB1)	17:33	54	14:49 (WEA ZB1)	18:27		20:24	27	07:26 (WEA VB1)	21:18	59	07:25 (WEA VB1)	21:58		
14	08:39		13:34 (WEA ZB1)	07:51		13:57 (WEA ZB1)	06:48	07:12 (WEA VB5)	06:33		06:57 (WEA VB4)	05:31		06:13 (WEA VB2)	04:59		
	16:36	81	14:55 (WEA ZB1)	17:35	51	14:48 (WEA ZB1)	18:29	4	07:16 (WEA VB5)	32	07:29 (WEA VB1)	21:20	56	07:23 (WEA VB1)	21:59		
15	08:38		13:35 (WEA ZB1)	07:49		13:59 (WEA ZB1)	06:45	07:09 (WEA VB5)	06:31		06:55 (WEA VB4)	05:29		06:14 (WEA VB2)	04:58		
	16:38	81	14:56 (WEA ZB1)	17:37	47	14:46 (WEA ZB1)	18:31	7	07:16 (WEA VB5)	35	07:30 (WEA VB1)	21:22	53	07:22 (WEA VB1)	22:00		
16	08:37		13:35 (WEA ZB1)	07:47		14:02 (WEA ZB1)	06:43	07:07 (WEA VB5)	06:28		06:54 (WEA VB4)	05:27		06:14 (WEA VB2)	04:58		
	16:40	81	14:56 (WEA ZB1)	17:39	42	14:44 (WEA ZB1)	18:33	10	07:17 (WEA VB5)	37	07:31 (WEA VB1)	21:23	49	07:20 (WEA VB1)	22:00		
17	08:36		13:36 (WEA ZB1)	07:45		14:05 (WEA ZB1)	06:41	07:04 (WEA VB5)	06:26		06:54 (WEA VB4)	05:26		06:14 (WEA VB2)	04:58		
	16:41	81	14:57 (WEA ZB1)	17:41	36	14:41 (WEA ZB1)	18:35	13	07:17 (WEA VB5)	38	07:32 (WEA VB1)	21:25	46	07:19 (WEA VB1)	22:01		
18	08:35		13:35 (WEA ZB1)	07:43		14:08 (WEA ZB1)	06:38	07:02 (WEA VB5)	06:24		06:54 (WEA VB1)	05:24		06:14 (WEA VB2)	04:58		
	16:43	82	14:57 (WEA ZB1)	17:43	29	14:37 (WEA ZB1)	18:37	15	07:17 (WEA VB5)	39	07:33 (WEA VB1)	21:27	38	07:15 (WEA VB1)	22:01		
19	08:34		13:36 (WEA ZB1)	07:41		14:14 (WEA ZB1)	06:36	07:01 (WEA VB5)	06:21		06:53 (WEA VB1)	05:23		06:15 (WEA VB2)	04:58		
	16:45	81	14:57 (WEA ZB1)	17:45	18	14:32 (WEA ZB1)	18:38	18	18:12 (WEA VB12)	41	07:34 (WEA VB1)	21:28	25	06:40 (WEA VB2)	22:01		
20	08:33		13:37 (WEA ZB1)	07:39			06:33	07:02 (WEA VB5)	06:19		06:52 (WEA VB1)	05:21		06:16 (WEA VB2)	04:58		
	16:47	81	14:58 (WEA ZB1)	17:47			18:40	18:14 (WEA VB12)	20:37	43	07:35 (WEA VB1)	21:30	24	06:40 (WEA VB2)	22:02		
21	08:32		13:36 (WEA ZB1)	07:37			06:31	07:02 (WEA VB5)	06:17		06:50 (WEA VB1)	05:20		06:15 (WEA VB2)	04:58		
	16:48	82	14:58 (WEA ZB1)	17:49			18:42	18:15 (WEA VB12)	20:39	44	07:34 (WEA VB1)	21:31	24	06:39 (WEA VB2)	22:02		
22	08:30		13:37 (WEA ZB1)	07:34			06:28	07:04 (WEA VB5)	06:15		06:50 (WEA VB1)	05:18		06:16 (WEA VB2)	04:58		
	16:50	81	14:58 (WEA ZB1)	17:51			18:44	18:18 (WEA VB12)	20:41	45	07:35 (WEA VB1)	21:33	23	06:39 (WEA VB2)	22:02		
23	08:29		13:37 (WEA ZB1)	07:32			06:26	18:10 (WEA VB12)	06:13		06:49 (WEA VB1)	05:17		06:17 (WEA VB2)	04:59		
	16:52	81	14:58 (WEA ZB1)	17:53			18:46	18:18 (WEA VB12)	20:43	46	07:35 (WEA VB1)	21:34	21	06:38 (WEA VB2)	22:02		
24	08:28		13:38 (WEA ZB1)	07:30			06:24	18:13 (WEA VB12)	06:10		06:49 (WEA VB1)	05:16		06:18 (WEA VB2)	04:59		
	16:54	81	14:59 (WEA ZB1)	17:55			18:48	2	18:15 (WEA VB12)	46	07:35 (WEA VB1)	21:36	20	06:38 (WEA VB2)	22:02		
25	08:26		13:38 (WEA ZB1)	07:28			06:21		06:08		06:48 (WEA VB1)	05:14		06:18 (WEA VB2)	04:59		
	16:56	80	14:58 (WEA ZB1)	17:57			18:50		20:46	47	07:35 (WEA VB1)	21:37	18	06:36 (WEA VB2)	22:02		
26	08:25		13:39 (WEA ZB1)	07:25			06:19		06:06		06:48 (WEA VB1)	05:13		06:20 (WEA VB2)	05:00		
	16:58	80	14:59 (WEA ZB1)	17:59			18:51		20:48	47	07:35 (WEA VB1)	21:39	15	06:35 (WEA VB2)	22:02		
27	08:23		13:39 (WEA ZB1)	07:23			06:16	06:43 (WEA VB3)	06:04		06:48 (WEA VB1)	05:12		06:21 (WEA VB2)	05:00		
	16:59	80	14:59 (WEA ZB1)	18:01			18:53	7	06:50 (WEA VB3)	47	07:35 (WEA VB1)	21:40	13	06:34 (WEA VB2)	22:02		
28	08:22		13:39 (WEA ZB1)	07:21			06:14	06:39 (WEA VB3)	06:02		06:48 (WEA VB1)	05:11		06:22 (WEA VB2)	05:01		
	17:01	79	14:58 (WEA ZB1)	18:03			18:55	14	06:53 (WEA VB3)	47	07:35 (WEA VB1)	21:42	11	06:33 (WEA VB2)	22:02		
29	08:20		13:40 (WEA ZB1)				07:11	07:37 (WEA VB3)	06:00		06:48 (WEA VB1)	05:09		06:25 (WEA VB2)	05:01		
	17:03	79	14:59 (WEA ZB1)				19:57	18	07:55 (WEA VB3)	47	07:35 (WEA VB1)	21:43	6	06:31 (WEA VB2)	22:02		
30	08:19		13:41 (WEA ZB1)				07:09	07:35 (WEA VB3)	05:57		06:47 (WEA VB1)	05:08			05:02		
	17:05	78	14:59 (WEA ZB1)				19:59	20	07:55 (WEA VB3)	48	07:35 (WEA VB1)	21:44			22:02		
31	08:17		13:41 (WEA ZB1)				07:06		07:34 (WEA VB3)			05:07					
	17:07	77	14:58 (WEA ZB1)				20:01	22	07:56 (WEA VB3)			21:45					
Sonnenscheinstunden			251				367		419			493					
astr.max.mögl.Beschattung			2709		1100		260		1038		1244						509

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

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

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO16 - Westerhausen 9
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember	
1	05:03	05:42	06:24 (WEA VB2)	06:36	07:03 (WEA VB4)	07:28		07:26	13:19 (WEA ZB1)	08:21	13:16 (WEA ZB1)
	22:01	21:27	61 07:37 (WEA VB1)	20:21	24 07:47 (WEA VB3)	19:07		16:57	63 14:22 (WEA ZB1)	16:13	80 14:36 (WEA ZB1)
2	05:03	05:44	06:24 (WEA VB2)	06:37	07:32 (WEA VB3)	07:30		07:28	13:19 (WEA ZB1)	08:22	12:17 (WEA ZB2)
	22:01	21:25	64 07:38 (WEA VB1)	20:18	17 07:49 (WEA VB3)	19:05	8 18:25 (WEA VB13)	16:55	65 14:24 (WEA ZB1)	16:13	86 14:36 (WEA ZB1)
3	05:04	05:45	06:24 (WEA VB2)	06:39	07:30 (WEA VB3)	07:32		07:30	13:18 (WEA ZB1)	08:24	12:13 (WEA ZB2)
	22:01	21:23	64 07:38 (WEA VB1)	20:16	19 07:49 (WEA VB3)	19:03	11 18:33 (WEA VB13)	16:53	67 14:25 (WEA ZB1)	16:12	93 14:36 (WEA ZB1)
4	05:05	05:47	06:25 (WEA VB2)	06:41	07:29 (WEA VB3)	07:34		07:32	13:17 (WEA ZB1)	08:25	12:11 (WEA ZB2)
	22:00	21:21	66 07:40 (WEA VB1)	20:13	22 07:51 (WEA VB3)	19:00	10 18:31 (WEA VB13)	16:51	69 14:26 (WEA ZB1)	16:11	98 14:37 (WEA ZB1)
5	05:06	05:49	06:26 (WEA VB2)	06:43	07:28 (WEA VB3)	07:36		07:34	13:16 (WEA ZB1)	08:27	12:10 (WEA ZB2)
	22:00	21:19	66 07:41 (WEA VB1)	20:11	23 07:51 (WEA VB3)	18:58	8 18:29 (WEA VB13)	16:50	70 14:26 (WEA ZB1)	16:11	101 14:37 (WEA ZB1)
6	05:07	05:50	06:25 (WEA VB2)	06:44	07:27 (WEA VB3)	07:37		07:36	13:15 (WEA ZB1)	08:28	12:09 (WEA ZB2)
	21:59	21:17	66 07:41 (WEA VB1)	20:09	24 07:51 (WEA VB3)	18:55	6 18:27 (WEA VB13)	16:48	72 14:27 (WEA ZB1)	16:10	103 14:37 (WEA ZB1)
7	05:08	05:52	06:27 (WEA VB2)	06:46	07:26 (WEA VB3)	07:39		07:38	13:14 (WEA ZB1)	08:29	12:08 (WEA ZB2)
	21:58	21:15	66 07:42 (WEA VB1)	20:06	25 07:51 (WEA VB3)	18:53	3 18:24 (WEA VB13)	16:46	73 14:27 (WEA ZB1)	16:10	105 14:37 (WEA ZB1)
8	05:09	05:54	06:27 (WEA VB2)	06:48	07:26 (WEA VB3)	07:41		07:40	13:13 (WEA ZB1)	08:31	12:08 (WEA ZB2)
	21:58	21:14	64 07:41 (WEA VB1)	20:04	25 07:51 (WEA VB3)	18:50		16:44	75 14:28 (WEA ZB1)	16:09	106 14:38 (WEA ZB1)
9	05:10	05:55	06:28 (WEA VB2)	06:50	07:25 (WEA VB3)	07:43		07:42	13:13 (WEA ZB1)	08:32	12:08 (WEA ZB2)
	21:57	21:12	63 07:42 (WEA VB1)	20:01	25 07:50 (WEA VB3)	18:48		16:42	75 14:28 (WEA ZB1)	16:09	107 14:38 (WEA ZB1)
10	05:11	05:57	06:30 (WEA VB2)	06:51	07:25 (WEA VB3)	07:45		07:44	13:12 (WEA ZB1)	08:33	12:07 (WEA ZB2)
	21:56	21:10	61 07:43 (WEA VB1)	19:59	25 07:50 (WEA VB3)	18:46		16:41	77 14:29 (WEA ZB1)	16:09	109 14:38 (WEA ZB1)
11	05:12	05:59	06:32 (WEA VB2)	06:53	07:26 (WEA VB3)	07:47		07:45	13:12 (WEA ZB1)	08:34	12:07 (WEA ZB2)
	21:55	21:07	55 07:42 (WEA VB1)	19:56	23 07:49 (WEA VB3)	18:43		16:39	77 14:29 (WEA ZB1)	16:08	110 14:38 (WEA ZB1)
12	05:13	06:01	06:36 (WEA VB1)	06:55	07:25 (WEA VB3)	07:48		07:47	13:13 (WEA ZB1)	08:35	12:08 (WEA ZB2)
	21:54	21:05	47 07:43 (WEA VB1)	19:54	23 07:48 (WEA VB3)	18:41		16:37	78 14:31 (WEA ZB1)	16:08	110 14:39 (WEA ZB1)
13	05:14	06:02	06:55 (WEA VB1)	06:57	07:26 (WEA VB3)	07:50		07:49	13:12 (WEA ZB1)	08:36	10:53 (WEA ZB3)
	21:53	21:03	47 07:42 (WEA VB1)	19:52	21 07:47 (WEA VB3)	18:39		16:36	79 14:31 (WEA ZB1)	16:08	116 14:40 (WEA ZB1)
14	05:15	06:36 (WEA VB2)	06:04	06:55 (WEA VB1)	06:58	07:27 (WEA VB3)	07:52	07:51	13:12 (WEA ZB1)	08:37	10:52 (WEA ZB3)
	21:52	2 06:38 (WEA VB2)	21:01	48 07:43 (WEA VB1)	19:49	18 07:45 (WEA VB3)	18:36	16:34	79 14:31 (WEA ZB1)	16:08	120 14:40 (WEA ZB1)
15	05:17	06:33 (WEA VB2)	06:06	06:55 (WEA VB1)	07:00	07:29 (WEA VB3)	07:54	07:53	13:12 (WEA ZB1)	08:38	10:51 (WEA ZB3)
	21:51	9 06:42 (WEA VB2)	20:59	48 07:43 (WEA VB1)	19:47	14 07:43 (WEA VB3)	18:34	16:32	80 14:32 (WEA ZB1)	16:08	123 14:40 (WEA ZB1)
16	05:18	06:31 (WEA VB2)	06:08	06:54 (WEA VB1)	07:02	07:31 (WEA VB3)	07:56	07:55	13:12 (WEA ZB1)	08:39	10:51 (WEA ZB3)
	21:50	12 06:43 (WEA VB2)	20:57	48 07:42 (WEA VB1)	19:44	8 07:39 (WEA VB3)	18:32	16:31	80 14:32 (WEA ZB1)	16:08	126 14:41 (WEA ZB1)
17	05:19	06:30 (WEA VB2)	06:09	06:55 (WEA VB1)	07:04		07:58	07:57	13:12 (WEA ZB1)	08:40	10:50 (WEA ZB3)
	21:49	14 06:44 (WEA VB2)	20:55	47 07:42 (WEA VB1)	19:42		18:29	16:29	80 14:32 (WEA ZB1)	16:08	128 14:41 (WEA ZB1)
18	05:21	06:28 (WEA VB2)	06:11	06:55 (WEA VB1)	07:05		08:00	07:59	13:12 (WEA ZB1)	08:41	10:50 (WEA ZB3)
	21:48	17 06:45 (WEA VB2)	20:53	47 07:42 (WEA VB1)	19:39		18:27	16:28	81 14:33 (WEA ZB1)	16:09	127 14:41 (WEA ZB1)
19	05:22	06:28 (WEA VB2)	06:13	06:54 (WEA VB1)	07:07		08:01	08:00	13:12 (WEA ZB1)	08:41	10:51 (WEA ZB3)
	21:47	19 06:47 (WEA VB2)	20:50	47 07:41 (WEA VB1)	19:37		18:25	16:27	81 14:33 (WEA ZB1)	16:09	128 14:42 (WEA ZB1)
20	05:23	06:27 (WEA VB2)	06:15	06:55 (WEA VB1)	07:09	18:57 (WEA VB12)	08:03	08:02	13:12 (WEA ZB1)	08:42	10:51 (WEA ZB3)
	21:45	21 06:48 (WEA VB2)	20:48	46 07:41 (WEA VB1)	19:34	7 19:04 (WEA VB12)	18:23	16:25	81 14:33 (WEA ZB1)	16:09	129 14:42 (WEA ZB1)
21	05:25	06:26 (WEA VB2)	06:16	06:55 (WEA VB1)	07:11	07:50 (WEA VB5)	08:05	08:04	13:12 (WEA ZB1)	08:43	10:51 (WEA ZB3)
	21:44	22 06:48 (WEA VB2)	20:46	45 07:40 (WEA VB1)	19:32	16 19:04 (WEA VB12)	18:20	16:24	82 14:34 (WEA ZB1)	16:10	130 14:43 (WEA ZB1)
22	05:26	06:26 (WEA VB2)	06:18	06:55 (WEA VB1)	07:12	07:48 (WEA VB5)	08:07	08:06	13:13 (WEA ZB1)	08:43	10:51 (WEA ZB3)
	21:43	23 06:49 (WEA VB2)	20:44	44 07:39 (WEA VB1)	19:29	19 19:02 (WEA VB12)	18:18	16:23	81 14:34 (WEA ZB1)	16:10	130 14:43 (WEA ZB1)
23	05:28	06:26 (WEA VB2)	06:20	06:56 (WEA VB1)	07:14	07:46 (WEA VB5)	08:09	08:07	13:13 (WEA ZB1)	08:44	10:52 (WEA ZB3)
	21:41	24 06:50 (WEA VB2)	20:42	42 07:38 (WEA VB1)	19:27	18 18:58 (WEA VB12)	18:16	22 15:04 (WEA ZB1)	81 14:34 (WEA ZB1)	16:11	130 14:44 (WEA ZB1)
24	05:29	06:25 (WEA VB2)	06:22	06:57 (WEA VB1)	07:16	07:45 (WEA VB5)	08:11	08:09	13:13 (WEA ZB1)	08:44	10:53 (WEA ZB3)
	21:40	25 06:50 (WEA VB2)	20:39	41 07:38 (WEA VB1)	19:24	17 18:56 (WEA VB12)	18:14	32 15:09 (WEA ZB1)	82 14:35 (WEA ZB1)	16:11	128 14:44 (WEA ZB1)
25	05:31	06:25 (WEA VB2)	06:23	06:57 (WEA VB1)	07:18	07:44 (WEA VB5)	07:13	08:11	13:13 (WEA ZB1)	08:45	10:53 (WEA ZB3)
	21:38	35 07:24 (WEA VB1)	20:37	39 07:36 (WEA VB1)	19:22	17 18:54 (WEA VB12)	17:12	38 14:11 (WEA ZB1)	81 14:34 (WEA ZB1)	16:12	128 14:44 (WEA ZB1)
26	05:32	06:24 (WEA VB2)	06:25	06:56 (WEA VB4)	07:20	07:46 (WEA VB5)	07:15	08:13	13:13 (WEA ZB1)	08:45	10:55 (WEA ZB3)
	21:37	42 07:27 (WEA VB1)	20:35	39 07:35 (WEA VB1)	19:20	14 08:00 (WEA VB5)	17:10	44 14:14 (WEA ZB1)	81 14:34 (WEA ZB1)	16:13	127 14:45 (WEA ZB1)
27	05:34	06:25 (WEA VB2)	06:27	06:56 (WEA VB4)	07:21	07:48 (WEA VB5)	07:17	08:14	13:14 (WEA ZB1)	08:45	10:56 (WEA ZB3)
	21:35	47 07:30 (WEA VB1)	20:32	38 07:34 (WEA VB1)	19:17	11 07:59 (WEA VB5)	17:08	48 14:16 (WEA ZB1)	81 14:35 (WEA ZB1)	16:13	126 14:46 (WEA ZB1)
28	05:35	06:24 (WEA VB2)	06:29	06:56 (WEA VB4)	07:23	07:49 (WEA VB5)	07:19	08:16	13:14 (WEA ZB1)	08:45	10:57 (WEA ZB3)
	21:33	50 07:31 (WEA VB1)	20:30	35 07:31 (WEA VB1)	19:15	8 07:57 (WEA VB5)	17:05	51 14:17 (WEA ZB1)	81 14:35 (WEA ZB1)	16:14	124 14:46 (WEA ZB1)
29	05:37	06:24 (WEA VB2)	06:30	06:58 (WEA VB4)	07:25	07:51 (WEA VB5)	07:20	08:18	13:15 (WEA ZB1)	08:45	10:58 (WEA ZB3)
	21:32	54 07:33 (WEA VB1)	20:28	31 07:29 (WEA VB1)	19:12	5 07:56 (WEA VB5)	17:03	55 14:19 (WEA ZB1)	81 14:36 (WEA ZB1)	16:15	122 14:47 (WEA ZB1)
30	05:39	06:24 (WEA VB2)	06:32	07:00 (WEA VB4)	07:27	07:53 (WEA VB5)	07:22	08:19	13:22 (WEA ZB1)	08:46	11:00 (WEA ZB3)
	21:30	57 07:34 (WEA VB1)	20:25	27 07:27 (WEA VB1)	19:10	1 07:54 (WEA VB5)	17:01	58 14:20 (WEA ZB1)	80 14:35 (WEA ZB1)	16:16	118 14:47 (WEA ZB1)
31	05:40	06:24 (WEA VB2)	06:34	07:01 (WEA VB4)			07:24		13:20 (WEA ZB1)	08:46	12:16 (WEA ZB2)
	21:28	60 07:36 (WEA VB1)	20:23	27 07:43 (WEA VB3)			16:59	61 14:21 (WEA ZB1)		16:17	110 14:48 (WEA ZB1)
Sonnenscheinstunden		511	459	382	469	329	455	260	2313	234	3577
astr.max.mögl.Beschattung		533	1529								

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO17 - Rüschenstede 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni	
1	08:45	10:17 (WEA VB1)	08:16	08:52 (WEA VB3)	07:19	07:04	08:39 (WEA VB2)	05:55	05:06		
	16:18	90 14:57 (WEA ZB1)	17:09	62 11:17 (WEA VB1)	18:04	20:02	22 09:01 (WEA VB2)	20:57	21:47		
2	08:45	10:18 (WEA VB1)	08:14	08:51 (WEA VB3)	07:16	07:02	08:41 (WEA VB2)	05:53	05:05		
	16:19	89 14:58 (WEA ZB1)	17:11	60 11:15 (WEA VB1)	18:06	20:04	16 08:57 (WEA VB2)	20:59	21:48		
3	08:45	10:19 (WEA VB1)	08:12	08:51 (WEA VB3)	07:14	06:59		05:51	05:05		
	16:21	87 14:58 (WEA ZB1)	17:13	58 11:14 (WEA VB1)	18:08	20:06		21:01	21:49		
4	08:45	10:18 (WEA VB1)	08:10	08:50 (WEA VB3)	07:12	06:57		05:49	05:04		
	16:22	88 14:58 (WEA ZB1)	17:15	56 11:12 (WEA VB1)	18:10	4 07:44 (WEA VB4)		21:03	21:50		
5	08:45	10:19 (WEA VB1)	08:09	08:49 (WEA VB3)	07:09	07:35 (WEA VB4)		05:47	05:03		
	16:23	87 14:58 (WEA ZB1)	17:17	53 11:09 (WEA VB1)	18:12	12 07:47 (WEA VB4)		21:04	21:51		
6	08:44	10:19 (WEA VB1)	08:07	08:49 (WEA VB3)	07:07	07:33 (WEA VB4)		05:45	05:02		
	16:24	86 14:58 (WEA ZB1)	17:19	45 11:05 (WEA VB1)	18:14	20 08:00 (WEA VB2)		21:06	21:52		
7	08:44	10:19 (WEA VB1)	08:05	08:32 (WEA VB5)	07:05	07:31 (WEA VB4)		05:43	05:02		
	16:26	84 14:57 (WEA ZB1)	17:21	31 09:19 (WEA VB3)	18:16	36 08:07 (WEA VB2)		21:08	21:53		
8	08:43	10:21 (WEA VB1)	08:03	08:30 (WEA VB5)	07:02	07:30 (WEA VB4)		05:41	05:01		
	16:27	83 14:58 (WEA ZB1)	17:23	36 09:19 (WEA VB3)	18:18	39 08:09 (WEA VB2)		21:10	21:54		
9	08:43	10:21 (WEA VB1)	08:01	08:28 (WEA VB5)	07:00	07:29 (WEA VB4)		05:40	05:00		
	16:28	82 14:57 (WEA ZB1)	17:25	41 09:20 (WEA VB3)	18:20	43 08:12 (WEA VB2)		21:11	21:55		
10	08:42	10:21 (WEA VB1)	07:59	08:26 (WEA VB5)	06:57	07:28 (WEA VB4)		05:38	05:00		
	16:30	79 14:56 (WEA ZB1)	17:27	44 09:20 (WEA VB3)	18:22	45 08:13 (WEA VB2)		21:13	21:56		
11	08:41	10:21 (WEA VB1)	07:57	08:24 (WEA VB5)	06:55	07:28 (WEA VB4)		05:36	04:59		
	16:31	77 14:55 (WEA ZB1)	17:29	46 09:20 (WEA VB3)	18:23	46 08:14 (WEA VB2)		21:15	21:57		
12	08:41	10:22 (WEA VB1)	07:55	08:21 (WEA VB5)	06:53	07:27 (WEA VB4)		05:34	04:59		
	16:33	73 14:54 (WEA ZB1)	17:31	48 09:19 (WEA VB3)	18:25	48 08:15 (WEA VB2)		21:17	21:58		
13	08:40	10:22 (WEA VB1)	07:53	08:21 (WEA VB5)	06:50	07:27 (WEA VB4)		05:32	04:59		
	16:35	70 14:52 (WEA ZB1)	17:33	48 09:19 (WEA VB3)	18:27	49 08:16 (WEA VB2)		21:18	21:58		
14	08:39	10:23 (WEA VB1)	07:51	08:21 (WEA VB5)	06:48	07:28 (WEA VB4)		05:31	04:58		
	16:36	59 11:22 (WEA VB1)	17:35	47 09:18 (WEA VB3)	18:29	49 08:17 (WEA VB2)		21:20	21:59		
15	08:38	10:23 (WEA VB1)	07:49	08:21 (WEA VB5)	06:45	07:27 (WEA VB4)		05:29	04:58		
	16:38	59 11:22 (WEA VB1)	17:37	45 09:18 (WEA VB3)	18:31	50 08:17 (WEA VB2)		21:22	22:00		
16	08:37	10:24 (WEA VB1)	07:47	08:22 (WEA VB5)	06:43	07:29 (WEA VB4)		05:27	04:58		
	16:40	59 11:23 (WEA VB1)	17:39	42 09:17 (WEA VB3)	18:33	48 08:17 (WEA VB2)		21:23	22:00		
17	08:36	10:25 (WEA VB1)	07:45	08:23 (WEA VB5)	06:41	07:29 (WEA VB4)		05:26	04:58		
	16:41	58 11:23 (WEA VB1)	17:41	38 09:16 (WEA VB3)	18:35	48 08:17 (WEA VB2)		21:25	22:01		
18	08:35	10:24 (WEA VB1)	07:43	08:23 (WEA VB5)	06:38	07:31 (WEA VB4)		05:24	04:58		
	16:43	59 11:23 (WEA VB1)	17:43	34 09:14 (WEA VB3)	18:37	46 08:17 (WEA VB2)		21:27	22:01		
19	08:34	10:25 (WEA VB1)	07:41	08:26 (WEA VB5)	06:36	07:32 (WEA VB2)		05:23	04:58		
	16:45	58 11:23 (WEA VB1)	17:45	26 09:13 (WEA VB3)	18:38	45 08:17 (WEA VB2)		21:28	22:01		
20	08:33	10:26 (WEA VB1)	07:39	08:56 (WEA VB3)	06:33	07:32 (WEA VB2)		05:21	04:58		
	16:46	57 11:23 (WEA VB1)	17:47	14 09:10 (WEA VB3)	18:40	45 08:17 (WEA VB2)		21:30	22:02		
21	08:32	10:26 (WEA VB1)	07:37	09:01 (WEA VB3)	06:31	07:32 (WEA VB2)		05:20	04:58		
	16:48	57 11:23 (WEA VB1)	17:49	5 09:06 (WEA VB3)	18:42	44 08:16 (WEA VB2)		21:31	22:02		
22	08:30	10:27 (WEA VB1)	07:34		06:28	07:32 (WEA VB2)		05:18	04:58		
	16:50	56 11:23 (WEA VB1)	17:51		18:44	44 08:16 (WEA VB2)		21:33	22:02		
23	08:29	10:27 (WEA VB1)	07:32		06:26	07:31 (WEA VB2)		05:17	04:59		
	16:52	55 11:22 (WEA VB1)	17:53		18:46	44 08:15 (WEA VB2)		21:34	22:02		
24	08:28	10:29 (WEA VB1)	07:30		06:24	07:32 (WEA VB2)		05:15	04:59		
	16:54	54 11:23 (WEA VB1)	17:55		18:48	42 08:14 (WEA VB2)		21:36	22:02		
25	08:26	10:29 (WEA VB1)	07:28		06:21	07:33 (WEA VB2)		05:14	04:59		
	16:56	53 11:22 (WEA VB1)	17:57		18:50	41 08:14 (WEA VB2)		21:37	22:02		
26	08:25	10:30 (WEA VB1)	07:25		06:19	07:32 (WEA VB2)		05:13	05:00		
	16:58	52 11:22 (WEA VB1)	17:59		18:51	40 08:12 (WEA VB2)		21:39	22:02		
27	08:23	10:31 (WEA VB1)	07:23		06:16	07:33 (WEA VB2)		05:12	05:00		
	16:59	50 11:21 (WEA VB1)	18:01		18:53	38 08:11 (WEA VB2)		21:40	22:02		
28	08:22	10:32 (WEA VB1)	07:21		06:14	07:33 (WEA VB2)		05:11	05:01		
	17:01	48 11:20 (WEA VB1)	18:02		18:55	36 08:09 (WEA VB2)		21:42	22:02		
29	08:20	08:58 (WEA VB3)			07:11	08:35 (WEA VB2)		05:09	05:01		
	17:03	56 11:20 (WEA VB1)			19:57	33 09:08 (WEA VB2)		21:43	22:02		
30	08:19	08:55 (WEA VB3)			07:09	08:35 (WEA VB2)		05:08	05:02		
	17:05	60 11:19 (WEA VB1)			19:59	31 09:06 (WEA VB2)		21:44	22:02		
31	08:17	08:53 (WEA VB3)			07:06	08:37 (WEA VB2)		05:07			
	17:07	62 11:18 (WEA VB1)			20:01	27 09:04 (WEA VB2)		21:46			
Sonnenscheinstunden	251		274		367		420		493		509
astr.max.mögl.Beschattung	2087		879		1093		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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO17 - Rüschenstede 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli	August	September		Oktober		November		Dezember				
1	05:02 22:01	05:42 21:27	06:36 20:21		07:28 19:07	48	08:07 (WEA VB4) 08:55 (WEA VB2)	07:26 16:57	42	07:55 (WEA VB5) 08:48 (WEA VB3)	08:21 16:13	77	10:03 (WEA VB1) 14:37 (WEA ZB1)
2	05:03 22:01	05:44 21:25	06:37 20:18		07:30 19:05	47	08:07 (WEA VB4) 08:54 (WEA VB2)	07:28 16:55	39	07:58 (WEA VB5) 08:49 (WEA VB3)	08:22 16:13	79	10:04 (WEA VB1) 14:39 (WEA ZB1)
3	05:04 22:01	05:45 21:23	06:39 20:16		07:32 19:02	45	08:06 (WEA VB4) 08:51 (WEA VB2)	07:30 16:53	36	08:00 (WEA VB5) 08:49 (WEA VB3)	08:24 16:12	81	10:04 (WEA VB1) 14:40 (WEA ZB1)
4	05:05 22:00	05:47 21:21	06:41 20:13		07:34 19:00	43	08:06 (WEA VB4) 08:49 (WEA VB2)	07:32 16:51	31	08:18 (WEA VB3) 08:49 (WEA VB3)	08:25 16:11	84	10:05 (WEA VB1) 14:42 (WEA ZB1)
5	05:06 22:00	05:49 21:19	06:43 20:11		07:36 18:58	41	08:06 (WEA VB4) 08:47 (WEA VB2)	07:34 16:50	47	08:19 (WEA VB3) 10:36 (WEA VB1)	08:27 16:11	83	10:05 (WEA VB1) 14:42 (WEA ZB1)
6	05:07 21:59	05:50 21:17	06:44 20:09		07:37 18:55	38	08:07 (WEA VB4) 08:45 (WEA VB2)	07:36 16:48	52	08:19 (WEA VB3) 10:39 (WEA VB1)	08:28 16:10	86	10:05 (WEA VB1) 14:44 (WEA ZB1)
7	05:08 21:58	05:52 21:15	06:46 20:06		07:39 18:53	31	08:08 (WEA VB4) 08:41 (WEA VB2)	07:38 16:46	57	08:20 (WEA VB3) 10:42 (WEA VB1)	08:29 16:10	86	10:06 (WEA VB1) 14:44 (WEA ZB1)
8	05:08 21:58	05:54 21:14	06:48 20:04		07:41 18:50	15	08:10 (WEA VB4) 08:25 (WEA VB4)	07:40 16:44	59	08:21 (WEA VB3) 10:44 (WEA VB1)	08:31 16:09	87	10:07 (WEA VB1) 14:46 (WEA ZB1)
9	05:10 21:57	05:55 21:12	06:50 20:01		07:43 18:48	10	08:11 (WEA VB4) 08:21 (WEA VB4)	07:42 16:42	60	08:22 (WEA VB3) 10:46 (WEA VB1)	08:32 16:09	87	10:07 (WEA VB1) 14:46 (WEA ZB1)
10	05:11 21:56	05:57 21:10	06:51 19:59	15	07:45 18:46		08:35 (WEA VB2) 08:50 (WEA VB2)	07:44 16:41	62	08:23 (WEA VB3) 10:48 (WEA VB1)	08:33 16:09	89	10:07 (WEA VB1) 14:47 (WEA ZB1)
11	05:12 21:55	05:59 21:07	06:53 19:56	21	07:47 18:43		08:32 (WEA VB2) 08:53 (WEA VB2)	07:45 16:39	61	08:24 (WEA VB3) 10:49 (WEA VB1)	08:34 16:08	90	10:07 (WEA VB1) 14:47 (WEA ZB1)
12	05:13 21:54	06:01 21:05	06:55 19:54	26	07:48 18:41		08:29 (WEA VB2) 08:55 (WEA VB2)	07:47 16:37	59	08:27 (WEA VB3) 10:51 (WEA VB1)	08:35 16:08	89	10:09 (WEA VB1) 14:49 (WEA ZB1)
13	05:14 21:53	06:02 21:03	06:57 19:52	30	07:50 18:39		08:27 (WEA VB2) 08:57 (WEA VB2)	07:49 16:36	56	08:30 (WEA VB3) 10:52 (WEA VB1)	08:36 16:08	89	10:09 (WEA VB1) 14:49 (WEA ZB1)
14	05:15 21:52	06:04 21:01	06:58 19:49	33	07:52 18:36		08:25 (WEA VB2) 08:58 (WEA VB2)	07:51 16:34	49	10:04 (WEA VB1) 10:53 (WEA VB1)	08:37 16:08	91	10:09 (WEA VB1) 14:50 (WEA ZB1)
15	05:17 21:51	06:06 20:59	07:00 19:47	35	07:54 18:34		08:24 (WEA VB2) 08:59 (WEA VB2)	07:53 16:32	50	10:04 (WEA VB1) 10:54 (WEA VB1)	08:38 16:08	91	10:10 (WEA VB1) 14:51 (WEA ZB1)
16	05:18 21:50	06:08 20:57	07:02 19:44	37	07:56 18:32		08:22 (WEA VB2) 08:59 (WEA VB2)	07:55 16:31	52	10:03 (WEA VB1) 10:55 (WEA VB1)	08:39 16:08	90	10:11 (WEA VB1) 14:51 (WEA ZB1)
17	05:19 21:49	06:09 20:55	07:04 19:42	39	07:58 18:29		08:21 (WEA VB2) 09:00 (WEA VB2)	07:57 16:29	53	10:03 (WEA VB1) 10:56 (WEA VB1)	08:40 16:08	91	10:10 (WEA VB1) 14:51 (WEA ZB1)
18	05:21 21:48	06:11 20:53	07:05 19:39	41	08:00 18:27		08:20 (WEA VB2) 09:01 (WEA VB2)	07:59 16:28	54	10:03 (WEA VB1) 10:57 (WEA VB1)	08:41 16:09	91	10:11 (WEA VB1) 14:52 (WEA ZB1)
19	05:22 21:47	06:13 20:50	07:07 19:37	42	08:01 18:25		08:19 (WEA VB2) 09:01 (WEA VB2)	08:00 16:27	55	10:02 (WEA VB1) 10:57 (WEA VB1)	08:41 16:09	92	10:12 (WEA VB1) 14:53 (WEA ZB1)
20	05:23 21:45	06:15 20:48	07:09 19:34	43	08:03 18:23		08:18 (WEA VB2) 09:01 (WEA VB2)	08:02 16:25	56	10:02 (WEA VB1) 10:58 (WEA VB1)	08:42 16:09	92	10:12 (WEA VB1) 14:53 (WEA ZB1)
21	05:25 21:44	06:16 20:46	07:11 19:32	43	08:05 18:20	9	08:18 (WEA VB2) 09:01 (WEA VB2)	08:04 16:24	57	10:02 (WEA VB1) 10:59 (WEA VB1)	08:43 16:10	90	10:13 (WEA VB1) 14:53 (WEA ZB1)
22	05:26 21:43	06:18 20:44	07:12 19:29	44	08:07 18:18	15	08:17 (WEA VB2) 09:01 (WEA VB2)	08:06 16:23	57	10:02 (WEA VB1) 10:59 (WEA VB1)	08:43 16:10	90	10:13 (WEA VB1) 14:53 (WEA ZB1)
23	05:28 21:41	06:20 20:42	07:14 19:27	44	08:09 18:16	29	08:16 (WEA VB2) 09:00 (WEA VB2)	08:07 16:21	58	10:02 (WEA VB1) 11:00 (WEA VB1)	08:44 16:11	90	10:14 (WEA VB1) 14:54 (WEA ZB1)
24	05:29 21:40	06:22 20:39	07:16 19:24	44	08:11 18:14	36	08:16 (WEA VB2) 09:00 (WEA VB2)	08:09 16:20	59	10:02 (WEA VB1) 11:01 (WEA VB1)	08:44 16:11	92	10:14 (WEA VB1) 14:55 (WEA ZB1)
25	05:31 21:38	06:23 20:37	07:18 19:22	46	07:13 17:12	40	08:14 (WEA VB4) 09:00 (WEA VB2)	08:11 16:19	58	10:03 (WEA VB1) 11:01 (WEA VB1)	08:45 16:12	91	10:14 (WEA VB1) 14:55 (WEA ZB1)
26	05:32 21:37	06:25 20:35	07:20 19:20	48	07:15 17:10	44	08:12 (WEA VB4) 09:00 (WEA VB2)	08:13 16:18	59	10:02 (WEA VB1) 11:01 (WEA VB1)	08:45 16:13	91	10:15 (WEA VB1) 14:56 (WEA ZB1)
27	05:34 21:35	06:27 20:32	07:21 19:17	48	07:17 17:07	45	08:11 (WEA VB4) 08:59 (WEA VB2)	08:14 16:17	59	10:02 (WEA VB1) 11:01 (WEA VB1)	08:45 16:13	92	10:15 (WEA VB1) 14:56 (WEA ZB1)
28	05:35 21:33	06:29 20:30	07:23 19:15	49	07:19 17:05	48	08:09 (WEA VB4) 08:58 (WEA VB2)	08:16 16:16	59	10:03 (WEA VB1) 11:02 (WEA VB1)	08:45 16:14	90	10:16 (WEA VB1) 14:56 (WEA ZB1)
29	05:37 21:32	06:30 20:28	07:25 19:12	49	07:20 17:03	48	08:08 (WEA VB4) 08:57 (WEA VB2)	08:18 16:15	69	10:03 (WEA VB1) 14:33 (WEA ZB1)	08:45 16:15	90	10:16 (WEA VB1) 14:57 (WEA ZB1)
30	05:39 21:30	06:32 20:25	07:27 19:10	49	07:22 17:01	48	08:07 (WEA VB4) 08:56 (WEA VB2)	08:19 16:14	73	10:03 (WEA VB1) 14:35 (WEA ZB1)	08:46 16:16	90	10:17 (WEA VB1) 14:57 (WEA ZB1)
31	05:40 21:28	06:34 20:23			07:24 16:59	45	07:53 (WEA VB5) 08:48 (WEA VB3)				08:46 16:17	91	10:17 (WEA VB1) 14:58 (WEA ZB1)
Sonnenscheinstunden	511	459	382		329			260			234		
astr.max.mögl.Beschattung			826		725			1638			2742		

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO18 - Langengroden 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45	09:47 (WEA VB6)	08:16	07:19	07:04	05:55	05:06	05:02	05:42	06:36	07:28	07:26
2	16:18	14:57 (WEA VB1)	17:09	18:04	20:02	20:57	21:47	22:01	21:27	20:21	19:07	16:57
3	08:45	09:49 (WEA VB6)	08:14	07:16	07:02	05:53	05:05	05:03	05:44	06:37	07:30	07:28
4	16:19	14:57 (WEA VB1)	17:11	18:06	20:04	20:59	21:48	22:01	21:25	20:18	19:05	16:55
5	08:45	10:25 (WEA VB4)	08:12	07:14	06:59	05:51	05:04	05:04	05:45	06:39	07:32	07:30
6	16:20	14:57 (WEA VB1)	17:13	18:08	20:06	21:01	21:49	22:01	21:23	20:16	19:02	16:53
7	08:45	10:25 (WEA VB4)	08:10	07:12	06:57	05:49	05:04	05:05	05:47	06:41	07:34	07:32
8	16:22	14:57 (WEA VB1)	17:15	18:10	20:08	21:03	21:50	22:00	21:21	20:13	19:00	16:51
9	08:45	10:26 (WEA VB4)	08:09	07:09	06:54	05:47	05:03	05:06	05:49	06:43	07:36	07:34
10	16:23	14:57 (WEA VB1)	17:17	18:12	20:10	21:04	21:51	22:00	21:19	20:11	18:58	16:49
11	08:44	10:26 (WEA VB4)	08:07	07:07	06:52	05:45	05:02	05:06	05:50	06:44	07:37	07:36
12	16:24	14:55 (WEA VB1)	17:19	18:14	20:12	21:06	21:52	21:59	21:17	20:09	18:55	16:48
13	08:44	10:27 (WEA VB4)	08:05	07:05	06:50	05:43	05:02	05:07	05:52	06:46	07:39	07:38
14	16:26	14:52 (WEA VB1)	17:21	18:16	20:13	21:08	21:53	21:58	21:15	20:06	18:53	16:46
15	08:43	10:28 (WEA VB4)	08:03	07:02	06:47	05:41	05:01	05:08	05:54	06:48	07:41	07:40
16	16:27	13:55 (WEA VB2)	17:23	18:18	20:15	21:10	21:54	21:58	21:13	20:04	18:50	16:44
17	08:43	10:29 (WEA VB4)	08:01	07:00	06:45	05:40	05:00	05:09	05:55	06:50	07:43	07:42
18	16:28	13:54 (WEA VB2)	17:25	18:20	20:17	21:11	21:55	21:57	21:12	20:01	18:48	16:42
19	08:42	10:29 (WEA VB4)	07:59	06:57	06:42	05:38	05:00	05:11	05:57	06:51	07:45	07:43
20	16:30	13:54 (WEA VB2)	17:27	18:22	20:19	21:13	21:56	21:56	21:09	19:59	18:46	16:40
21	08:41	10:30 (WEA VB4)	07:57	06:55	06:40	05:36	04:59	05:12	05:59	06:53	07:47	07:45
22	16:31	13:54 (WEA VB2)	17:29	18:23	20:21	21:15	21:57	21:55	21:07	19:56	18:43	16:39
23	08:41	10:31 (WEA VB4)	07:55	06:53	06:38	05:34	04:59	05:13	06:01	06:55	07:48	07:47
24	16:33	13:54 (WEA VB2)	17:31	18:25	20:23	21:17	21:58	21:54	21:05	19:54	18:41	16:37
25	08:40	10:32 (WEA VB4)	07:53	06:50	06:35	05:32	04:59	05:14	06:02	06:57	07:50	07:49
26	16:35	13:54 (WEA VB2)	17:33	18:27	20:24	21:18	21:58	21:53	21:03	19:51	18:39	16:35
27	08:39	10:33 (WEA VB4)	07:51	06:48	06:33	05:31	04:58	05:15	06:04	06:58	07:52	07:51
28	16:36	13:54 (WEA VB2)	17:35	18:29	20:26	21:20	21:59	21:52	21:01	19:49	18:36	16:34
29	08:38	10:34 (WEA VB4)	07:49	06:45	06:31	05:29	04:58	05:16	06:06	07:00	07:54	07:53
30	16:38	13:54 (WEA VB2)	17:37	18:31	20:28	21:22	22:00	21:51	20:59	19:47	18:34	16:32
31	08:37	10:36 (WEA VB4)	07:47	06:43	06:28	05:27	04:58	05:18	06:08	07:02	07:56	07:55
32	16:39	13:54 (WEA VB2)	17:39	18:33	20:30	21:23	22:00	21:50	20:57	19:44	18:32	16:31
33	08:36	10:37 (WEA VB4)	07:45	06:41	06:26	05:26	04:58	05:19	06:09	07:04	07:58	07:57
34	16:41	13:53 (WEA VB2)	17:41	18:35	20:32	21:25	22:01	21:49	20:55	19:42	18:29	16:29
35	08:35	10:38 (WEA VB4)	07:43	06:38	06:24	05:24	04:58	05:20	06:11	07:05	08:00	07:58
36	16:43	13:52 (WEA VB2)	17:43	18:37	20:34	21:27	22:01	21:48	20:53	19:39	18:27	16:28
37	08:34	10:41 (WEA VB4)	07:41	06:36	06:21	05:23	04:58	05:22	06:13	07:07	08:01	08:00
38	16:45	13:51 (WEA VB2)	17:45	18:38	20:35	21:28	22:01	21:47	20:50	19:37	18:25	16:26
39	08:33	10:44 (WEA VB4)	07:39	06:33	06:19	05:21	04:58	05:23	06:15	07:09	08:03	08:02
40	16:46	13:51 (WEA VB2)	17:47	18:40	20:37	21:30	22:02	21:45	20:48	19:34	18:23	16:25
41	08:32	13:26 (WEA VB2)	07:37	06:31	06:17	05:20	04:58	05:25	06:16	07:11	08:05	08:04
42	16:48	13:49 (WEA VB2)	17:49	18:42	20:39	21:31	22:02	21:44	20:46	19:32	18:20	16:24
43	08:30	13:29 (WEA VB2)	07:34	06:28	06:15	05:18	04:58	05:26	06:18	07:12	08:07	08:06
44	16:50	13:48 (WEA VB2)	17:51	18:44	20:41	21:33	22:02	21:43	20:44	19:29	18:18	16:23
45	08:29	13:32 (WEA VB2)	07:32	06:26	06:12	05:17	04:59	05:28	06:20	07:14	08:09	08:07
46	16:52	13:44 (WEA VB2)	17:53	18:46	20:43	21:34	22:02	21:41	20:41	19:27	18:16	16:21
47	08:28	13:30 (WEA VB2)	07:30	06:23	06:10	05:15	04:59	05:29	06:22	07:16	08:11	08:09
48	16:54	13:45 (WEA VB2)	17:55	18:48	20:44	21:36	22:02	21:40	20:39	19:24	18:14	16:20
49	08:26	13:27 (WEA VB2)	07:28	06:21	06:08	05:14	04:59	05:31	06:23	07:18	08:13	08:11
50	16:56	13:47 (WEA VB2)	17:57	18:49	20:46	21:37	22:02	21:38	20:37	19:22	18:12	16:19
51	08:25	13:25 (WEA VB2)	07:25	06:19	06:06	05:13	05:00	05:32	06:25	07:20	08:15	08:13
52	16:57	13:48 (WEA VB2)	17:59	18:51	20:48	21:39	22:02	21:37	20:35	19:20	18:10	16:18
53	08:23	13:23 (WEA VB2)	07:23	06:16	06:04	05:12	05:00	05:34	06:27	07:21	08:17	08:14
54	16:59	13:49 (WEA VB2)	18:00	18:53	20:50	21:40	22:02	21:35	20:32	19:17	18:07	16:17
55	08:22	13:22 (WEA VB2)	07:21	06:14	06:02	05:10	05:01	05:35	06:29	07:23	08:18	08:16
56	17:01	18:02	18:55	20:52	21:42	22:02	21:33	20:30	19:15	18:05	16:16	16:14
57	08:20		07:11	05:59	05:09	05:01	05:37	06:30	07:25	08:20	09:15	09:13
58	17:03		19:57	20:54	21:43	22:02	21:32	20:28	19:12	18:03	16:15	16:13
59	08:19		07:09	05:57	05:08	05:02	05:39	06:32	07:27	08:22	09:17	09:15
60	17:05		19:59	20:55	21:44	22:02	21:30	20:25	19:10	18:01	16:14	16:12
61	08:17		07:06	06:00	05:07	05:00	05:40	06:34	07:29	08:24	09:19	09:17
62	17:07		20:01	21:00	21:45	21:28	20:23	19:18	18:03	16:59	15:54	15:52
Sonnenscheinstunden	251		274	367	420	493	509	511	459	382	329	260
astr.max.mögl.Beschattung	1485										549	3188

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO19 - WA Sengwarden BP207
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 15:25 (WEA VB14)	08:15 17:09	07:18 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:26	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 15:26 (WEA VB14)	08:14 17:09	07:16 18:04	07:02 20:02	05:53 20:57	05:05 21:48	05:03 22:01	05:44 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 15:41 (WEA VB14)	08:12 17:11	07:14 18:06	06:59 20:04	05:51 20:59	05:05 21:48	05:04 22:01	05:45 21:25	06:39 20:18	07:32 19:05	07:30 16:55	08:24 16:13
4	08:45 15:26 (WEA VB14)	08:10 17:13	07:11 18:08	06:57 20:06	05:49 21:01	05:04 21:49	05:05 22:00	05:47 21:23	06:41 20:16	07:34 19:02	07:32 16:53	08:25 16:12
5	08:45 15:41 (WEA VB14)	08:08 17:15	07:09 18:10	06:54 20:08	05:47 21:02	05:03 21:50	05:06 22:00	05:49 21:21	06:43 20:13	07:36 19:00	07:34 16:51	08:26 16:11
6	08:44 15:27 (WEA VB14)	08:07 17:17	07:07 18:12	06:52 20:10	05:45 21:04	05:02 21:51	05:07 21:59	05:50 21:19	06:44 20:11	07:37 18:58	07:36 16:49	08:28 16:11
7	08:44 15:27 (WEA VB14)	08:05 17:19	07:04 18:14	06:49 20:11	05:43 21:06	05:02 21:52	05:07 21:59	05:52 21:17	06:46 20:08	07:39 18:55	07:38 16:48	08:29 16:10
8	08:43 15:30 (WEA VB14)	08:03 17:21	07:02 18:16	06:47 20:13	05:41 21:08	05:01 21:53	05:08 21:58	05:54 21:15	06:48 20:06	07:41 18:53	07:39 16:46	08:30 16:10
9	08:43 15:40 (WEA VB14)	08:01 17:23	07:00 18:18	06:45 20:15	05:40 21:10	05:00 21:54	05:10 21:57	05:55 21:13	06:50 20:04	07:43 18:50	07:41 16:44	08:32 16:09
10	08:42 15:35 (WEA VB14)	07:59 17:25	06:57 18:20	06:42 20:17	05:38 21:11	05:00 21:55	05:11 21:57	05:57 21:11	06:51 20:01	07:45 18:48	07:43 16:42	08:33 16:09
11	08:41 15:38 (WEA VB14)	07:57 17:27	06:55 18:21	06:40 20:19	05:36 21:13	04:59 21:56	05:12 21:56	05:59 21:09	06:53 19:59	07:46 18:46	07:45 16:40	08:34 16:09
12	08:41 15:38 (WEA VB14)	07:55 17:29	06:53 18:23	06:38 20:21	05:34 21:15	04:59 21:57	05:13 21:55	06:01 21:07	06:55 19:56	07:48 18:43	07:47 16:39	08:35 16:08
13	08:40 15:33	07:55 17:31	06:53 18:25	06:38 20:22	05:34 21:16	04:59 21:57	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
14	08:39 15:35	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
15	08:38 15:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
16	08:37 15:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 21:59	05:17 21:51	06:06 20:59	07:00 19:46	07:54 18:34	07:53 16:32	08:38 16:08
17	08:36 15:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:08 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
18	08:35 15:41	07:45 17:41	06:40 18:35	06:26 20:32	05:26 21:25	04:58 22:00	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:56 16:29	08:40 16:08
19	08:34 15:43	07:43 17:43	06:38 18:36	06:24 20:33	05:24 21:26	04:58 22:01	05:20 21:48	06:11 20:52	07:05 19:39	07:59 18:27	07:58 16:28	08:41 16:09
20	08:33 15:45	07:41 17:45	06:36 18:38	06:21 20:35	05:23 21:28	04:58 22:01	05:22 21:46	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
21	08:33 15:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:01	05:23 21:45	06:15 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
22	08:31 15:48	07:36 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:10
23	08:30 15:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:42	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:23	08:43 16:10
24	08:29 15:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:59 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:11
25	08:28 15:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:39	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
26	08:26 15:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	08:13 17:12	08:11 16:19	08:44 16:12
27	08:25 15:57	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	05:32 21:36	06:25 20:34	07:19 19:19	08:15 17:10	08:12 16:18	08:45 16:13
28	08:23 15:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	08:16 17:07	08:14 16:17	08:45 16:13
29	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:10 21:41	05:01 22:02	05:35 21:33	06:29 20:30	07:23 19:15	08:18 17:05	08:16 16:16	08:45 16:14
30	08:20 17:03		07:11 19:57	05:59 20:53	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	08:20 17:03	08:17 16:15	08:45 16:15
31	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	08:22 17:01	08:19 16:14	08:45 16:16
	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
	Sonnenscheinstunden astr.max.mögl.Beschattung	251 114	274 367	419	493	509	511	459	382	329	260	235 395

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO2 - Utwarfe 2

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar			Februar			März			April			Mai			Juni		
1	08:45	11:30 (WEA VB6)	08:15	09:09 (WEA VB7)	07:18				07:04			05:55	19:04 (WEA VB4)	05:06			
	16:18	61 14:54 (WEA VB5)	17:09	15:28 (WEA VB5)	18:04				20:02			20:57	47 19:51 (WEA VB4)	21:47			
2	08:45	11:30 (WEA VB6)	08:14	09:10 (WEA VB7)	07:16				07:02			05:53	19:04 (WEA VB4)	05:05			
	16:19	66 14:57 (WEA VB5)	17:11	15:29 (WEA VB5)	18:06				20:04			20:59	47 19:51 (WEA VB4)	21:48			
3	08:45	11:30 (WEA VB6)	08:12	09:10 (WEA VB7)	07:14				06:59			05:51	19:04 (WEA VB4)	05:04			
	16:20	69 14:58 (WEA VB5)	17:13	15:29 (WEA VB5)	18:08				20:06			21:01	47 19:51 (WEA VB4)	21:49			
4	08:45	11:31 (WEA VB6)	08:10	09:11 (WEA VB7)	07:12				06:57			05:49	19:04 (WEA VB4)	05:04			
	16:22	70 15:00 (WEA VB5)	17:15	15:30 (WEA VB5)	18:10				20:08			21:03	47 19:51 (WEA VB4)	21:50			
5	08:44	11:31 (WEA VB6)	08:09	09:11 (WEA VB7)	07:09				06:54			05:47	19:04 (WEA VB4)	05:03			
	16:23	73 15:02 (WEA VB5)	17:17	15:30 (WEA VB5)	18:12				20:10			21:04	46 19:50 (WEA VB4)	21:51			
6	08:44	09:21 (WEA VB7)	08:07	09:12 (WEA VB7)	07:07				06:52			05:45	19:04 (WEA VB4)	05:02			
	16:24	83 15:04 (WEA VB5)	17:19	15:30 (WEA VB5)	18:14				20:11			21:06	46 19:50 (WEA VB4)	21:52			
7	08:44	09:18 (WEA VB7)	08:05	09:12 (WEA VB7)	07:04				06:49			05:43	19:05 (WEA VB4)	05:01			
	16:26	89 15:05 (WEA VB5)	17:21	15:30 (WEA VB5)	18:16				20:13			21:08	45 19:50 (WEA VB4)	21:53			
8	08:43	09:18 (WEA VB7)	08:03	09:13 (WEA VB7)	07:02				06:47			05:41	19:05 (WEA VB4)	05:01			
	16:27	94 15:07 (WEA VB5)	17:23	15:29 (WEA VB5)	18:18				20:15			21:10	44 19:49 (WEA VB4)	21:54			
9	08:43	09:17 (WEA VB7)	08:01	09:14 (WEA VB7)	07:00				06:45			05:40	19:05 (WEA VB4)	05:00			
	16:28	99 15:09 (WEA VB5)	17:25	15:29 (WEA VB5)	18:20				20:17			21:11	44 19:49 (WEA VB4)	21:55			
10	08:42	09:15 (WEA VB7)	07:59	09:15 (WEA VB7)	06:57				06:42			05:38	19:05 (WEA VB4)	05:00			
	16:30	103 15:10 (WEA VB5)	17:27	15:29 (WEA VB5)	18:22				20:19			21:13	43 19:48 (WEA VB4)	21:56			
11	08:41	09:15 (WEA VB7)	07:57	09:15 (WEA VB7)	06:55				06:40			05:36	19:06 (WEA VB4)	04:59			
	16:31	107 15:11 (WEA VB5)	17:29	15:28 (WEA VB5)	18:23				20:21			21:15	42 19:48 (WEA VB4)	21:57			
12	08:40	09:14 (WEA VB7)	07:55	09:16 (WEA VB7)	06:53				06:38			05:34	19:07 (WEA VB4)	04:59			
	16:33	109 15:12 (WEA VB5)	17:31	15:27 (WEA VB5)	18:25	12	17:42 (WEA VB3)		20:22	9	19:44 (WEA VB2)	21:17	40 19:47 (WEA VB4)	21:57			
13	08:40	09:13 (WEA VB7)	07:53	09:17 (WEA VB7)	06:50		17:54 (WEA VB3)		06:35		19:53 (WEA VB2)	05:32					
	16:35	114 15:13 (WEA VB5)	17:33	15:27 (WEA VB5)	18:27	18	17:57 (WEA VB3)		20:24	15	19:41 (WEA VB2)	21:18	39 19:08 (WEA VB4)	04:59			
14	08:39	09:13 (WEA VB7)	07:51	09:19 (WEA VB7)	06:48		17:37 (WEA VB3)		06:33		19:56 (WEA VB2)	05:31	39 19:47 (WEA VB4)	21:58			
	16:36	116 15:15 (WEA VB5)	17:35	15:26 (WEA VB5)	18:29	21	17:58 (WEA VB3)		20:26	22	19:29 (WEA VB4)	21:20	38 19:08 (WEA VB4)	04:58			
15	08:38	09:12 (WEA VB7)	07:49	09:21 (WEA VB7)	06:45		17:36 (WEA VB3)		06:31		19:57 (WEA VB2)	05:29	38 19:46 (WEA VB4)	21:59			
	16:38	119 15:16 (WEA VB5)	17:37	15:26 (WEA VB5)	18:31	23	17:59 (WEA VB3)		20:28	37	19:22 (WEA VB4)	21:22	35 19:09 (WEA VB4)	04:58			
16	08:37	09:12 (WEA VB7)	07:47	09:24 (WEA VB7)	06:43		17:35 (WEA VB3)		06:28		19:59 (WEA VB2)	05:27	35 19:44 (WEA VB4)	21:59			
	16:39	121 15:17 (WEA VB5)	17:39	15:25 (WEA VB5)	18:33	25	18:00 (WEA VB3)		20:30	41	19:18 (WEA VB4)	21:23	34 19:10 (WEA VB4)	04:58			
17	08:36	09:12 (WEA VB7)	07:45	09:29 (WEA VB7)	06:40		17:33 (WEA VB3)		06:26		19:59 (WEA VB2)	05:26	34 19:44 (WEA VB4)	22:00			
	16:41	124 15:19 (WEA VB5)	17:41	15:24 (WEA VB5)	18:35	27	18:00 (WEA VB3)		20:32	43	19:16 (WEA VB4)	21:25	32 19:12 (WEA VB4)	04:58			
18	08:35	09:11 (WEA VB7)	07:43	14:42 (WEA VB5)	06:38		17:33 (WEA VB3)		06:24		19:59 (WEA VB2)	05:24	32 19:44 (WEA VB4)	22:00			
	16:43	125 15:19 (WEA VB5)	17:43	15:22 (WEA VB5)	18:36	28	18:01 (WEA VB3)		20:33	46	19:14 (WEA VB4)	21:27	30 19:12 (WEA VB4)	04:58			
19	08:34	09:11 (WEA VB7)	07:41	14:44 (WEA VB5)	06:36		17:32 (WEA VB3)		06:21		20:00 (WEA VB2)	21:28	30 19:42 (WEA VB4)	22:01			
	16:45	126 15:20 (WEA VB5)	17:45	15:20 (WEA VB5)	18:38	28	18:00 (WEA VB3)		20:35	47	19:13 (WEA VB4)	05:23	27 19:14 (WEA VB4)	04:58			
20	08:33	09:11 (WEA VB7)	07:39	14:47 (WEA VB5)	06:33		17:32 (WEA VB3)		06:19		20:00 (WEA VB2)	21:28	27 19:41 (WEA VB4)	22:01			
	16:46	126 15:21 (WEA VB5)	17:47	15:18 (WEA VB5)	18:40	32	18:14 (WEA VB1)		20:37	49	19:10 (WEA VB4)	05:21	24 19:15 (WEA VB4)	04:58			
21	08:31	09:10 (WEA VB7)	07:36	14:49 (WEA VB5)	06:31		17:31 (WEA VB3)		06:17		19:59 (WEA VB2)	21:30	24 19:39 (WEA VB4)	22:02			
	16:48	128 15:22 (WEA VB5)	17:49	15:16 (WEA VB5)	18:42	35	18:15 (WEA VB1)		20:39	50	19:09 (WEA VB4)	05:20	21 19:17 (WEA VB4)	04:58			
22	08:30	09:10 (WEA VB7)	07:34	14:52 (WEA VB5)	06:28		17:31 (WEA VB3)		06:15		19:59 (WEA VB2)	21:31	21 19:38 (WEA VB4)	22:02			
	16:50	128 15:23 (WEA VB5)	17:51	15:12 (WEA VB5)	18:44	38	18:18 (WEA VB1)		20:41	51	19:08 (WEA VB4)	05:18	19 19:19 (WEA VB4)	04:58			
23	08:29	09:09 (WEA VB7)	07:32	15:12 (WEA VB5)	18:44		17:31 (WEA VB3)		06:12		19:59 (WEA VB2)	21:33	18 19:37 (WEA VB4)	22:02			
	16:52	127 15:23 (WEA VB5)	17:53	14:59 (WEA VB5)	06:26		18:19 (WEA VB1)		20:43	51	19:07 (WEA VB4)	05:17	18 19:22 (WEA VB4)	04:59			
24	08:28	09:10 (WEA VB7)	07:30	15:06 (WEA VB5)	06:23		17:32 (WEA VB3)		06:10		19:58 (WEA VB2)	21:34	13 19:35 (WEA VB4)	22:02			
	16:54	127 15:25 (WEA VB5)	17:55		06:23		18:21 (WEA VB1)		20:44	51	19:07 (WEA VB4)	05:15	13 19:25 (WEA VB4)	04:59			
25	08:26	09:09 (WEA VB7)	07:28		06:21		17:32 (WEA VB3)		06:08		19:58 (WEA VB2)	21:36	5 19:30 (WEA VB4)	22:02			
	16:56	127 15:25 (WEA VB5)	17:57		06:21		18:23 (WEA VB1)		20:46	51	19:06 (WEA VB4)	05:14		04:59			
26	08:25	09:10 (WEA VB7)	07:25		06:19		17:33 (WEA VB3)		06:06		19:57 (WEA VB2)	21:37		22:02			
	16:57	123 15:26 (WEA VB5)	17:59		06:19		18:25 (WEA VB1)		20:48	50	19:06 (WEA VB4)	05:13		05:00			
27	08:23	09:09 (WEA VB7)	07:23		06:16		17:35 (WEA VB3)		06:04		19:56 (WEA VB2)	21:39		22:02			
	16:59	120 15:26 (WEA VB5)	18:00		06:16		18:25 (WEA VB1)		20:50	50	19:05 (WEA VB4)	05:12		05:00			
28	08:22	09:09 (WEA VB7)	07:21		06:14		17:36 (WEA VB3)		06:02		19:55 (WEA VB2)	21:40		22:02			
	17:01	116 15:27 (WEA VB5)	18:02		06:14		18:23 (WEA VB1)		20:52	48	19:05 (WEA VB4)	05:10		05:01			
29	08:20	09:10 (WEA VB7)			07:11		18:40 (WEA VB3)		05:59		19:54 (WEA VB2)	21:41		22:02			
	17:03	105 15:28 (WEA VB5)			07:09		19:21 (WEA VB1)		20:54	48	19:04 (WEA VB4)	05:09		05:01			
30	08:19	09:10 (WEA VB7)			07:09		19:13 (WEA VB1)		20:57		19:52 (WEA VB4)	21:43		22:02			
	17:05	101 15:28 (WEA VB5)			07:06		19:16 (WEA VB1)		20:55	48	19:04 (WEA VB4)	05:08		05:02			
31	08:17	09:10 (WEA VB7)			07:06						19:52 (WEA VB4)	21:44		22:02			
	17:07	101 15:28 (WEA VB5)			20:00						05:07						
Sonnenscheinstunden	251		274		367				420		493		509				
astr.max.mögl.Beschattung	3297		1664		531				807		854						

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

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

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO2 - Utwarfe 2
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember	
1	05:02	05:42	19:17 (WEA VB4)	06:36		07:28	18:20 (WEA VB3)	07:26	08:43 (WEA VB7)	08:21	08:57 (WEA VB7)
	22:01	21:27	41 19:58 (WEA VB4)	20:20		19:07	18:35 (WEA VB3)	16:57	14:58 (WEA VB5)	16:13	14:53 (WEA VB5)
2	05:03	05:43	19:17 (WEA VB4)	06:37		07:30	18:23 (WEA VB3)	07:28	08:42 (WEA VB7)	08:22	08:58 (WEA VB7)
	22:01	21:25	41 19:58 (WEA VB4)	20:18		19:05	7 18:30 (WEA VB3)	16:55	14:58 (WEA VB5)	16:13	104 14:53 (WEA VB5)
3	05:04	05:45	19:15 (WEA VB4)	06:39		07:32		07:30	08:43 (WEA VB7)	08:24	09:00 (WEA VB7)
	22:01	21:23	43 19:58 (WEA VB4)	20:16		19:02		16:53	14:59 (WEA VB5)	16:12	99 14:52 (WEA VB5)
4	05:05	05:47	19:15 (WEA VB4)	06:41		07:34		07:32	08:42 (WEA VB7)	08:25	09:02 (WEA VB7)
	22:00	21:21	44 19:59 (WEA VB4)	20:13		19:00		16:51	14:59 (WEA VB5)	16:11	94 14:51 (WEA VB5)
5	05:06	05:49	19:14 (WEA VB4)	06:43		07:36		07:34	08:41 (WEA VB7)	08:26	09:03 (WEA VB7)
	22:00	21:19	45 19:59 (WEA VB4)	20:11		18:58		16:49	14:59 (WEA VB5)	16:11	90 14:50 (WEA VB5)
6	05:06	05:50	19:14 (WEA VB4)	06:44		07:37		07:36	08:41 (WEA VB7)	08:28	09:07 (WEA VB7)
	21:59	21:17	46 20:00 (WEA VB4)	20:08		18:55		16:48	14:59 (WEA VB5)	16:10	83 14:50 (WEA VB5)
7	05:07	05:52	19:14 (WEA VB4)	06:46		07:39		07:38	08:41 (WEA VB7)	08:29	11:18 (WEA VB6)
	21:58	21:15	46 20:00 (WEA VB4)	20:06		18:53		16:46	14:59 (WEA VB5)	16:10	73 14:49 (WEA VB5)
8	05:08	05:54	19:13 (WEA VB4)	06:48		07:41		07:40	08:41 (WEA VB7)	08:30	11:19 (WEA VB6)
	21:58	21:13	47 20:00 (WEA VB4)	20:04		18:50		16:44	14:59 (WEA VB5)	16:09	71 14:49 (WEA VB5)
9	05:09	05:55	19:13 (WEA VB4)	06:50		07:43		07:41	08:40 (WEA VB7)	08:32	11:19 (WEA VB6)
	21:57	21:11	47 20:00 (WEA VB4)	20:01		18:48		16:42	14:59 (WEA VB5)	16:09	69 14:47 (WEA VB5)
10	05:11	05:57	19:12 (WEA VB4)	06:51		07:45		07:43	08:40 (WEA VB7)	08:33	11:19 (WEA VB6)
	21:56	21:09	47 19:59 (WEA VB4)	19:59		18:46		16:40	14:59 (WEA VB5)	16:09	66 14:46 (WEA VB5)
11	05:12	05:59	19:12 (WEA VB4)	06:53		07:46		07:45	08:40 (WEA VB7)	08:34	11:20 (WEA VB6)
	21:55	21:07	48 20:00 (WEA VB4)	19:56		18:43		16:39	14:59 (WEA VB5)	16:08	61 14:44 (WEA VB5)
12	05:13	06:01	19:12 (WEA VB4)	06:55		07:48		07:47	08:40 (WEA VB7)	08:35	11:20 (WEA VB6)
	21:54	21:05	48 20:00 (WEA VB4)	19:54		18:41		16:37	14:59 (WEA VB5)	16:08	56 14:42 (WEA VB5)
13	05:14	06:02	19:12 (WEA VB4)	06:57		07:50		07:49	08:41 (WEA VB7)	08:36	11:21 (WEA VB6)
	21:53	21:03	47 19:59 (WEA VB4)	19:51		18:39		16:35	14:59 (WEA VB5)	16:08	53 12:14 (WEA VB6)
14	05:15	06:04	19:12 (WEA VB4)	06:58		07:52	18:31 (WEA VB3)	07:51	08:42 (WEA VB7)	08:37	11:22 (WEA VB6)
	21:52	21:01	47 19:59 (WEA VB2)	19:49	16	18:36	19:11 (WEA VB1)	16:34	15:00 (WEA VB5)	16:08	52 12:14 (WEA VB6)
15	05:16	06:06	19:12 (WEA VB4)	07:00		07:54	18:26 (WEA VB3)	07:53	08:42 (WEA VB7)	08:38	11:22 (WEA VB6)
	21:51	20:59	49 20:01 (WEA VB2)	19:47	28	18:34	19:12 (WEA VB1)	16:32	14:59 (WEA VB5)	16:08	53 12:15 (WEA VB6)
16	05:18	06:08	19:12 (WEA VB4)	07:02		07:56	18:24 (WEA VB3)	07:55	08:43 (WEA VB7)	08:39	11:22 (WEA VB6)
	21:50	20:57	50 20:02 (WEA VB2)	19:44	34	18:32	19:13 (WEA VB1)	16:31	14:59 (WEA VB5)	16:08	52 12:14 (WEA VB6)
17	05:19	06:09	19:12 (WEA VB4)	07:04		07:58	18:22 (WEA VB3)	07:57	08:43 (WEA VB7)	08:40	11:22 (WEA VB6)
	21:49	20:55	51 20:03 (WEA VB2)	19:42	39	18:29	19:14 (WEA VB1)	16:29	14:59 (WEA VB5)	16:08	53 12:15 (WEA VB6)
18	05:20	06:11	19:13 (WEA VB4)	07:05		07:59	18:21 (WEA VB3)	07:58	08:44 (WEA VB7)	08:41	11:23 (WEA VB6)
	21:48	20:53	51 20:04 (WEA VB2)	19:39	40	18:27	19:12 (WEA VB1)	16:28	14:59 (WEA VB5)	16:09	53 12:16 (WEA VB6)
19	05:22	06:13	19:12 (WEA VB4)	07:07		08:01	18:18 (WEA VB3)	08:00	08:44 (WEA VB7)	08:41	11:24 (WEA VB6)
	21:46	20:50	52 20:04 (WEA VB2)	19:37	40	18:25	19:08 (WEA VB1)	16:26	14:58 (WEA VB5)	16:09	53 12:17 (WEA VB6)
20	05:23	06:15	19:13 (WEA VB4)	07:09		08:03	18:18 (WEA VB3)	08:02	08:45 (WEA VB7)	08:42	11:24 (WEA VB6)
	21:45	20:48	51 20:04 (WEA VB2)	19:34	39	18:23	19:06 (WEA VB1)	16:25	14:58 (WEA VB5)	16:09	52 12:16 (WEA VB6)
21	05:25	06:16	19:13 (WEA VB4)	07:11		08:05	18:17 (WEA VB3)	08:04	08:46 (WEA VB7)	08:43	11:24 (WEA VB6)
	21:44	20:46	51 20:04 (WEA VB2)	19:32	38	18:20	19:04 (WEA VB1)	16:24	14:58 (WEA VB5)	16:10	53 12:17 (WEA VB6)
22	05:26	06:18	19:14 (WEA VB4)	07:12		08:07	18:17 (WEA VB3)	08:06	08:47 (WEA VB7)	08:43	11:24 (WEA VB6)
	21:42	20:44	50 20:04 (WEA VB2)	19:29	35	18:18	19:02 (WEA VB1)	16:22	14:58 (WEA VB5)	16:10	53 12:17 (WEA VB6)
23	05:28	06:20	19:15 (WEA VB4)	07:14		08:09	18:15 (WEA VB3)	08:07	08:48 (WEA VB7)	08:44	11:25 (WEA VB6)
	21:41	20:41	49 20:04 (WEA VB2)	19:27	32	18:16	18:58 (WEA VB1)	16:21	14:57 (WEA VB5)	16:11	53 12:18 (WEA VB6)
24	05:29	06:22	19:16 (WEA VB4)	07:16		08:11	18:15 (WEA VB3)	08:09	08:49 (WEA VB7)	08:44	11:26 (WEA VB6)
	21:40	20:39	47 20:03 (WEA VB2)	19:24	29	18:14	18:44 (WEA VB3)	16:20	14:57 (WEA VB5)	16:11	53 12:19 (WEA VB6)
25	05:31	06:23	19:17 (WEA VB4)	07:18		07:13	18:15 (WEA VB3)	08:11	08:57 (WEA VB7)	08:44	11:26 (WEA VB6)
	21:38	20:37	46 20:03 (WEA VB2)	19:22	29	17:12	18:44 (WEA VB3)	16:19	14:53 (WEA VB5)	16:12	53 12:19 (WEA VB6)
26	05:32	06:25	19:19 (WEA VB4)	07:19		07:15	18:16 (WEA VB3)	08:13	08:53 (WEA VB7)	08:45	11:27 (WEA VB6)
	21:37	20:35	43 20:02 (WEA VB2)	19:19	27	17:10	18:43 (WEA VB3)	16:18	14:55 (WEA VB5)	16:12	53 12:20 (WEA VB6)
27	05:34	06:27	19:20 (WEA VB4)	07:21		07:16	18:15 (WEA VB3)	08:14	08:50 (WEA VB7)	08:45	11:27 (WEA VB6)
	21:35	20:32	40 20:00 (WEA VB2)	19:17	26	17:07	18:41 (WEA VB3)	16:17	14:55 (WEA VB5)	16:13	53 12:20 (WEA VB6)
28	05:35	06:29	19:24 (WEA VB4)	07:23		07:18	18:16 (WEA VB3)	08:16	08:48 (WEA VB7)	08:45	11:28 (WEA VB6)
	21:33	20:30	35 19:59 (WEA VB2)	19:15	24	17:05	18:40 (WEA VB3)	16:16	14:56 (WEA VB5)	16:14	53 12:21 (WEA VB6)
29	05:37	06:30	19:31 (WEA VB4)	07:25		07:20	18:17 (WEA VB3)	08:17	08:47 (WEA VB7)	08:45	11:28 (WEA VB6)
	21:32	20:28	20 19:58 (WEA VB2)	19:12	22	17:03	18:39 (WEA VB3)	16:15	14:56 (WEA VB5)	16:15	53 12:21 (WEA VB6)
30	05:39	06:32	19:41 (WEA VB4)	07:27		07:22	18:18 (WEA VB3)	08:19	08:45 (WEA VB7)	08:45	11:29 (WEA VB6)
	21:30	20:25	14 19:55 (WEA VB2)	19:10	19	17:01	18:37 (WEA VB3)	16:14	14:57 (WEA VB5)	16:16	53 12:22 (WEA VB6)
31	05:40	06:34	19:44 (WEA VB4)			07:24		08:44 (WEA VB7)		08:45	11:29 (WEA VB6)
	21:28	20:23	8 19:52 (WEA VB2)			16:59		14:57 (WEA VB5)		16:17	52 12:21 (WEA VB6)
Sonnenscheinstunden		511		382		329		260		234	
astr.max.mögl.Beschattung		331	1344	517		719		3374		1976	

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO20 - Langengrodener Weg 17
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:45 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:27 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:12	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:09	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:26	08:05 17:21	07:05 18:16	06:49 20:13	05:43 21:08	05:01 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:58	05:54 21:13	06:48 20:04	07:41 18:50	07:40 16:44	08:31 16:09
9	08:43 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	05:09 21:57	05:55 21:12	06:50 20:01	07:43 18:48	07:42 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	05:11 21:56	05:57 21:10	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:47 18:43	07:45 16:39	08:34 16:08
12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:23	05:34 21:17	04:59 21:58	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:34	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 22:00	05:16 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:08 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:41 18:35	06:26 20:32	05:26 21:25	04:58 22:01	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:37	06:24 20:34	05:24 21:27	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	08:00 18:27	07:59 16:28	08:41 16:08
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:23 21:28	04:58 22:01	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:15 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:37 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:09
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:43	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:58 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:10
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:45 16:12
26	08:25 16:57	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	05:32 21:37	06:25 20:35	07:19 19:19	07:15 17:10	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:17 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:10 21:42	05:00 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:18 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:46 16:16
31	08:17 17:07		07:06 20:00		05:07 21:46		05:40 21:28	06:34 20:23		07:24 16:59		08:46 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.Beschattung												

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) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO21 - Am Sudring 15

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:45 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:27 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:12	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:09	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:26	08:05 17:21	07:05 18:16	06:49 20:13	05:43 21:08	05:01 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:58	05:54 21:14	06:48 20:04	07:41 18:50	07:40 16:44	08:31 16:09
9	08:43 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	05:09 21:57	05:55 21:12	06:50 20:01	07:43 18:48	07:42 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	05:10 21:56	05:57 21:10	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:47 18:43	07:45 16:39	08:34 16:08
12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:23	05:34 21:17	04:59 21:58	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:34	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 22:00	05:16 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:07 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:41 18:35	06:26 20:32	05:26 21:25	04:58 22:01	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:37	06:24 20:34	05:24 21:27	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	08:00 18:27	07:59 16:28	08:41 16:08
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:22 21:28	04:58 22:01	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:15 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:37 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:09
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:43	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:58 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:10
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:45 16:12
26	08:25 16:57	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	04:59 22:02	05:32 21:37	06:25 20:35	07:19 19:19	07:15 17:10	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:17 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:10 21:42	05:00 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:18 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:46 16:16
31	08:17 17:07		07:06 20:00		05:07 21:46		05:40 21:28	06:34 20:23		07:24 16:59		08:46 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.Beschattung												

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) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO22 - Georg-Adden-Straße 55
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:12
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:45 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:05 22:00	05:48 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:27 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:12	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:09	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:25	08:05 17:21	07:05 18:16	06:49 20:13	05:43 21:08	05:01 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:58	05:54 21:14	06:48 20:04	07:41 18:50	07:40 16:44	08:31 16:09
9	08:43 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:39 21:11	05:00 21:55	05:09 21:57	05:55 21:12	06:50 20:01	07:43 18:48	07:42 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	05:10 21:56	05:57 21:10	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:08
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:47 18:43	07:45 16:39	08:34 16:08
12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:23	05:34 21:17	04:59 21:58	05:13 21:54	06:00 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:34	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 22:00	05:16 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:07 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:41 18:35	06:26 20:32	05:26 21:25	04:58 22:01	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:37	06:24 20:34	05:24 21:27	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	07:59 18:27	07:59 16:28	08:41 16:08
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:22 21:28	04:58 22:01	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:14 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:37 17:49	06:31 18:42	06:17 20:39	05:19 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:09
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:43	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:58 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:08 16:21	08:44 16:10
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:45 16:12
26	08:25 16:57	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	04:59 22:02	05:32 21:37	06:25 20:35	07:19 19:19	07:15 17:09	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:17 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:01 20:52	05:10 21:42	05:00 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:18 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:38 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:46 16:16
31	08:17 17:07		07:06 20:00		05:07 21:46		05:40 21:28	06:34 20:23		07:24 16:59		08:46 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.Beschattung												

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) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO23 - Hooksiel

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:01 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:12
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:45 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:05 22:00	05:48 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:27 16:10
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:09	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:25	08:05 17:21	07:05 18:16	06:49 20:13	05:43 21:08	05:01 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:09
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:58	05:54 21:13	06:48 20:04	07:41 18:50	07:40 16:44	08:31 16:09
9	08:43 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:39 21:11	05:00 21:55	05:09 21:57	05:55 21:11	06:50 20:01	07:43 18:48	07:42 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:21	06:42 20:19	05:38 21:13	05:00 21:56	05:10 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:08
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:46 18:43	07:45 16:39	08:34 16:08
12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:22	05:34 21:17	04:59 21:58	05:13 21:54	06:00 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:34	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 22:00	05:16 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:07 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:40 18:35	06:26 20:32	05:26 21:25	04:58 22:01	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:36	06:24 20:33	05:24 21:27	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	07:59 18:27	07:58 16:28	08:41 16:08
19	08:34 16:44	07:41 17:45	06:36 18:38	06:21 20:35	05:22 21:28	04:58 22:01	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:14 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:36 17:49	06:31 18:42	06:17 20:39	05:19 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:09
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:43	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:58 22:02	05:27 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:10
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:21 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:55	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:45 16:12
26	08:25 16:57	07:25 17:58	06:19 18:51	06:06 20:48	05:13 21:39	04:59 22:02	05:32 21:37	06:25 20:35	07:19 19:19	07:15 17:09	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:11 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:17 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:01 20:52	05:10 21:42	05:00 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:18 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:38 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:46 16:16
31	08:17 17:07		07:06 20:00		05:07 21:46		05:40 21:28	06:34 20:23		07:24 16:59		08:46 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.Beschattung												

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)
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Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH

Helmut-A. Müller-Straße 1-5

DE-82152 Planegg / München

0049 89 85 602 0

Felix Bergholz / Felix.Bergholz@mbbm-ind.com

Berechnet:

17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO24 - Depenhausen/Pakens 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni	
1	08:45	09:52 (WEA ZB3)	08:16		07:19		07:04	07:45 (WEA VB1)	05:55		05:06
	16:18	93 11:48 (WEA ZB1)	17:09		18:04		23 08:08 (WEA VB1)	20:57		21:47	21:04 (WEA VB8)
2	08:45	09:53 (WEA ZB3)	08:14		07:16		07:02	07:45 (WEA VB1)	05:53	9	21:13 (WEA VB8)
	16:19	91 11:49 (WEA ZB1)	17:11		18:06		21 08:06 (WEA VB1)	20:59		21:48	21:04 (WEA VB8)
3	08:45	09:55 (WEA ZB3)	08:12		07:14		06:59	07:47 (WEA VB1)	05:51	05:05	21:05 (WEA VB8)
	16:21	90 11:50 (WEA ZB1)	17:13		18:08		17 08:04 (WEA VB1)	21:01		21:49	21:13 (WEA VB8)
4	08:45	09:55 (WEA ZB3)	08:10		07:12		06:57	07:48 (WEA VB1)	05:49	05:04	21:06 (WEA VB8)
	16:22	87 11:49 (WEA ZB1)	17:15		18:10		13 08:01 (WEA VB1)	21:03		21:50	21:13 (WEA VB8)
5	08:45	09:56 (WEA ZB3)	08:09		07:09		06:54	07:52 (WEA VB1)	05:47	05:03	21:07 (WEA VB8)
	16:23	85 11:50 (WEA ZB1)	17:17		18:12		5 07:57 (WEA VB1)	21:04		21:51	21:12 (WEA VB8)
6	08:44	09:57 (WEA ZB3)	08:07		07:07		06:52		05:45	05:02	21:08 (WEA VB8)
	16:24	82 11:50 (WEA ZB1)	17:19		18:14		20:12		21:06	21:52	21:10 (WEA VB8)
7	08:44	09:58 (WEA ZB3)	08:05		07:05		06:50		05:43	05:02	
	16:26	80 11:50 (WEA ZB1)	17:21		18:16		20:13		21:08	21:53	
8	08:43	10:00 (WEA ZB3)	08:03		07:02	17:48 (WEA VB12)	06:47	07:11 (WEA VB2)	05:42	05:01	
	16:27	78 11:51 (WEA ZB1)	17:23		18:18	3 17:51 (WEA VB12)	20:15	5 07:16 (WEA VB2)	21:10	21:54	
9	08:43	10:01 (WEA ZB3)	08:01		07:00	17:47 (WEA VB12)	06:45	07:09 (WEA VB2)	05:40	05:00	
	16:29	75 11:51 (WEA ZB1)	17:25		18:20	6 17:53 (WEA VB12)	20:17	10 07:19 (WEA VB2)	21:12	21:55	
10	08:42	10:03 (WEA ZB3)	07:59		06:58	17:46 (WEA VB12)	06:42	07:06 (WEA VB2)	05:38	05:00	
	16:30	72 11:51 (WEA ZB1)	17:27		18:22	9 17:55 (WEA VB12)	20:19	13 07:19 (WEA VB2)	21:13	21:56	
11	08:41	10:05 (WEA ZB3)	07:57		06:55	17:46 (WEA VB12)	06:40	07:04 (WEA VB2)	05:36	05:00	
	16:32	67 11:51 (WEA ZB1)	17:29		18:24	11 17:57 (WEA VB12)	20:21	16 07:20 (WEA VB2)	21:15	21:57	
12	08:41	10:51 (WEA ZB3)	07:55		06:53	17:46 (WEA VB12)	06:38	07:02 (WEA VB2)	05:34	04:59	
	16:33	60 11:51 (WEA ZB1)	17:31		18:25	13 17:59 (WEA VB12)	20:23	19 07:21 (WEA VB2)	21:17	21:58	
13	08:40	10:52 (WEA ZB3)	07:53		06:50	17:46 (WEA VB12)	06:35	07:01 (WEA VB2)	05:32	04:59	
	16:35	59 11:51 (WEA ZB1)	17:33		18:27	14 18:00 (WEA VB12)	20:24	20 07:21 (WEA VB2)	21:18	21:58	
14	08:39	10:53 (WEA ZB3)	07:51		06:48	17:47 (WEA VB12)	06:33	07:01 (WEA VB2)	05:31	04:59	
	16:36	58 11:51 (WEA ZB1)	17:35		18:29	12 17:59 (WEA VB12)	20:26	20 07:21 (WEA VB2)	21:20	21:59	
15	08:38	10:53 (WEA ZB3)	07:49		06:45	17:48 (WEA VB12)	06:31	07:01 (WEA VB2)	05:29	04:58	
	16:38	58 11:51 (WEA ZB1)	17:37		18:31	9 17:57 (WEA VB12)	20:28	20 07:21 (WEA VB2)	21:22	22:00	
16	08:37	10:54 (WEA ZB3)	07:47		06:43	07:07 (WEA VB3)	06:28	07:00 (WEA VB2)	05:27	04:58	
	16:40	57 11:51 (WEA ZB1)	17:39		18:33	6 17:53 (WEA VB12)	20:30	20 07:20 (WEA VB2)	21:23	22:00	
17	08:36	10:55 (WEA ZB3)	07:45		06:41	07:04 (WEA VB3)	06:26	07:00 (WEA VB2)	05:26	04:58	
	16:41	56 11:51 (WEA ZB1)	17:41		18:35	9 07:13 (WEA VB3)	20:32	19 07:19 (WEA VB2)	21:25	22:01	
18	08:35	10:56 (WEA ZB3)	07:43		06:38	07:02 (WEA VB3)	06:24	07:01 (WEA VB2)	05:24	04:58	
	16:43	54 11:50 (WEA ZB1)	17:43		18:37	12 07:14 (WEA VB3)	20:34	17 07:18 (WEA VB2)	21:27	22:01	
19	08:34	10:57 (WEA ZB3)	07:41	17:14 (WEA VB13)	06:36	06:59 (WEA VB3)	06:22	07:02 (WEA VB2)	05:23	04:58	
	16:45	53 11:50 (WEA ZB1)	17:45	2 17:16 (WEA VB13)	18:38	15 07:14 (WEA VB3)	20:35	15 07:17 (WEA VB2)	21:28	22:01	
20	08:33	10:58 (WEA ZB3)	07:39	17:13 (WEA VB13)	06:33	06:57 (WEA VB3)	06:19	07:03 (WEA VB2)	05:21	04:58	
	16:47	52 11:50 (WEA ZB1)	17:47	6 17:19 (WEA VB13)	18:40	18 07:15 (WEA VB3)	20:37	13 07:16 (WEA VB2)	21:30	22:02	
21	08:32	10:59 (WEA ZB3)	07:37	17:12 (WEA VB13)	06:31	06:54 (WEA VB1)	06:17	07:05 (WEA VB2)	05:20	04:58	
	16:48	50 11:49 (WEA ZB1)	17:49	9 17:21 (WEA VB13)	18:42	20 07:14 (WEA VB3)	20:39	7 07:12 (WEA VB2)	21:31	22:02	
22	08:30	11:00 (WEA ZB3)	07:34	17:11 (WEA VB13)	06:28	06:52 (WEA VB1)	06:15		05:18	04:58	
	16:50	49 11:49 (WEA ZB1)	17:51	11 17:22 (WEA VB13)	18:44	23 07:15 (WEA VB3)	20:41		21:33	22:02	
23	08:29	11:01 (WEA ZB3)	07:32	17:11 (WEA VB13)	06:26	06:49 (WEA VB1)	06:13		05:17	04:59	
	16:52	47 11:48 (WEA ZB1)	17:53	14 17:25 (WEA VB13)	18:46	24 07:13 (WEA VB3)	20:43		21:34	22:02	
24	08:28	11:03 (WEA ZB3)	07:30	17:11 (WEA VB13)	06:24	06:47 (WEA VB1)	06:10		05:16	04:59	
	16:54	44 11:47 (WEA ZB1)	17:55	16 17:27 (WEA VB13)	18:48	26 07:13 (WEA VB3)	20:45	1 21:03 (WEA VB8)	22:02	04:59	
25	08:26	11:04 (WEA ZB3)	07:28	17:11 (WEA VB13)	06:21	06:45 (WEA VB1)	06:08		05:14	04:59	
	16:56	42 11:46 (WEA ZB1)	17:57	16 17:27 (WEA VB13)	18:50	27 07:12 (WEA VB3)	20:46		21:37	22:02	
26	08:25	11:06 (WEA ZB3)	07:25	17:12 (WEA VB13)	06:19	06:44 (WEA VB1)	06:06		05:13	05:00	
	16:58	39 11:45 (WEA ZB1)	17:59	14 17:26 (WEA VB13)	18:51	28 07:12 (WEA VB1)	20:48		21:39	22:02	
27	08:24	11:07 (WEA ZB3)	07:23	17:13 (WEA VB13)	06:16	06:44 (WEA VB1)	06:04		05:12	05:00	
	17:00	37 11:44 (WEA ZB1)	18:01	12 17:25 (WEA VB13)	18:53	28 07:12 (WEA VB1)	20:50		21:40	22:02	
28	08:22	11:09 (WEA ZB3)	07:21	17:14 (WEA VB13)	06:14	06:43 (WEA VB1)	06:02		05:11	05:01	
	17:01	33 11:42 (WEA ZB1)	18:03	9 17:23 (WEA VB13)	18:55	28 07:11 (WEA VB1)	20:52		21:42	22:02	
29	08:20	11:12 (WEA ZB3)			07:11	07:43 (WEA VB1)	06:00		05:09	05:01	
	17:03	28 11:40 (WEA ZB1)			19:57	28 08:11 (WEA VB1)	20:54		21:43	22:02	
30	08:19	11:15 (WEA ZB3)			07:09	07:43 (WEA VB1)	05:57		05:08	05:02	
	17:05	22 11:37 (WEA ZB1)			19:59	26 08:09 (WEA VB1)	20:55		21:44	22:02	
31	08:17	11:19 (WEA ZB3)			07:07	07:44 (WEA VB1)			05:07	21:03 (WEA VB8)	
	17:07	14 11:33 (WEA ZB1)			20:01	25 08:09 (WEA VB1)			21:46	21:12 (WEA VB8)	
Sonnenscheinstunden		251			367		420		493	509	40
astr.max.mögl.Beschattung		1812	109		420		293		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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO24 - Depenhausen/Pakens 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli		August		September		Oktober		November		Dezember	
1	05:03		05:42		06:36	07:03 (WEA VB2)	07:29	18:25 (WEA VB12)	07:26		08:21	09:47 (WEA B3)
	22:01		21:27		20:21	16 07:19 (WEA VB2)	19:07	14 18:39 (WEA VB12)	16:57		16:13	67 11:33 (WEA B1)
2	05:03		05:44		06:37	07:05 (WEA VB2)	07:30	18:25 (WEA VB12)	07:28		08:22	09:46 (WEA B3)
	22:01		21:25		20:18	13 07:18 (WEA VB2)	19:05	12 18:37 (WEA VB12)	16:55		16:13	72 11:34 (WEA B1)
3	05:04		05:45		06:39	07:06 (WEA VB2)	07:32	18:24 (WEA VB12)	07:30		08:24	09:44 (WEA B3)
	22:01		21:23		20:16	10 07:16 (WEA VB2)	19:03	10 18:34 (WEA VB12)	16:53		16:12	75 11:34 (WEA B1)
4	05:05		05:47		06:41	07:08 (WEA VB2)	07:34	18:24 (WEA VB12)	07:32		08:25	09:44 (WEA B3)
	22:00		21:21		20:13	5 07:13 (WEA VB2)	19:00	7 18:31 (WEA VB12)	16:51		16:11	78 11:35 (WEA B1)
5	05:06		05:49		06:43		07:36	18:25 (WEA VB12)	07:34		08:27	09:43 (WEA B3)
	22:00		21:19		20:11		07:38	4 18:29 (WEA VB12)	16:50		16:11	80 11:35 (WEA B1)
6	05:07		05:50		06:44		07:38	18:26 (WEA VB12)	07:36		08:28	09:43 (WEA B3)
	21:59		21:17		20:09		18:55	1 18:27 (WEA VB12)	16:48		16:10	82 11:36 (WEA B1)
7	05:08		05:52		06:46	07:48 (WEA VB1)	07:39		07:38		08:29	09:43 (WEA B3)
	21:58	4 21:18 (WEA VB8)	21:15		20:06	3 07:51 (WEA VB1)	18:53		16:46		16:10	83 11:36 (WEA B1)
8	05:09		05:54		06:48	07:53 (WEA VB1)	07:41		07:40		08:31	09:43 (WEA B3)
	21:58	6 21:19 (WEA VB8)	21:14		20:04	13 07:50 (WEA VB1)	18:51		16:44		16:09	88 11:38 (WEA B1)
9	05:10		05:56		06:50	07:40 (WEA VB1)	07:43		07:42		08:32	09:43 (WEA B3)
	21:57	8 21:20 (WEA VB8)	21:12		20:01	17 07:57 (WEA VB1)	18:48		16:42		16:09	89 11:38 (WEA B1)
10	05:11		05:57		06:51	07:38 (WEA VB1)	07:45		07:44		08:33	09:43 (WEA B3)
	21:56	9 21:21 (WEA VB8)	21:10		19:59	21 07:59 (WEA VB1)	18:46		16:41		16:09	90 11:38 (WEA B1)
11	05:12		05:59		06:53	07:37 (WEA VB1)	07:47		07:45	10:49 (WEA ZB1)	08:34	09:42 (WEA B3)
	21:55	10 21:21 (WEA VB8)	21:08		19:56	23 08:00 (WEA VB1)	18:43		16:39	15 11:04 (WEA ZB1)	16:08	93 11:38 (WEA B1)
12	05:13		06:01		06:55	07:36 (WEA VB1)	07:48		07:47	10:46 (WEA ZB1)	08:35	09:43 (WEA B3)
	21:54	9 21:20 (WEA VB8)	21:05		19:54	25 08:01 (WEA VB1)	18:41		16:37	23 11:09 (WEA ZB1)	16:08	94 11:40 (WEA B1)
13	05:14		06:02		06:57	07:34 (WEA VB1)	07:50	17:50 (WEA VB13)	07:49	10:44 (WEA ZB1)	08:36	09:44 (WEA B3)
	21:53	8 21:19 (WEA VB8)	21:03		19:52	27 08:01 (WEA VB1)	18:39	3 17:53 (WEA VB13)	16:36	28 11:12 (WEA ZB1)	16:08	94 11:40 (WEA B1)
14	05:15		06:04		06:58	07:34 (WEA VB1)	07:52	17:47 (WEA VB13)	07:51	10:42 (WEA ZB1)	08:37	09:44 (WEA B3)
	21:52	7 21:19 (WEA VB8)	21:01		19:49	27 08:01 (WEA VB1)	18:36	10 17:57 (WEA VB13)	16:34	33 11:15 (WEA ZB1)	16:08	96 11:41 (WEA B1)
15	05:17		06:06		07:00	07:33 (WEA VB1)	07:53	17:45 (WEA VB13)	07:53	10:40 (WEA ZB1)	08:38	09:44 (WEA B3)
	21:51	7 21:18 (WEA VB8)	20:59		19:47	28 08:01 (WEA VB1)	18:34	13 17:58 (WEA VB13)	16:32	37 11:17 (WEA ZB1)	16:08	96 11:41 (WEA B1)
16	05:18		06:08		07:02	07:32 (WEA VB1)	07:56	17:44 (WEA VB13)	07:55	10:39 (WEA ZB1)	08:39	09:45 (WEA B3)
	21:50	5 21:16 (WEA VB8)	20:57		19:44	28 08:00 (WEA VB1)	18:32	15 17:59 (WEA VB13)	16:31	39 11:18 (WEA ZB1)	16:08	96 11:42 (WEA B1)
17	05:19		06:09		07:04	07:32 (WEA VB1)	07:58	17:43 (WEA VB13)	07:57	10:38 (WEA ZB1)	08:40	09:44 (WEA B3)
	21:49	4 21:15 (WEA VB8)	20:55		19:42	28 08:00 (WEA VB1)	18:29	16 17:59 (WEA VB13)	16:29	42 11:20 (WEA ZB1)	16:08	97 11:41 (WEA B1)
18	05:21		06:11		07:05	07:32 (WEA VB1)	08:00	17:43 (WEA VB13)	07:59	10:37 (WEA ZB1)	08:41	09:45 (WEA B3)
	21:48	3 21:14 (WEA VB8)	20:53		19:39	28 08:00 (WEA VB1)	18:27	15 17:58 (WEA VB13)	16:28	44 11:21 (WEA ZB1)	16:09	97 11:42 (WEA B1)
19	05:22		06:13		07:07	07:34 (WEA VB1)	08:01	17:42 (WEA VB13)	08:00	10:36 (WEA ZB1)	08:41	09:45 (WEA B3)
	21:47	1 21:13 (WEA VB8)	20:50		19:37	26 08:00 (WEA VB1)	18:25	13 17:55 (WEA VB13)	16:27	47 11:23 (WEA ZB1)	16:09	98 11:43 (WEA B1)
20	05:23		06:15		07:09	07:35 (WEA VB1)	08:03	17:43 (WEA VB13)	08:02	10:35 (WEA ZB1)	08:42	09:45 (WEA B3)
	21:45		20:48		19:34	25 08:00 (WEA VB1)	18:23	10 17:53 (WEA VB13)	16:25	49 11:24 (WEA ZB1)	16:09	98 11:43 (WEA B1)
21	05:25		06:16		07:11	07:37 (WEA VB1)	08:05	17:43 (WEA VB13)	08:04	10:35 (WEA ZB1)	08:43	09:46 (WEA B3)
	21:44		20:46		19:32	23 08:00 (WEA VB1)	18:20	8 17:51 (WEA VB13)	16:24	50 11:25 (WEA ZB1)	16:10	98 11:44 (WEA B1)
22	05:26		06:18		07:13	07:39 (WEA VB1)	08:07	17:44 (WEA VB13)	08:06	10:34 (WEA ZB1)	08:43	09:46 (WEA B3)
	21:43		20:44	9 07:18 (WEA VB2)	19:29	21 08:00 (WEA VB1)	18:18	4 17:48 (WEA VB13)	16:23	52 11:26 (WEA ZB1)	16:10	98 11:44 (WEA B1)
23	05:28		06:20		07:14	07:40 (WEA VB1)	08:09	17:45 (WEA VB13)	08:08	10:34 (WEA ZB1)	16:11	09:47 (WEA B3)
	21:41		20:42	13 07:20 (WEA VB2)	19:27	19 07:59 (WEA VB1)	18:16	1 17:46 (WEA VB13)	16:21	53 11:27 (WEA ZB1)	16:11	98 11:45 (WEA B1)
24	05:29		06:22		07:16	07:42 (WEA VB1)	08:11		08:09	10:34 (WEA ZB1)	08:44	09:47 (WEA B3)
	21:40		20:39	15 07:21 (WEA VB2)	19:25	16 07:58 (WEA VB1)	18:14		16:20	54 11:28 (WEA ZB1)	16:11	98 11:45 (WEA B1)
25	05:31		06:23		07:18	07:44 (WEA VB1)	07:13		08:11	10:34 (WEA ZB1)	08:45	09:48 (WEA B3)
	21:38		20:37	17 07:21 (WEA VB2)	19:22	13 07:57 (WEA VB1)	17:12		16:19	55 11:29 (WEA ZB1)	16:12	97 11:45 (WEA B1)
26	05:32		06:25		07:20	07:46 (WEA VB1)	07:15		08:13	10:33 (WEA ZB1)	08:45	09:49 (WEA B3)
	21:37		20:35	19 07:22 (WEA VB2)	19:20	10 07:56 (WEA VB1)	17:10		16:18	56 11:29 (WEA ZB1)	16:13	97 11:46 (WEA B1)
27	05:34		06:27		07:21	07:48 (WEA VB1)	07:17		08:14	10:33 (WEA ZB1)	08:45	09:49 (WEA B3)
	21:35		20:32	20 07:23 (WEA VB2)	19:17	6 07:54 (WEA VB1)	17:08		16:17	57 11:30 (WEA ZB1)	16:13	98 11:47 (WEA B1)
28	05:35		06:29		07:23	18:29 (WEA VB12)	07:19		08:16	10:33 (WEA ZB1)	08:45	09:50 (WEA B3)
	21:33		20:30	20 07:22 (WEA VB2)	19:15	8 18:37 (WEA VB12)	17:05		16:16	58 11:31 (WEA ZB1)	16:14	96 11:47 (WEA B1)
29	05:37		06:30		07:25	18:27 (WEA VB12)	07:20		08:18	10:33 (WEA ZB1)	08:45	09:51 (WEA B3)
	21:32		20:28	20 07:22 (WEA VB2)	19:12	12 18:39 (WEA VB12)	17:03		16:15	59 11:32 (WEA ZB1)	16:15	94 11:47 (WEA B1)
30	05:39		06:32		07:27	18:26 (WEA VB12)	07:22		08:19	10:32 (WEA ZB1)	08:46	09:51 (WEA B3)
	21:30		20:25	20 07:22 (WEA VB2)	19:10	14 18:40 (WEA VB12)	17:01		16:14	60 11:32 (WEA ZB1)	16:16	95 11:48 (WEA B1)
31	05:40		06:34		07:29		17:04				16:16	09:46 (WEA B3)
	21:28		20:23	19 07:20 (WEA VB2)			16:59				16:17	93 11:48 (WEA B1)
Sonnenscheinstunden	511		459		382		329		260		234	
astr.max.mögl.Beschattung	81		172		505		156		911		2825	

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO25 - Tain 3

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar		Februar		März		April		Mai		Juni			
1	08:46 16:18		08:16 17:09	25	08:43 (WEA ZB3) 09:08 (WEA ZB2)	07:19 18:05	27	08:14 (WEA ZB1) 08:41 (WEA ZB1)	07:04 20:02	11	07:28 (WEA VB1) 07:39 (WEA VB1)	05:55 20:57	05:06 21:47	20:37 (WEA VB10) 20:40 (WEA VB10)
2	08:45 16:20		08:14 17:11	32	08:41 (WEA ZB3) 16:34 (WEA VB13)	07:16 18:06	24	08:16 (WEA ZB1) 08:40 (WEA ZB1)	07:02 20:04	13	07:25 (WEA VB1) 07:38 (WEA VB1)	05:53 20:59	05:06 21:48	
3	08:45 16:21		08:12 17:13	43	08:40 (WEA ZB3) 16:40 (WEA VB13)	07:14 18:08	20	08:17 (WEA ZB1) 08:37 (WEA ZB1)	06:59 20:06	13	07:24 (WEA VB1) 07:37 (WEA VB1)	05:51 21:01	05:05 21:49	
4	08:45 16:22		08:11 17:15	49	08:38 (WEA ZB3) 16:42 (WEA VB13)	07:12 18:10	13	08:21 (WEA ZB1) 08:34 (WEA ZB1)	06:57 20:08	10	07:25 (WEA VB1) 07:35 (WEA VB1)	05:49 21:03	05:04 21:50	
5	08:45 16:23		08:09 17:17	55	08:36 (WEA ZB3) 16:44 (WEA VB13)	07:09 18:12			06:54 20:10	3	07:28 (WEA VB1) 07:31 (WEA VB1)	05:47 21:04	05:03 21:51	
6	08:44 16:24		08:07 17:19	56	08:36 (WEA ZB3) 16:45 (WEA VB13)	07:07 18:14			06:52 20:12			05:45 21:06	05:02 21:52	
7	08:44 16:26		08:05 17:21	60	08:32 (WEA ZB1) 16:46 (WEA VB13)	07:05 18:16			06:50 20:13			05:44 21:08	05:02 21:53	
8	08:43 16:27		08:03 17:23	66	08:30 (WEA ZB1) 16:47 (WEA VB13)	07:02 18:18		17:38 (WEA VB12)	06:47 20:15			05:42 21:10	05:01 21:54	
9	08:43 16:29		08:01 17:25	69	08:28 (WEA ZB1) 16:48 (WEA VB13)	07:00 18:20	13	17:51 (WEA VB12)	06:45 20:17	4	19:39 (WEA VB11)	05:40 21:12	05:01 21:55	
10	08:42 16:30		07:59 17:27	71	08:26 (WEA ZB1) 16:49 (WEA VB13)	06:58 18:22	17	17:33 (WEA VB12)	06:42 20:19	12	19:34 (WEA VB11)	05:38 21:13	05:00 21:56	
11	08:41 16:32		07:57 17:29	72	08:24 (WEA ZB1) 16:49 (WEA VB13)	06:55 18:24	21	17:32 (WEA VB12)	06:40 20:21	15	19:33 (WEA VB11)	05:36 21:15	05:00 21:57	
12	08:41 16:33		07:55 17:31	73	08:22 (WEA ZB1) 16:50 (WEA VB13)	06:53 18:25	24	17:31 (WEA VB12)	06:38 20:23	18	19:31 (WEA VB11)	05:34 21:17	05:00 21:58	
13	08:40 16:35		07:53 17:33	72	08:19 (WEA ZB1) 16:49 (WEA VB13)	06:50 18:27	26	17:30 (WEA VB12)	06:35 20:24	19	19:30 (WEA VB11)	05:33 21:18	05:00 21:58	
14	08:39 16:36		07:51 17:35	67	08:17 (WEA ZB1) 16:49 (WEA VB13)	06:48 18:29	27	17:30 (WEA VB12)	06:33 20:26	19	19:29 (WEA VB11)	05:31 21:20	05:00 21:59	
15	08:38 16:38		07:49 17:37	64	08:15 (WEA ZB1) 16:50 (WEA VB13)	06:46 18:31	27	17:28 (WEA VB12)	06:31 20:28	20	19:29 (WEA VB11)	05:29 21:22	05:00 22:00	
16	08:37 16:40		07:47 17:39	67	08:13 (WEA ZB1) 16:50 (WEA VB13)	06:43 18:33	29	17:28 (WEA VB12)	06:28 20:30	20	19:28 (WEA VB11)	05:27 21:23	05:00 22:00	
17	08:36 16:41		07:45 17:41	67	08:11 (WEA ZB1) 16:49 (WEA VB13)	06:41 18:35	29	17:28 (WEA VB12)	06:26 20:32	21	19:28 (WEA VB11)	05:26 21:25	05:00 22:01	
18	08:35 16:43		07:43 17:43	68	08:10 (WEA ZB1) 16:48 (WEA VB13)	06:38 18:37	28	17:28 (WEA VB12)	06:24 20:34	20	19:28 (WEA VB11)	05:24 21:27	05:00 22:01	
19	08:34 16:45		07:41 17:45	68	08:10 (WEA ZB1) 16:48 (WEA VB13)	06:36 18:39	28	17:28 (WEA VB12)	06:22 20:35	20	19:29 (WEA VB11)	05:23 21:28	05:00 22:01	
20	08:33 16:47		07:39 17:47	67	08:10 (WEA ZB1) 16:47 (WEA VB13)	06:33 18:40	27	17:28 (WEA VB12)	06:19 20:37	18	19:29 (WEA VB11)	05:21 21:30	05:00 22:01	
21	08:32 16:48		07:37 17:49	65	08:11 (WEA ZB1) 16:46 (WEA VB13)	06:31 18:42	25	17:29 (WEA VB12)	06:17 20:39	19	19:30 (WEA VB11)	05:20 21:31	05:00 22:02	
22	08:30 16:50		07:34 17:51	62	08:10 (WEA ZB1) 16:44 (WEA VB13)	06:28 18:44	24	17:30 (WEA VB12)	06:15 20:41	14	19:31 (WEA VB11)	05:18 21:33	05:00 22:02	
23	08:29 16:52	08:58 (WEA ZB2) 2 09:00 (WEA ZB2)	07:32 17:53	60	08:10 (WEA ZB1) 16:43 (WEA VB13)	06:26 18:46	22	17:32 (WEA VB12)	06:13 20:43	12	19:34 (WEA VB11)	05:17 21:34	05:00 22:02	
24	08:28 16:54	08:57 (WEA ZB2) 5 09:02 (WEA ZB2)	07:30 17:55	56	08:11 (WEA ZB1) 16:40 (WEA VB13)	06:24 18:48	18	17:33 (WEA VB12)	06:10 20:45	6	19:40 (WEA VB11)	05:16 21:36	05:00 22:02	
25	08:26 16:56	08:55 (WEA ZB2) 8 09:03 (WEA ZB2)	07:28 17:57	49	08:12 (WEA ZB1) 16:34 (WEA VB13)	06:21 18:50	14	17:38 (WEA VB12)	06:08 20:46			05:14 21:37	05:00 22:03	
26	08:25 16:58	08:54 (WEA ZB2) 11 09:05 (WEA ZB2)	07:26 17:59	36	08:11 (WEA ZB1) 08:45 (WEA ZB1)	06:19 18:51	5	17:43 (WEA VB12)	06:06 20:48	19	19:47 (WEA VB11)	05:13 21:39	05:00 22:02	
27	08:24 17:00	08:52 (WEA ZB2) 13 09:05 (WEA ZB2)	07:23 18:01	34	08:13 (WEA ZB1) 08:45 (WEA ZB1)	06:16 18:53			06:04 20:50	16	20:30 (WEA VB1)	05:12 21:40	05:00 22:02	
28	08:22 17:01	08:50 (WEA ZB2) 16 09:06 (WEA ZB2)	07:21 18:03	32	08:13 (WEA ZB1) 08:43 (WEA ZB1)	06:14 18:55	15	06:37 (WEA VB1)	06:02 20:52	15	20:31 (WEA VB1)	05:11 21:42	05:00 22:02	
29	08:21 17:03	08:49 (WEA ZB2) 18 09:07 (WEA ZB2)	07:19 18:07	30	08:43 (WEA ZB1)	07:11 19:57	2	06:39 (WEA VB1)	06:00 20:50	13	20:44 (WEA VB1)	05:10 21:43	05:00 22:02	
30	08:19 17:05	08:47 (WEA ZB2) 21 09:08 (WEA ZB2)	07:17 18:08			07:09 19:59	5	07:40 (WEA VB1)	05:54 20:55	12	20:44 (WEA VB1)	05:08 21:44	05:00 22:02	
31	08:17 17:07	08:45 (WEA ZB2) 23 09:08 (WEA ZB2)	07:15 18:08			07:07 20:01	7	07:39 (WEA VB1)	05:57 20:56	10	20:44 (WEA VB1)	05:07 21:46	05:00 22:02	
Sonnenscheinstunden	251		274			367		419			493		509	
astr.max.mögl.Beschattung	117		1567			511		287		323		3		

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

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

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO25 - Tain 3
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember	
1	05:03	05:42	20:42 (WEA VB10)	06:36	19:32 (WEA VB11)	07:29	18:10 (WEA VB12)	07:26	07:56 (WEA ZB1)	08:21	
	22:02	21:27	10 20:52 (WEA VB10)	20:21	14 19:46 (WEA VB11)	19:07	26 18:36 (WEA VB12)	16:57	70 16:18 (WEA VB13)	16:13	
2	05:03	05:44	20:44 (WEA VB10)	06:38	19:33 (WEA VB11)	07:30	18:11 (WEA VB12)	07:28	07:58 (WEA ZB1)	08:22	
	22:01	21:25	7 20:51 (WEA VB10)	20:18	12 19:45 (WEA VB11)	19:05	24 18:35 (WEA VB12)	16:55	69 16:18 (WEA VB13)	16:13	
3	05:04	05:45		06:39	19:36 (WEA VB11)	07:32	18:11 (WEA VB12)	07:30	08:00 (WEA ZB1)	08:24	
	22:01	21:23		20:16	4 19:40 (WEA VB11)	19:03	22 18:33 (WEA VB12)	16:53	65 16:17 (WEA VB13)	16:12	
4	05:05	05:47		06:41		07:34	18:12 (WEA VB12)	07:32	08:02 (WEA ZB1)	08:25	
	22:00	21:21		20:13		19:00	19 18:31 (WEA VB12)	16:52	59 16:16 (WEA VB13)	16:11	
5	05:06	05:49		06:43		07:36	18:14 (WEA VB12)	07:34	08:05 (WEA ZB3)	08:27	
	22:00	21:19		20:11		18:58	15 18:29 (WEA VB12)	16:50	57 16:15 (WEA VB13)	16:11	
6	05:07	05:50		06:45		07:38	18:17 (WEA VB12)	07:36	08:06 (WEA ZB3)	08:28	
	21:59	21:17		20:09		18:55	8 18:25 (WEA VB12)	16:48	53 16:13 (WEA VB13)	16:10	
7	05:08	05:52		06:46	07:24 (WEA VB1)	07:39		07:38	08:08 (WEA ZB3)	08:29	
	21:58	21:16		20:06	2 07:26 (WEA VB1)	18:53		16:46	47 16:11 (WEA VB13)	16:10	
8	05:09	05:54		06:48	07:20 (WEA VB1)	07:41		07:40	08:10 (WEA ZB3)	08:31	
	21:58	21:14		20:04	10 07:30 (WEA VB1)	18:51		16:44	41 16:09 (WEA VB13)	16:09	
9	05:10	05:56		06:50	07:18 (WEA VB1)	07:43		08:59 (WEA ZB1)	07:42	08:32	
	21:57	21:12		20:01	12 07:30 (WEA VB1)	18:48	7 09:06 (WEA ZB1)	16:42	27 08:39 (WEA ZB2)	16:09	
10	05:11	05:57		06:52	07:18 (WEA VB1)	07:45		08:53 (WEA ZB1)	07:44	08:33	
	21:56	21:10		19:59	13 07:31 (WEA VB1)	18:46	16 09:09 (WEA ZB1)	16:41	25 08:39 (WEA ZB2)	16:09	
11	05:12	05:59		06:53	07:20 (WEA VB1)	07:47		08:50 (WEA ZB1)	07:45	08:34	
	21:55	21:08		19:57	12 07:32 (WEA VB1)	18:43	22 09:12 (WEA ZB1)	16:39	23 08:40 (WEA ZB2)	16:09	
12	05:13	20:43 (WEA VB10)	06:01	06:55	07:22 (WEA VB1)	07:48		08:48 (WEA ZB1)	07:47	08:35	
	21:54	6 20:49 (WEA VB10)	21:06	19:54	10 07:32 (WEA VB1)	18:41	26 09:14 (WEA ZB1)	16:37	21 08:40 (WEA ZB2)	16:08	
13	05:14	20:42 (WEA VB10)	06:02	06:57	07:23 (WEA VB1)	07:50		08:47 (WEA ZB1)	07:49	08:36	
	21:53	9 20:51 (WEA VB10)	21:03	19:52	8 07:31 (WEA VB1)	18:39	28 09:15 (WEA ZB1)	16:36	18 08:39 (WEA ZB2)	16:08	
14	05:15	20:42 (WEA VB10)	06:04	06:59	07:25 (WEA VB1)	07:52		08:45 (WEA ZB1)	07:51	08:37	
	21:52	11 20:53 (WEA VB10)	21:01	19:49	5 07:30 (WEA VB1)	18:36	31 09:16 (WEA ZB1)	16:34	16 08:39 (WEA ZB2)	16:08	
15	05:17	20:41 (WEA VB10)	06:06	07:00	07:27 (WEA VB1)	07:54		08:44 (WEA ZB1)	07:53	08:38	
	21:51	12 20:53 (WEA VB10)	20:59	19:47	2 07:29 (WEA VB1)	18:34	33 09:17 (WEA ZB1)	16:32	13 08:38 (WEA ZB2)	16:08	
16	05:18	20:40 (WEA VB10)	06:08	07:02		07:56		08:43 (WEA ZB1)	07:55	08:39	
	21:50	14 20:54 (WEA VB10)	20:57	19:44		18:32	35 09:18 (WEA ZB1)	16:31	11 08:38 (WEA ZB2)	16:08	
17	05:19	20:39 (WEA VB10)	06:09	07:04		07:58		08:43 (WEA ZB1)	07:57	08:40	
	21:49	15 20:54 (WEA VB10)	20:55	19:42		18:30	43 17:09 (WEA VB13)	16:29	8 08:37 (WEA ZB2)	16:08	
18	05:21	20:39 (WEA VB10)	06:11	07:06		08:00		08:42 (WEA ZB1)	07:59	08:41	
	21:48	16 20:55 (WEA VB10)	20:53	19:39		18:27	53 17:13 (WEA VB13)	16:28	5 08:36 (WEA ZB2)	16:09	
19	05:22	20:39 (WEA VB10)	06:13	07:07		08:01		08:41 (WEA ZB1)	08:00	08:42	
	21:47	17 20:56 (WEA VB10)	20:51	19:37	13 18:21 (WEA VB12)	18:25	58 17:15 (WEA VB13)	16:27	2 08:35 (WEA ZB2)	16:09	
20	05:23	20:38 (WEA VB10)	06:15	07:09		18:25		08:41 (WEA ZB1)	08:02	08:42	
	21:45	18 20:56 (WEA VB10)	20:48	19:34	17 18:34 (WEA VB12)	18:23	61 17:16 (WEA VB13)	16:25		16:09	
21	05:25	20:38 (WEA VB10)	06:16	07:11		18:23		08:41 (WEA ZB1)	08:04	08:43	
	21:44	18 20:56 (WEA VB10)	20:46	19:37 (WEA VB11)	07:11	18:16 (WEA VB12)	08:05	08:41 (WEA ZB1)	08:04	16:10	
22	05:26	20:38 (WEA VB10)	06:18	07:13	21 18:37 (WEA VB12)	18:21	64 17:17 (WEA VB13)	16:24		08:43	
	21:43	19 20:57 (WEA VB10)	20:44	19:34 (WEA VB11)	07:13	18:15 (WEA VB12)	08:07	08:41 (WEA ZB1)	08:06	16:10	
23	05:28	20:38 (WEA VB10)	06:20	07:14	23 18:38 (WEA VB12)	18:18	66 17:18 (WEA VB13)	16:23		08:44	
	21:41	19 20:57 (WEA VB10)	20:42	19:33 (WEA VB11)	07:14	18:13 (WEA VB12)	08:09	08:41 (WEA ZB1)	08:08	16:11	
24	05:29	20:39 (WEA VB10)	06:22	07:16	26 18:39 (WEA VB12)	18:16	66 17:18 (WEA VB13)	16:21		08:44	
	21:40	18 20:57 (WEA VB10)	20:39	19:32 (WEA VB11)	07:16	18:12 (WEA VB12)	08:11	08:41 (WEA ZB1)	08:09	16:11	
25	05:31	20:38 (WEA VB10)	06:23	07:18	26 18:38 (WEA VB12)	18:14	68 17:19 (WEA VB13)	16:20		08:45	
	21:38	19 20:57 (WEA VB10)	20:37	19:31 (WEA VB11)	07:18	18:11 (WEA VB12)	07:13	07:41 (WEA ZB1)	08:11	16:12	
26	05:32	20:38 (WEA VB10)	06:25	07:20	28 18:39 (WEA VB12)	17:12	68 16:19 (WEA VB13)	16:19		16:13	
	21:37	19 20:57 (WEA VB10)	20:35	19:31 (WEA VB11)	07:20	18:11 (WEA VB12)	07:15	07:43 (WEA ZB1)	08:13	16:13	
27	05:34	20:39 (WEA VB10)	06:27	07:21	28 18:39 (WEA VB12)	17:10	66 16:19 (WEA VB13)	16:18		08:45	
	21:35	18 20:57 (WEA VB10)	20:32	19:31 (WEA VB11)	07:21	18:10 (WEA VB12)	07:17	07:45 (WEA ZB1)	08:14	16:14	
28	05:36	20:39 (WEA VB10)	06:29	07:23	29 18:39 (WEA VB12)	17:08	63 16:19 (WEA VB13)	16:17		08:45	
	21:33	17 20:56 (WEA VB10)	20:30	19:30 (WEA VB11)	07:23	18:09 (WEA VB12)	07:19	07:47 (WEA ZB1)	08:16	16:14	
29	05:37	20:40 (WEA VB10)	06:31	07:25	29 18:38 (WEA VB12)	17:05	69 16:19 (WEA VB13)	16:16		08:46	
	21:32	16 20:56 (WEA VB10)	20:28	19:30 (WEA VB11)	07:25	18:09 (WEA VB12)	07:21	07:49 (WEA ZB1)	08:18	16:15	
30	05:39	20:40 (WEA VB10)	06:32	07:27	28 18:37 (WEA VB12)	17:03	72 16:19 (WEA VB13)	16:15		08:46	
	21:30	15 20:55 (WEA VB10)	20:25	19:31 (WEA VB11)	07:27	18:09 (WEA VB12)	07:22	07:51 (WEA ZB1)	08:19	16:16	
31	05:40	20:41 (WEA VB10)	06:34	07:28	19:10 18:37 (WEA VB12)	17:01	73 16:18 (WEA VB13)	16:14		08:46	
	21:28	13 20:54 (WEA VB10)	20:23	19:30 (WEA VB11)		07:24		07:53 (WEA ZB1)		16:17	
Sonnenscheinstunden		511		382		329		260		234	
astr.max.mögl.Beschattung		309		400		1275		630			

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO26 - Waterpott 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlungsrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar		Februar		März		April		Mai		Juni		
1	08:46 16:18	08:16 17:09			07:19 18:05	32	07:45 (WEA B2) 18:05 (WEA B2)	07:04 20:02	07:54 (WEA B1) 19:13 (WEA B1)	05:55 20:57	19:39 (WEA B1) 20:11 (WEA B1)	05:06 21:47	20:40 (WEA B1) 21:01 (WEA B1)
2	08:45 16:20	08:14 17:11			07:16 18:06	31	07:46 (WEA B2) 18:17 (WEA B2)	07:02 20:04	07:55 (WEA B1) 19:12 (WEA B1)	05:53 20:59	19:39 (WEA B1) 20:10 (WEA B1)	05:06 21:48	20:40 (WEA B1) 21:01 (WEA B1)
3	08:45 16:21	08:12 17:13			07:14 18:08	31	07:45 (WEA B2) 18:16 (WEA B2)	06:59 20:06	07:56 (WEA B1) 19:12 (WEA B1)	05:51 21:01	19:40 (WEA B1) 20:10 (WEA B1)	05:05 21:49	20:40 (WEA B1) 21:01 (WEA B1)
4	08:45 16:22	08:11 17:15			07:12 18:10	29	07:46 (WEA B2) 18:15 (WEA B2)	06:57 20:08	07:57 (WEA B1) 19:11 (WEA B1)	05:49 21:03	19:40 (WEA B1) 20:09 (WEA B1)	05:04 21:50	20:41 (WEA B1) 21:02 (WEA B1)
5	08:45 16:23	08:09 17:17			07:09 18:12	28	07:47 (WEA B2) 18:15 (WEA B2)	06:54 20:10	08:00 (WEA B1) 19:11 (WEA B1)	05:47 21:04	19:40 (WEA B1) 20:08 (WEA B1)	05:03 21:51	20:41 (WEA B1) 21:01 (WEA B1)
6	08:44 16:24	08:07 17:19			07:07 18:14	26	07:47 (WEA B2) 18:13 (WEA B2)	06:52 20:12	08:05 (WEA B1) 19:11 (WEA B1)	05:45 21:06	19:42 (WEA B1) 20:08 (WEA B1)	05:02 21:52	20:40 (WEA B1) 21:01 (WEA B1)
7	08:44 16:26	08:05 17:21			07:05 18:16	24	07:48 (WEA B2) 18:12 (WEA B2)	06:50 20:13	18:32 (WEA B1) 19:09 (WEA B1)	05:44 21:08	19:42 (WEA B1) 20:07 (WEA B1)	05:02 21:53	20:41 (WEA B1) 21:02 (WEA B1)
8	08:43 16:27	08:03 17:23			07:02 18:18	21	07:49 (WEA B2) 18:10 (WEA B2)	06:47 20:15	18:33 (WEA B1) 19:08 (WEA B1)	05:42 21:10	19:43 (WEA B1) 20:06 (WEA B1)	05:01 21:54	20:41 (WEA B1) 21:01 (WEA B1)
9	08:43 16:29	08:01 17:25			07:00 18:20	17	07:51 (WEA B2) 18:08 (WEA B2)	06:45 20:17	18:34 (WEA B1) 19:07 (WEA B1)	05:40 21:12	19:44 (WEA B1) 20:04 (WEA B1)	05:01 21:55	20:42 (WEA B1) 21:02 (WEA B1)
10	08:42 16:30	07:59 17:27			06:58 18:22	11	07:53 (WEA B2) 18:04 (WEA B2)	06:43 20:19	18:34 (WEA B1) 19:05 (WEA B1)	05:38 21:13	19:46 (WEA B1) 20:03 (WEA B1)	05:00 21:56	20:42 (WEA B1) 21:02 (WEA B1)
11	08:41 16:32	07:57 17:29			06:55 18:24			06:40 20:21	18:35 (WEA B1) 19:04 (WEA B1)	05:36 21:15	19:47 (WEA B1) 20:01 (WEA B1)	05:00 21:57	20:42 (WEA B1) 21:02 (WEA B1)
12	08:41 16:33	07:55 17:31			06:53 18:25			06:38 20:23	18:37 (WEA B1) 19:03 (WEA B1)	05:34 21:17	19:50 (WEA B1) 19:58 (WEA B1)	04:59 21:58	20:42 (WEA B1) 21:02 (WEA B1)
13	08:40 16:35	07:53 17:33			06:50 18:27	9	07:14 (WEA B1) 18:27 (WEA B1)	06:35 20:24	18:38 (WEA B1) 19:00 (WEA B1)	05:33 21:18		04:59 21:58	20:43 (WEA B1) 21:03 (WEA B1)
14	08:39 16:36	07:51 17:35			06:48 18:29	14	07:12 (WEA B1) 18:26 (WEA B1)	06:33 20:26	18:41 (WEA B1) 18:57 (WEA B1)	05:31 21:20		04:59 21:59	20:43 (WEA B1) 21:03 (WEA B1)
15	08:38 16:38	07:49 17:37			06:46 18:31	19	07:09 (WEA B1) 18:28 (WEA B1)	06:31 20:28	18:47 (WEA B1) 18:51 (WEA B1)	05:29 21:22		04:58 22:00	20:44 (WEA B1) 21:04 (WEA B1)
16	08:37 16:40	07:47 17:39			06:43 18:33	22	07:07 (WEA B1) 18:33 (WEA B1)	06:28 20:30		05:27 21:23		04:58 22:00	20:44 (WEA B1) 21:04 (WEA B1)
17	08:36 16:41	07:45 17:41			06:41 18:35	26	07:04 (WEA B1) 18:30 (WEA B1)	06:26 20:32		05:26 21:25		04:58 22:01	20:44 (WEA B1) 21:04 (WEA B1)
18	08:35 16:43	07:43 17:43			06:38 18:37	29	07:02 (WEA B1) 18:31 (WEA B1)	06:24 20:34	19:53 (WEA B1) 20:02 (WEA B1)	05:24 21:27		04:58 22:01	20:45 (WEA B1) 21:04 (WEA B1)
19	08:34 16:45	07:41 17:45			06:36 18:39	32	06:59 (WEA B1) 18:39 (WEA B1)	06:22 20:35	19:50 (WEA B1) 20:05 (WEA B1)	05:23 21:28		04:58 22:01	20:45 (WEA B1) 21:04 (WEA B1)
20	08:33 16:47	07:39 17:47			06:33 18:40	47	06:57 (WEA B1) 18:02 (WEA B1)	06:19 20:37	19:47 (WEA B1) 20:07 (WEA B1)	05:21 21:30		04:58 22:02	20:45 (WEA B1) 21:04 (WEA B1)
21	08:32 16:48	07:37 17:49			06:31 18:42	57	06:54 (WEA B1) 18:05 (WEA B1)	06:17 20:39	19:45 (WEA B1) 20:08 (WEA B1)	05:20 21:31	20:45 (WEA B1) 20:53 (WEA B1)	04:58 22:02	20:45 (WEA B1) 21:04 (WEA B1)
22	08:30 16:50	07:34 17:51			06:29 18:44	62	06:54 (WEA B1) 18:07 (WEA B1)	06:15 20:41	19:44 (WEA B1) 20:09 (WEA B1)	05:18 21:33	20:44 (WEA B1) 20:55 (WEA B1)	04:58 22:02	20:45 (WEA B1) 21:04 (WEA B1)
23	08:29 16:52	07:32 17:53			06:26 18:46	67	06:54 (WEA B1) 18:10 (WEA B1)	06:13 20:43	19:43 (WEA B1) 20:10 (WEA B1)	05:17 21:34	20:43 (WEA B1) 20:56 (WEA B1)	04:59 22:02	20:45 (WEA B1) 21:04 (WEA B1)
24	08:28 16:54	07:30 17:55			06:24 18:48	70	06:53 (WEA B1) 18:10 (WEA B1)	06:10 20:45	19:42 (WEA B1) 20:10 (WEA B1)	05:16 21:36	20:42 (WEA B1) 20:57 (WEA B1)	04:59 22:02	20:46 (WEA B1) 21:05 (WEA B1)
25	08:26 16:56	07:28 17:57			06:21 18:50	73	06:53 (WEA B1) 18:12 (WEA B1)	06:08 20:46	19:41 (WEA B1) 20:11 (WEA B1)	05:14 21:37	20:42 (WEA B1) 20:58 (WEA B1)	04:59 22:03	20:46 (WEA B1) 21:05 (WEA B1)
26	08:25 16:58	07:26 17:59			06:19 18:51	75	06:52 (WEA B1) 18:12 (WEA B1)	06:06 20:48	19:40 (WEA B1) 20:11 (WEA B1)	05:13 21:39	20:41 (WEA B1) 20:58 (WEA B1)	05:00 22:02	20:46 (WEA B1) 21:05 (WEA B1)
27	08:24 17:00	07:23 18:01			06:16 18:53	76	06:52 (WEA B1) 18:13 (WEA B1)	06:04 20:50	19:40 (WEA B1) 20:11 (WEA B1)	05:12 21:40	20:40 (WEA B1) 20:59 (WEA B1)	05:00 22:02	20:46 (WEA B1) 21:05 (WEA B1)
28	08:22 17:01	07:21 18:03			06:14 18:55	77	06:52 (WEA B1) 18:13 (WEA B1)	06:02 20:52	19:40 (WEA B1) 20:11 (WEA B1)	05:11 21:42	20:40 (WEA B1) 20:59 (WEA B1)	05:01 22:02	20:47 (WEA B1) 21:06 (WEA B1)
29	08:20 17:03				07:11 19:57	75	07:53 (WEA B1) 19:13 (WEA B1)	06:00 20:54	19:40 (WEA B1) 20:11 (WEA B1)	05:10 21:43	20:40 (WEA B1) 20:59 (WEA B1)	05:01 22:02	20:46 (WEA B1) 21:06 (WEA B1)
30	08:19 17:05				07:09 19:59	77	07:52 (WEA B1) 19:13 (WEA B1)	05:58 20:55	19:39 (WEA B1) 20:11 (WEA B1)	05:08 21:44	20:41 (WEA B1) 21:01 (WEA B1)	05:02 22:02	20:47 (WEA B1) 21:06 (WEA B1)
31	08:17 17:07				07:07 20:01	75	07:53 (WEA B1) 19:13 (WEA B1)			05:07 21:46	20:40 (WEA B1) 21:01 (WEA B1)		
Sonnenscheinstunden		251	274		367			419		493		509	
astr.max.mögl.Beschattung			215		1232			939		461		590	

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO26 - Watpott 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli			August			September			Oktober			November			Dezember		
1	05:03	20:46 (WEA VB11)	05:42	19:59 (WEA VB12)	06:36	18:34 (WEA VB13)	07:29	07:55 (WEA ZB1)	07:26	08:21							
	22:02	20	21:06 (WEA VB11)	21:27	11	20:10 (WEA VB12)	20:21	19:03 (WEA VB13)	19:07	5	08:00 (WEA ZB1)	16:57	16:14				
2	05:03	20:47 (WEA VB11)	05:44	19:57 (WEA VB12)	06:38	18:33 (WEA VB13)	07:30					07:28	08:22				
	22:01	20	21:07 (WEA VB11)	21:25	15	20:12 (WEA VB12)	20:18	19:04 (WEA VB13)	19:05			16:55	16:13				
3	05:04	20:47 (WEA VB11)	05:45	19:56 (WEA VB12)	06:39	18:31 (WEA VB13)	07:32	08:33 (WEA ZB2)	07:30			07:30	08:24				
	22:01	20	21:07 (WEA VB11)	21:23	18	20:14 (WEA VB12)	20:16	19:04 (WEA VB13)	19:03	7	08:40 (WEA ZB2)	16:53	16:12				
4	05:05	20:47 (WEA VB11)	05:47	19:54 (WEA VB12)	06:41	18:30 (WEA VB13)	07:34	08:29 (WEA ZB2)	07:32			07:32	08:25				
	22:00	21	21:08 (WEA VB11)	21:21	21	20:15 (WEA VB12)	20:13	19:05 (WEA VB13)	19:00	15	08:44 (WEA ZB2)	16:52	16:11				
5	05:06	20:47 (WEA VB11)	05:49	19:53 (WEA VB12)	06:43	18:29 (WEA VB13)	07:36	08:26 (WEA ZB2)	07:34			07:34	08:27				
	22:00	20	21:07 (WEA VB11)	21:19	23	20:16 (WEA VB12)	20:11	19:06 (WEA VB13)	18:58	20	08:46 (WEA ZB2)	16:50	16:11				
6	05:07	20:47 (WEA VB11)	05:50	19:51 (WEA VB12)	06:45	08:01 (WEA ZB1)	07:38	08:25 (WEA ZB2)	07:36			07:36	08:28				
	21:59	20	21:07 (WEA VB11)	21:17	26	20:17 (WEA VB12)	20:09	19:06 (WEA VB13)	18:55	23	08:48 (WEA ZB2)	16:48	16:10				
7	05:08	20:47 (WEA VB11)	05:52	19:51 (WEA VB12)	06:46	07:55 (WEA ZB1)	07:39	08:23 (WEA ZB2)	07:38			07:38	08:29				
	21:58	21	21:08 (WEA VB11)	21:16	27	20:18 (WEA VB12)	20:06	19:06 (WEA VB13)	18:53	26	08:49 (WEA ZB2)	16:46	16:10				
8	05:09	20:47 (WEA VB11)	05:54	19:49 (WEA VB12)	06:48	07:53 (WEA ZB1)	07:41	08:22 (WEA ZB2)	07:40			07:40	08:31				
	21:58	21	21:08 (WEA VB11)	21:14	29	20:18 (WEA VB12)	20:04	19:06 (WEA VB13)	18:51	27	08:49 (WEA ZB2)	16:44	16:09				
9	05:10	20:47 (WEA VB11)	05:56	19:49 (WEA VB12)	06:50	07:50 (WEA ZB1)	07:43	08:21 (WEA ZB2)	07:42			07:42	08:32				
	21:57	21	21:08 (WEA VB11)	21:12	29	20:18 (WEA VB12)	20:01	19:05 (WEA VB13)	18:48	29	08:50 (WEA ZB2)	16:42	16:09				
10	05:11	20:48 (WEA VB11)	05:57	19:49 (WEA VB12)	06:52	07:48 (WEA ZB1)	07:45	08:20 (WEA ZB2)	07:44			07:44	08:33				
	21:56	20	21:08 (WEA VB11)	21:10	30	20:19 (WEA VB12)	19:59	19:06 (WEA VB13)	18:46	29	08:49 (WEA ZB2)	16:41	16:09				
11	05:12	20:48 (WEA VB11)	05:59	19:48 (WEA VB12)	06:53	07:47 (WEA ZB1)	07:47	08:19 (WEA ZB2)	07:45			07:45	08:34				
	21:55	20	21:08 (WEA VB11)	21:08	31	20:19 (WEA VB12)	19:57	19:05 (WEA VB13)	18:43	31	08:50 (WEA ZB2)	16:39	16:09				
12	05:13	20:48 (WEA VB11)	06:01	19:48 (WEA VB12)	06:55	07:46 (WEA ZB1)	07:48	08:19 (WEA ZB2)	07:47			07:47	08:35				
	21:54	20	21:08 (WEA VB11)	21:05	31	20:19 (WEA VB12)	19:54	19:05 (WEA VB13)	18:41	31	08:50 (WEA ZB2)	16:37	16:08				
13	05:14	20:48 (WEA VB11)	06:02	19:48 (WEA VB12)	06:57	07:44 (WEA ZB1)	07:50	08:18 (WEA ZB2)	07:49			07:49	08:36				
	21:53	20	21:08 (WEA VB11)	21:03	31	20:19 (WEA VB12)	19:52	19:04 (WEA VB13)	18:39	32	08:50 (WEA ZB2)	16:36	16:08				
14	05:15	20:49 (WEA VB11)	06:04	19:47 (WEA VB12)	06:59	07:43 (WEA ZB1)	07:52	08:19 (WEA ZB2)	07:51			07:51	08:37				
	21:52	20	21:09 (WEA VB11)	21:01	32	20:19 (WEA VB12)	19:49	19:04 (WEA VB13)	18:36	30	08:49 (WEA ZB2)	16:34	16:08				
15	05:17	20:49 (WEA VB11)	06:06	19:47 (WEA VB12)	07:00	07:42 (WEA ZB1)	07:54	08:21 (WEA ZB2)	07:53			07:53	08:38				
	21:51	20	21:09 (WEA VB11)	20:59	32	20:19 (WEA VB12)	19:47	19:03 (WEA VB13)	18:34	28	08:49 (WEA ZB2)	16:32	16:08				
16	05:18	20:50 (WEA VB11)	06:08	19:47 (WEA VB12)	07:02	07:41 (WEA ZB1)	07:56	08:23 (WEA ZB2)	07:55			07:55	08:39				
	21:50	18	21:08 (WEA VB11)	20:57	31	20:18 (WEA VB12)	19:44	19:01 (WEA VB13)	18:32	25	08:48 (WEA ZB3)	16:31	16:08				
17	05:19	20:50 (WEA VB11)	06:09	19:47 (WEA VB12)	07:04	07:41 (WEA ZB1)	07:58	08:25 (WEA ZB3)	07:57			07:57	08:40				
	21:49	18	21:08 (WEA VB11)	20:55	30	20:17 (WEA VB12)	19:42	19:00 (WEA VB13)	18:30	23	08:48 (WEA ZB3)	16:29	16:09				
18	05:21	20:50 (WEA VB11)	06:11	19:48 (WEA VB12)	07:06	07:40 (WEA ZB1)	08:00	08:27 (WEA ZB3)	07:59			07:59	08:41				
	21:48	17	21:07 (WEA VB11)	20:53	29	20:17 (WEA VB12)	19:39	18:59 (WEA VB13)	18:27	21	08:48 (WEA ZB3)	16:28	16:09				
19	05:22	20:52 (WEA VB11)	06:13	19:47 (WEA VB12)	07:07	07:40 (WEA ZB1)	08:01	08:29 (WEA ZB3)	08:00			08:00	08:42				
	21:47	15	21:07 (WEA VB11)	20:51	29	20:16 (WEA VB12)	19:37	18:58 (WEA VB13)	18:25	19	08:48 (WEA ZB3)	16:27	16:09				
20	05:23	20:52 (WEA VB11)	06:15	19:48 (WEA VB12)	07:09	07:39 (WEA ZB1)	08:03	08:31 (WEA ZB3)	08:02			08:02	08:42				
	21:45	14	21:06 (WEA VB11)	20:48	27	20:15 (WEA VB12)	19:34	18:56 (WEA VB13)	18:23	17	08:48 (WEA ZB3)	16:25	16:09				
21	05:25	20:53 (WEA VB11)	06:16	19:49 (WEA VB12)	07:11	07:39 (WEA ZB1)	08:05	08:33 (WEA ZB3)	08:04			08:04	08:43				
	21:44	12	21:05 (WEA VB11)	20:46	25	20:14 (WEA VB12)	19:32	18:54 (WEA VB13)	18:21	14	08:47 (WEA ZB3)	16:24	16:10				
22	05:26	20:55 (WEA VB11)	06:18	19:50 (WEA VB12)	07:13	07:40 (WEA ZB1)	08:07	08:35 (WEA ZB3)	08:06			08:06	08:43				
	21:43	9	21:04 (WEA VB11)	20:44	22	20:12 (WEA VB12)	19:29	18:51 (WEA VB13)	18:18	11	08:46 (WEA ZB3)	16:23	16:10				
23	05:28	20:57 (WEA VB11)	06:20	19:51 (WEA VB12)	07:14	07:41 (WEA ZB1)	08:09	08:37 (WEA ZB3)	08:08			08:08	08:44				
	21:41	5	21:02 (WEA VB11)	20:42	19	20:10 (WEA VB12)	19:27	18:48 (WEA VB13)	18:16	9	08:46 (WEA ZB3)	16:21	16:11				
24	05:29		06:22	19:54 (WEA VB12)	07:16	07:42 (WEA ZB1)	08:11	08:39 (WEA ZB3)	08:09			08:09	08:44				
	21:40		20:39	14	20:08 (WEA VB12)	19:25	33	08:15 (WEA ZB1)	18:14	5	08:44 (WEA ZB3)	16:20	16:11				
25	05:31		06:23	19:56 (WEA VB12)	07:18	07:44 (WEA ZB1)	07:13	07:41 (WEA ZB3)	08:11			08:11	08:45				
	21:38		20:37	8	20:04 (WEA VB12)	19:22	30	08:14 (WEA ZB1)	17:12	2	07:43 (WEA ZB3)	16:19	16:12				
26	05:32		06:25		07:20	07:46 (WEA ZB1)	07:15		08:13			08:13	08:45				
	21:37		20:35		19:20	08:13 (WEA ZB1)	17:10		16:18			16:18	16:13				
27	05:34		06:27		07:21	07:48 (WEA ZB1)	07:17		16:14			16:14	08:45				
	21:35		20:32		19:17	08:12 (WEA ZB1)	17:08		16:17			16:17	16:13				
28	05:36		06:29		07:23	07:49 (WEA ZB1)	07:19		16:16			16:16	08:45				
	21:33		20:30	6	18:53 (WEA VB13)	19:15	20	08:09 (WEA ZB1)	17:06			16:16	16:14				
29	05:37		06:31		18:42 (WEA VB13)	19:25		07:51 (WEA ZB1)	17:20			16:18	08:45				
	21:32		20:28	16	18:58 (WEA VB13)	19:12	16	08:07 (WEA ZB1)	17:03			16:15	16:15				
30	05:39		06:32		18:39 (WEA VB13)	19:27		07:53 (WEA ZB1)	17:22			16:19	08:46				
	21:30		20:25	22	19:01 (WEA VB13)	19:10	11	08:04 (WEA ZB1)	17:01			16:14	16:16				
31	05:40		06:34		18:36 (WEA VB13)				07:24				08:46				
	21:28		20:23	26	19:02 (WEA VB13)				16:59				16:17				
Sonnenscheinstunden		511		459		382			329			260	234				
astr.max.mögl.Beschattung		412		690		1533		479									

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

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

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO27 - Klein Depenhausen 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni	
1	08:45	08:16		07:19	07:43 (WEA ZB3)	07:04		05:55	06:47 (WEA ZB1)	05:06	20:32 (WEA VB12)
	16:18	17:09		18:05	8 07:51 (WEA ZB3)	20:02		20:57	76 20:14 (WEA VB13)	21:47	15 20:47 (WEA VB12)
2	08:45	08:14		07:16	07:41 (WEA ZB3)	07:02		05:53	06:47 (WEA ZB1)	05:06	20:33 (WEA VB12)
	16:20	17:11		18:06	11 07:52 (WEA ZB3)	20:04		20:59	75 20:14 (WEA VB13)	21:48	13 20:46 (WEA VB12)
3	08:45	08:12		07:14	07:38 (WEA ZB3)	06:59		05:51	06:48 (WEA ZB1)	05:05	20:34 (WEA VB12)
	16:21	17:13		18:08	15 07:53 (WEA ZB3)	20:06		21:01	74 20:14 (WEA VB13)	21:49	11 20:45 (WEA VB12)
4	08:45	08:10		07:12	07:36 (WEA ZB3)	06:57		05:49	06:15 (WEA VB1)	05:04	20:36 (WEA VB12)
	16:22	17:15		18:10	18 07:54 (WEA ZB3)	20:08		21:03	74 20:13 (WEA VB13)	21:50	9 20:45 (WEA VB12)
5	08:45	08:09		07:09	07:34 (WEA ZB3)	06:54		05:47	06:13 (WEA VB1)	05:03	20:37 (WEA VB12)
	16:23	17:17		18:12	20 07:54 (WEA ZB3)	20:10		21:04	76 20:13 (WEA VB13)	21:51	6 20:43 (WEA VB12)
6	08:44	08:07		07:07	07:31 (WEA ZB3)	06:52		05:45	06:12 (WEA VB1)	05:02	
	16:24	17:19		18:14	23 07:54 (WEA ZB3)	20:12		21:06	74 20:13 (WEA VB13)	21:52	
7	08:44	08:05		07:05	07:29 (WEA ZB3)	06:50		05:44	06:10 (WEA VB1)	05:02	21:16 (WEA VB11)
	16:26	17:21		18:16	25 07:54 (WEA ZB3)	20:13		21:08	72 20:12 (WEA VB13)	21:53	2 21:18 (WEA VB11)
8	08:43	08:03		07:02	07:26 (WEA ZB3)	06:47		05:42	06:08 (WEA VB1)	05:01	21:14 (WEA VB11)
	16:27	17:23		18:18	28 07:54 (WEA ZB3)	20:15	10 07:21 (WEA ZB1)	21:10	77 20:39 (WEA VB12)	21:54	5 21:19 (WEA VB11)
9	08:43	08:01		07:00	07:24 (WEA ZB3)	06:45		05:40	06:06 (WEA VB1)	05:01	21:14 (WEA VB11)
	16:29	17:25		18:20	30 07:54 (WEA ZB3)	20:17	16 07:25 (WEA ZB1)	21:12	78 20:40 (WEA VB12)	21:55	6 21:20 (WEA VB11)
10	08:42	07:59		06:58	07:21 (WEA ZB3)	06:43		05:38	06:05 (WEA VB1)	05:00	21:14 (WEA VB11)
	16:30	17:27		18:22	31 07:52 (WEA ZB3)	20:19	21 07:27 (WEA ZB1)	21:13	77 20:43 (WEA VB12)	21:56	7 21:21 (WEA VB11)
11	08:41	07:57		06:55	07:19 (WEA ZB3)	06:40		05:36	06:03 (WEA VB1)	05:00	21:13 (WEA VB11)
	16:32	17:29		18:24	33 07:52 (WEA ZB3)	20:21	25 07:29 (WEA ZB1)	21:15	77 20:44 (WEA VB12)	21:57	8 21:21 (WEA VB11)
12	08:41	07:55		06:53	07:17 (WEA ZB2)	06:38		05:34	06:03 (WEA VB1)	04:59	21:13 (WEA VB11)
	16:33	17:31		18:25	34 07:51 (WEA ZB3)	20:23	29 07:31 (WEA ZB1)	21:17	72 20:45 (WEA VB12)	21:58	9 21:22 (WEA VB11)
13	08:40	07:53		06:50	07:14 (WEA ZB2)	06:35		05:33	06:05 (WEA VB1)	04:59	21:13 (WEA VB11)
	16:35	17:33		18:27	36 07:50 (WEA ZB3)	20:24	32 07:31 (WEA ZB1)	21:18	64 20:47 (WEA VB12)	21:58	10 21:23 (WEA VB11)
14	08:39	07:51		06:48	07:12 (WEA ZB2)	06:33		05:31	06:06 (WEA VB1)	04:59	21:13 (WEA VB11)
	16:36	17:35		18:29	36 07:48 (WEA ZB3)	20:26	36 07:33 (WEA ZB1)	21:20	51 20:48 (WEA VB12)	21:59	11 21:24 (WEA VB11)
15	08:38	07:49		06:46	07:09 (WEA ZB2)	06:31		05:29	20:27 (WEA VB12)	04:58	21:14 (WEA VB11)
	16:38	17:37		18:31	37 07:46 (WEA ZB3)	20:28	39 07:34 (WEA ZB1)	21:22	23 20:50 (WEA VB12)	22:00	10 21:24 (WEA VB11)
16	08:37	07:47		06:43	07:07 (WEA ZB2)	06:28		05:27	20:26 (WEA VB12)	04:58	21:14 (WEA VB11)
	16:40	17:39		18:33	37 07:44 (WEA ZB3)	20:30	41 07:33 (WEA ZB1)	21:23	24 20:50 (WEA VB12)	22:00	11 21:25 (WEA VB11)
17	08:36	07:45		06:41	07:06 (WEA ZB2)	06:26		05:26	20:26 (WEA VB12)	04:58	21:13 (WEA VB11)
	16:41	17:41		18:35	38 07:44 (WEA ZB3)	20:32	44 07:34 (WEA ZB1)	21:25	25 20:51 (WEA VB12)	22:01	11 21:24 (WEA VB11)
18	08:35	07:43		06:38	07:06 (WEA ZB2)	06:24		05:24	20:26 (WEA VB12)	04:58	21:14 (WEA VB11)
	16:43	17:43		18:37	38 07:44 (WEA ZB3)	20:34	45 07:35 (WEA ZB1)	21:27	24 20:50 (WEA VB12)	22:01	12 21:26 (WEA VB11)
19	08:34	07:41		06:36	07:05 (WEA ZB2)	06:22		05:23	20:26 (WEA VB12)	04:58	21:14 (WEA VB11)
	16:45	17:45		18:39	38 07:43 (WEA ZB3)	20:35	46 07:35 (WEA ZB1)	21:28	25 20:51 (WEA VB12)	22:01	12 21:26 (WEA VB11)
20	08:33	07:39		06:33	07:05 (WEA ZB2)	06:19		05:21	20:26 (WEA VB12)	04:58	21:14 (WEA VB11)
	16:47	17:47		18:40	38 07:43 (WEA ZB3)	20:37	59 20:07 (WEA VB13)	21:30	25 20:51 (WEA VB12)	22:02	12 21:26 (WEA VB11)
21	08:32	07:37		06:31	07:05 (WEA ZB2)	06:17		05:20	20:26 (WEA VB12)	04:58	21:14 (WEA VB11)
	16:48	17:49		18:42	37 07:42 (WEA ZB3)	20:39	65 20:08 (WEA VB13)	21:31	24 20:50 (WEA VB12)	22:02	12 21:26 (WEA VB11)
22	08:30	07:34		06:28	07:05 (WEA ZB2)	06:15		05:18	20:26 (WEA VB12)	04:58	21:14 (WEA VB11)
	16:50	17:51		18:44	37 07:42 (WEA ZB3)	20:41	69 20:10 (WEA VB13)	21:33	24 20:50 (WEA VB12)	22:02	12 21:26 (WEA VB11)
23	08:29	07:32		06:26	07:06 (WEA ZB2)	06:13		05:17	20:27 (WEA VB12)	04:59	21:14 (WEA VB11)
	16:52	17:53		18:46	36 07:42 (WEA ZB3)	20:43	72 20:12 (WEA VB13)	21:34	23 20:50 (WEA VB12)	22:02	12 21:26 (WEA VB11)
24	08:28	07:30		06:24	07:06 (WEA ZB2)	06:10		05:16	20:27 (WEA VB12)	04:59	21:15 (WEA VB11)
	16:54	17:55		18:48	34 07:40 (WEA ZB3)	20:45	74 20:13 (WEA VB13)	21:36	23 20:50 (WEA VB12)	22:02	12 21:27 (WEA VB11)
25	08:26	07:28		06:21	07:07 (WEA ZB2)	06:08		05:14	20:28 (WEA VB12)	04:59	21:15 (WEA VB11)
	16:56	17:57		18:50	32 07:39 (WEA ZB3)	20:46	76 20:13 (WEA VB13)	21:37	22 20:50 (WEA VB12)	22:02	12 21:27 (WEA VB11)
26	08:25	07:26		06:19	07:07 (WEA ZB2)	06:06		05:13	20:28 (WEA VB12)	05:00	21:16 (WEA VB11)
	16:58	17:59		18:51	30 07:37 (WEA ZB3)	20:48	78 20:14 (WEA VB13)	21:39	21 20:49 (WEA VB12)	22:02	11 21:27 (WEA VB11)
27	08:24	07:23		06:16	07:08 (WEA ZB2)	06:04		05:12	20:28 (WEA VB12)	05:00	21:16 (WEA VB11)
	17:00	18:01		18:53	28 07:36 (WEA ZB3)	20:50	78 20:14 (WEA VB13)	21:40	21 20:49 (WEA VB12)	22:02	11 21:27 (WEA VB11)
28	08:22	07:21	07:45 (WEA ZB3)	06:14	07:09 (WEA ZB2)	06:02		05:11	20:29 (WEA VB12)	05:01	21:16 (WEA VB11)
	17:01	18:03	3 07:48 (WEA ZB3)	18:55	24 07:33 (WEA ZB3)	20:52	79 20:15 (WEA VB13)	21:42	20 20:49 (WEA VB12)	22:02	11 21:27 (WEA VB11)
29	08:20			07:11	08:11 (WEA ZB2)	06:00		05:10	20:29 (WEA VB12)	05:01	21:16 (WEA VB11)
	17:03			19:57	20 08:31 (WEA ZB2)	20:54	78 20:15 (WEA VB13)	21:43	19 20:48 (WEA VB12)	22:02	10 21:26 (WEA VB11)
30	08:19			07:09	08:14 (WEA ZB2)	05:58		05:08	20:31 (WEA VB12)	05:02	21:17 (WEA VB11)
	17:05			19:59	13 08:27 (WEA ZB2)	20:55	78 20:15 (WEA VB13)	21:44	18 20:49 (WEA VB12)	22:02	9 21:26 (WEA VB11)
31	08:17			07:07				05:07	20:32 (WEA VB12)		
	17:07			20:01				21:46	16 20:48 (WEA VB12)		
Sonnenscheinstunden		251	274			419		493		509	
astr.max.mögl.Beschattung			3		865	1190		1394		292	

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO27 - Klein Depenhausen 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember
1	05:03	21:17 (WEA VB11)	05:42	06:13 (WEA VB1)	06:36	07:03 (WEA ZB1)	07:29	07:55 (WEA ZB2)	07:26	08:21
	22:01	9 21:26 (WEA VB11)	21:27	73 20:55 (WEA VB12)	20:21	25 07:28 (WEA ZB1)	19:07	35 08:30 (WEA ZB3)	16:57	16:14
2	05:03	21:18 (WEA VB11)	05:44	06:14 (WEA VB1)	06:38	07:05 (WEA ZB1)	07:30	07:57 (WEA ZB2)	07:28	08:22
	22:01	8 21:26 (WEA VB11)	21:25	77 20:54 (WEA VB12)	20:18	21 07:26 (WEA ZB1)	19:05	34 08:31 (WEA ZB3)	16:55	16:13
3	05:04	21:19 (WEA VB11)	05:45	06:16 (WEA VB1)	06:39	07:06 (WEA ZB1)	07:32	07:58 (WEA ZB2)	07:30	08:24
	22:01	6 21:25 (WEA VB11)	21:23	77 20:52 (WEA VB12)	20:16	16 07:22 (WEA ZB1)	19:03	32 08:30 (WEA ZB3)	16:53	16:12
4	05:05	21:20 (WEA VB11)	05:47	06:17 (WEA VB1)	06:41	07:08 (WEA ZB1)	07:34	08:00 (WEA ZB2)	07:32	08:25
	22:00	5 21:25 (WEA VB11)	21:21	78 20:50 (WEA VB12)	20:13	10 07:18 (WEA ZB1)	19:00	30 08:30 (WEA ZB3)	16:52	16:11
5	05:06	21:20 (WEA VB11)	05:49	06:19 (WEA VB1)	06:43		07:36	08:02 (WEA ZB3)	07:34	08:27
	22:00	4 21:24 (WEA VB11)	21:19	77 20:49 (WEA VB12)	20:11		18:58	28 08:30 (WEA ZB3)	16:50	16:11
6	05:07		05:50	06:20 (WEA VB1)	06:45		07:38	08:04 (WEA ZB3)	07:36	08:28
	21:59		21:17	74 20:22 (WEA VB13)	20:09		18:55	26 08:30 (WEA ZB3)	16:48	16:10
7	05:08	20:44 (WEA VB12)	05:52	06:22 (WEA VB1)	06:46		07:39	08:06 (WEA ZB3)	07:38	08:29
	21:58	5 20:49 (WEA VB12)	21:16	75 20:23 (WEA VB13)	20:06		18:53	24 08:30 (WEA ZB3)	16:46	16:10
8	05:09	20:43 (WEA VB12)	05:54	06:23 (WEA VB1)	06:48		07:41	08:08 (WEA ZB3)	07:40	08:31
	21:58	8 20:51 (WEA VB12)	21:14	74 20:22 (WEA VB13)	20:04		18:51	22 08:30 (WEA ZB3)	16:44	16:09
9	05:10	20:42 (WEA VB12)	05:56	06:25 (WEA VB1)	06:50		07:43	08:10 (WEA ZB3)	07:42	08:32
	21:57	10 20:52 (WEA VB12)	21:12	74 20:23 (WEA VB13)	20:01		18:48	19 08:29 (WEA ZB3)	16:42	16:09
10	05:11	20:41 (WEA VB12)	05:57	06:57 (WEA ZB1)	06:52		07:45	08:11 (WEA ZB3)	07:44	08:33
	21:56	12 20:53 (WEA VB12)	21:10	74 20:23 (WEA VB13)	19:59		18:46	16 08:27 (WEA ZB3)	16:41	16:09
11	05:12	20:40 (WEA VB12)	05:59	06:56 (WEA ZB1)	06:53		07:47	08:13 (WEA ZB3)	07:45	08:34
	21:55	14 20:54 (WEA VB12)	21:08	76 20:23 (WEA VB13)	19:56		18:43	13 08:26 (WEA ZB3)	16:39	16:09
12	05:13	20:39 (WEA VB12)	06:01	06:55 (WEA ZB1)	06:55		07:48	08:15 (WEA ZB3)	07:47	08:35
	21:54	16 20:55 (WEA VB12)	21:05	78 20:23 (WEA VB13)	19:54		18:41	10 08:25 (WEA ZB3)	16:37	16:08
13	05:14	20:39 (WEA VB12)	06:02	06:55 (WEA ZB1)	06:57	08:05 (WEA ZB2)	07:50	08:17 (WEA ZB3)	07:49	08:36
	21:53	17 20:56 (WEA VB12)	21:03	78 20:23 (WEA VB13)	19:52	13 08:18 (WEA ZB2)	18:39	6 08:23 (WEA ZB3)	16:36	16:08
14	05:15	20:39 (WEA VB12)	06:04	06:54 (WEA ZB1)	06:59	08:02 (WEA ZB2)	07:52	08:19 (WEA ZB3)	07:51	08:37
	21:52	18 20:57 (WEA VB12)	21:01	78 20:22 (WEA VB13)	19:49	19 08:21 (WEA ZB2)	18:36	2 08:21 (WEA ZB3)	16:34	16:08
15	05:17	20:38 (WEA VB12)	06:06	06:54 (WEA ZB1)	07:00	08:00 (WEA ZB2)	07:54		07:53	08:38
	21:51	20 20:58 (WEA VB12)	20:59	79 20:22 (WEA VB13)	19:47	23 08:23 (WEA ZB2)	18:34		16:32	16:08
16	05:18	20:38 (WEA VB12)	06:08	06:53 (WEA ZB1)	07:02		07:57 (WEA ZB2)		07:55	08:39
	21:50	20 20:58 (WEA VB12)	20:57	78 20:21 (WEA VB13)	19:44	27 08:24 (WEA ZB2)	18:32		16:31	16:08
17	05:19	20:37 (WEA VB12)	06:09	06:53 (WEA ZB1)	07:04		07:56 (WEA ZB2)		07:57	08:40
	21:49	22 20:59 (WEA VB12)	20:55	76 20:20 (WEA VB13)	19:42	29 08:25 (WEA ZB2)	18:30		16:29	16:09
18	05:21	20:37 (WEA VB12)	06:11	06:53 (WEA ZB1)	07:06		07:54 (WEA ZB2)		07:59	08:41
	21:48	22 20:59 (WEA VB12)	20:53	76 20:20 (WEA VB13)	19:39	33 08:27 (WEA ZB2)	18:27		16:28	16:09
19	05:22	20:37 (WEA VB12)	06:13	06:52 (WEA ZB1)	07:07		07:53 (WEA ZB2)		08:00	08:41
	21:47	23 21:00 (WEA VB12)	20:51	74 20:18 (WEA VB13)	19:37	34 08:27 (WEA ZB2)	18:25		16:27	16:09
20	05:23	20:37 (WEA VB12)	06:15	06:52 (WEA ZB1)	07:09		07:52 (WEA ZB2)		08:02	08:42
	21:45	23 21:00 (WEA VB12)	20:48	72 20:17 (WEA VB13)	19:34	35 08:27 (WEA ZB2)	18:23		16:25	16:09
21	05:25	20:36 (WEA VB12)	06:16	06:53 (WEA ZB1)	07:11		07:51 (WEA ZB2)		08:04	08:43
	21:44	24 21:00 (WEA VB12)	20:46	69 20:16 (WEA VB13)	19:32	37 08:28 (WEA ZB2)	18:21		16:24	16:10
22	05:26	20:37 (WEA VB12)	06:18	06:52 (WEA ZB1)	07:13		07:50 (WEA ZB2)		08:06	08:43
	21:43	24 21:01 (WEA VB12)	20:44	65 20:13 (WEA VB13)	19:29	38 08:28 (WEA ZB2)	18:18		16:23	16:10
23	05:28	20:36 (WEA VB12)	06:20	06:52 (WEA ZB1)	07:14		07:50 (WEA ZB2)		08:08	08:44
	21:41	25 21:01 (WEA VB12)	20:42	58 20:10 (WEA VB13)	19:27	38 08:28 (WEA ZB2)	18:16		16:21	16:11
24	05:29	20:37 (WEA VB12)	06:22	06:53 (WEA ZB1)	07:16		07:49 (WEA ZB2)		08:09	08:44
	21:40	24 21:01 (WEA VB12)	20:39	46 07:39 (WEA ZB1)	19:25	38 08:27 (WEA ZB2)	18:14		16:20	16:11
25	05:31	20:36 (WEA VB12)	06:23	06:53 (WEA ZB1)	07:18		07:49 (WEA ZB2)		08:11	08:45
	21:38	25 21:01 (WEA VB12)	20:37	45 07:38 (WEA ZB1)	19:22	38 08:27 (WEA ZB2)	17:12		16:19	16:12
26	05:32	20:36 (WEA VB12)	06:25	06:53 (WEA ZB1)	07:20		07:49 (WEA ZB2)		08:13	08:45
	21:37	24 21:00 (WEA VB12)	20:35	44 07:37 (WEA ZB1)	19:20	38 08:27 (WEA ZB2)	17:10		16:18	16:13
27	05:34	20:37 (WEA VB12)	06:27	06:55 (WEA ZB1)	07:21		07:49 (WEA ZB2)		08:14	08:45
	21:35	24 21:01 (WEA VB12)	20:32	41 07:36 (WEA ZB1)	19:17	37 08:26 (WEA ZB2)	17:08		16:17	16:13
28	05:36	20:37 (WEA VB12)	06:29	06:56 (WEA ZB1)	07:23		07:49 (WEA ZB2)		08:16	08:45
	21:33	23 21:00 (WEA VB12)	20:30	38 07:34 (WEA ZB1)	19:15	36 08:25 (WEA ZB3)	17:05		16:16	16:14
29	05:37	06:18 (WEA VB1)	06:31	06:58 (WEA ZB1)	07:25		07:51 (WEA ZB2)		08:18	08:45
	21:32	42 21:00 (WEA VB12)	20:28	35 07:33 (WEA ZB1)	19:12	37 08:28 (WEA ZB3)	17:03		16:15	16:15
30	05:39	06:15 (WEA VB1)	06:32	07:00 (WEA ZB1)	07:27		07:53 (WEA ZB2)		08:19	08:46
	21:30	58 20:58 (WEA VB12)	20:25	32 07:32 (WEA ZB1)	19:10	36 08:29 (WEA ZB3)	17:01		16:14	16:16
31	05:40	06:15 (WEA VB1)	06:34	07:01 (WEA ZB1)			07:24			08:46
	21:28	67 20:57 (WEA VB12)	20:23	29 07:30 (WEA ZB1)			16:59			16:17
Sonnenscheinstunden		511	459		382		329		260	234
astr.max.mögl.Beschattung		622	2020		658		297			

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO28 - Klein Westerhausen 1 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März		April		Mai		Juni	
1	08:45 16:18	08:16 17:09	07:19 18:04		07:43 (WEA ZB3) 07:45 (WEA ZB3)	07:04 20:02	07:41 (WEA ZB2) 08:47 (WEA ZB2)	05:55 20:57	07:51 (WEA ZB2) 20:14 (WEA VB13)	05:06 21:47
2	08:45 16:20	08:14 17:11	07:16 18:06		07:41 (WEA ZB3) 07:51 (WEA ZB3)	07:02 20:04	07:40 (WEA ZB2) 08:47 (WEA ZB2)	05:53 20:59	07:54 (WEA ZB2) 20:29 (WEA VB12)	05:06 21:48
3	08:45 16:21	08:12 17:13	07:14 18:08		07:38 (WEA ZB3) 07:54 (WEA ZB3)	06:59 20:06	07:39 (WEA ZB2) 08:47 (WEA ZB2)	05:51 21:01	07:58 (WEA ZB2) 20:31 (WEA VB12)	05:05 21:49
4	08:45 16:22	08:10 17:15	07:12 18:10		07:36 (WEA ZB3) 07:56 (WEA ZB3)	06:57 20:08	07:38 (WEA ZB2) 08:47 (WEA ZB2)	05:49 21:03	20:25 (WEA VB12) 20:32 (WEA VB12)	05:04 21:50
5	08:45 16:23	08:09 17:17	07:09 18:12		07:34 (WEA ZB3) 07:58 (WEA ZB3)	06:54 20:10	07:38 (WEA ZB2) 08:47 (WEA ZB2)	05:47 21:04	20:25 (WEA VB12) 20:34 (WEA VB12)	05:03 21:51
6	08:44 16:24	08:07 17:19	07:07 18:14		07:31 (WEA ZB3) 07:58 (WEA ZB3)	06:52 20:12	07:38 (WEA ZB2) 08:47 (WEA ZB2)	05:45 21:06	20:25 (WEA VB12) 20:36 (WEA VB12)	05:02 21:52
7	08:44 16:26	08:05 17:21	07:05 18:16		07:29 (WEA ZB3) 08:00 (WEA ZB3)	06:50 20:13	07:37 (WEA ZB2) 08:46 (WEA ZB2)	05:43 21:08	20:25 (WEA VB12) 20:38 (WEA VB12)	05:02 21:53
8	08:43 16:27	08:03 17:23	07:02 18:18		07:26 (WEA ZB3) 08:00 (WEA ZB3)	06:47 20:15	07:37 (WEA ZB2) 08:46 (WEA ZB2)	05:42 21:10	20:24 (WEA VB12) 20:39 (WEA VB12)	05:01 21:54
9	08:43 16:29	08:01 17:25	07:00 18:20		07:24 (WEA ZB3) 08:01 (WEA ZB3)	06:45 20:17	07:37 (WEA ZB2) 08:46 (WEA ZB2)	05:40 21:11	20:24 (WEA VB12) 20:40 (WEA VB12)	05:01 21:55
10	08:42 16:30	07:59 17:27	06:58 18:22		07:21 (WEA ZB3) 08:01 (WEA ZB3)	06:42 20:19	07:36 (WEA ZB2) 08:45 (WEA ZB2)	05:38 21:13	20:25 (WEA VB12) 20:41 (WEA VB12)	05:00 21:56
11	08:41 16:32	07:57 17:29	06:55 18:24		07:21 (WEA ZB3) 08:01 (WEA ZB3)	06:40 20:21	07:36 (WEA ZB2) 08:45 (WEA ZB2)	05:36 21:15	20:25 (WEA VB12) 20:40 (WEA VB12)	05:00 21:57
12	08:41 16:33	07:55 17:31	06:53 18:25		07:20 (WEA ZB3) 08:02 (WEA ZB3)	06:38 20:23	07:36 (WEA ZB2) 08:45 (WEA ZB2)	05:34 21:17	20:26 (WEA VB12) 20:39 (WEA VB12)	04:59 21:58
13	08:40 16:35	07:53 17:33	06:50 18:27		07:19 (WEA ZB3) 08:01 (WEA ZB3)	06:35 20:24	07:35 (WEA ZB2) 08:43 (WEA ZB2)	05:33 21:18	20:27 (WEA VB12) 20:38 (WEA VB12)	04:59 21:58
14	08:39 16:36	07:51 17:35	06:48 18:29		07:19 (WEA ZB3) 08:02 (WEA ZB3)	06:33 20:26	07:36 (WEA ZB2) 08:43 (WEA ZB2)	05:31 21:20	20:28 (WEA VB12) 20:36 (WEA VB12)	04:59 21:59
15	08:38 16:38	07:49 17:37	06:45 18:31		07:19 (WEA ZB3) 08:01 (WEA ZB3)	06:31 20:28	07:36 (WEA ZB2) 08:42 (WEA ZB2)	05:29 21:22	20:32 (WEA VB12) 20:34 (WEA VB12)	04:58 22:00
16	08:37 16:40	07:47 17:39	06:43 18:33		07:19 (WEA ZB3) 08:01 (WEA ZB3)	06:28 20:30	07:36 (WEA ZB2) 08:41 (WEA ZB2)	05:27 21:23		04:58
17	08:36 16:41	07:45 17:41	06:41 18:35		07:18 (WEA ZB3) 08:00 (WEA ZB3)	06:26 20:32	07:36 (WEA ZB2) 08:40 (WEA ZB2)	05:26 21:25		04:58
18	08:35 16:43	07:43 17:43	06:38 18:37		07:08 (WEA ZB2) 07:59 (WEA ZB3)	06:24 20:34	07:37 (WEA ZB2) 08:39 (WEA ZB2)	05:24 21:27		04:58
19	08:34 16:45	07:41 17:45	06:36 18:38		07:03 (WEA ZB2) 07:58 (WEA ZB3)	06:22 20:35	07:37 (WEA ZB2) 20:07 (WEA VB13)	05:23 21:28		04:58
20	08:33 16:47	07:39 17:47	06:33 18:40		07:00 (WEA ZB2) 07:57 (WEA ZB3)	06:19 20:37	07:38 (WEA ZB2) 20:09 (WEA VB13)	05:21 21:30		04:58
21	08:32 16:48	07:37 17:49	06:31 18:42		06:57 (WEA ZB2) 07:56 (WEA ZB3)	06:17 20:39	07:38 (WEA ZB2) 20:10 (WEA VB13)	05:20 21:31		04:58
22	08:30 16:50	07:34 17:51	06:28 18:44		06:55 (WEA ZB2) 07:55 (WEA ZB3)	06:15 20:41	07:38 (WEA ZB2) 20:12 (WEA VB13)	05:18 21:33		04:58
23	08:29 16:52	07:32 17:53	06:26 18:46		06:53 (WEA ZB2) 07:54 (WEA ZB3)	06:13 20:43	07:39 (WEA ZB2) 20:14 (WEA VB13)	05:17 21:34		04:59
24	08:28 16:54	07:30 17:55	06:24 18:48		06:51 (WEA ZB2) 07:51 (WEA ZB3)	06:10 20:45	07:40 (WEA ZB2) 20:16 (WEA VB13)	05:16 21:36		04:59
25	08:26 16:56	07:28 17:57	06:21 18:50		06:50 (WEA ZB2) 07:49 (WEA ZB3)	06:08 20:46	07:41 (WEA ZB2) 20:17 (WEA VB13)	05:14 21:37		04:59
26	08:25 16:58	07:25 17:59	06:19 18:51		06:47 (WEA ZB2) 07:46 (WEA ZB3)	06:06 20:48	07:42 (WEA ZB2) 20:18 (WEA VB13)	05:13 21:39		05:00
27	08:23 17:00	07:23 18:01	06:16 18:53		06:47 (WEA ZB2) 07:45 (WEA ZB2)	06:04 20:50	07:44 (WEA ZB2) 20:18 (WEA VB13)	05:12 21:40		05:00
28	08:22 17:01	07:21 18:03	06:14 18:55		06:45 (WEA ZB2) 07:45 (WEA ZB2)	06:02 20:52	07:45 (WEA ZB2) 20:17 (WEA VB13)	05:11 21:42		05:01
29	08:20 17:03		07:11 19:57		07:44 (WEA ZB2) 08:46 (WEA ZB2)	06:00 20:54	07:47 (WEA ZB2) 20:16 (WEA VB13)	05:10 21:43		05:01
30	08:19 17:05		07:09 19:59		07:42 (WEA ZB2) 08:46 (WEA ZB2)	05:57 20:55	07:48 (WEA ZB2) 20:15 (WEA VB13)	05:08 21:44		05:02
31	08:17 17:07		07:07 20:01		07:42 (WEA ZB2) 08:47 (WEA ZB2)			05:07 21:45		
Sonnenscheinstunden	251	274	367		419			493		509
astr.max.mögl.Beschattung			1364		1977			228		172

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO28 - Klein Westerhausen 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember
1	05:03	05:35 (WEA VB1)	05:42	20:36 (WEA VB12)	06:36	07:35 (WEA ZB2)	07:29	07:59 (WEA ZB3)	07:26	08:21
	22:01	6 05:41 (WEA VB1)	21:27	13 20:49 (WEA VB12)	20:21	69 08:44 (WEA ZB2)	19:07	42 08:41 (WEA ZB3)	16:57	16:13
2	05:03	05:36 (WEA VB1)	05:44	20:36 (WEA VB12)	06:38	07:35 (WEA ZB2)	07:30	07:59 (WEA ZB3)	07:28	08:22
	22:01	5 05:41 (WEA VB1)	21:25	15 20:51 (WEA VB12)	20:18	69 08:44 (WEA ZB2)	19:05	41 08:40 (WEA ZB3)	16:55	16:13
3	05:04	05:37 (WEA VB1)	05:45	20:34 (WEA VB12)	06:39	07:34 (WEA ZB2)	07:32	07:59 (WEA ZB3)	07:30	08:24
	22:01	4 05:41 (WEA VB1)	21:23	16 20:50 (WEA VB12)	20:16	69 08:43 (WEA ZB2)	19:03	40 08:39 (WEA ZB3)	16:53	16:12
4	05:05	05:38 (WEA VB1)	05:47	20:35 (WEA VB12)	06:41	07:34 (WEA ZB2)	07:34	08:00 (WEA ZB3)	07:32	08:25
	22:00	3 05:41 (WEA VB1)	21:21	15 20:50 (WEA VB12)	20:13	69 08:43 (WEA ZB2)	19:00	38 08:38 (WEA ZB3)	16:52	16:11
5	05:06	05:38 (WEA VB1)	05:49	20:35 (WEA VB12)	06:43	07:34 (WEA ZB2)	07:36	08:02 (WEA ZB3)	07:34	08:27
	22:00	2 05:40 (WEA VB1)	21:19	14 20:49 (WEA VB12)	20:11	69 08:43 (WEA ZB2)	18:58	35 08:37 (WEA ZB3)	16:50	16:11
6	05:07	05:39 (WEA VB1)	05:50	20:34 (WEA VB12)	06:45	07:33 (WEA ZB2)	07:38	08:04 (WEA ZB3)	07:36	08:28
	21:59	1 05:40 (WEA VB1)	21:17	12 20:46 (WEA VB12)	20:09	69 08:42 (WEA ZB2)	18:55	32 08:36 (WEA ZB3)	16:48	16:10
7	05:08		05:52	20:35 (WEA VB12)	06:46	07:33 (WEA ZB2)	07:39	08:06 (WEA ZB3)	07:38	08:29
	21:58		21:15	10 20:45 (WEA VB12)	20:06	69 08:42 (WEA ZB2)	18:53	29 08:35 (WEA ZB3)	16:46	16:10
8	05:09		05:54	20:34 (WEA VB12)	06:48	07:33 (WEA ZB2)	07:41	08:08 (WEA ZB3)	07:40	08:31
	21:58		21:14	9 20:43 (WEA VB12)	20:04	69 08:42 (WEA ZB2)	18:51	26 08:34 (WEA ZB3)	16:44	16:09
9	05:10		05:56	20:35 (WEA VB12)	06:50	07:33 (WEA ZB2)	07:43	08:10 (WEA ZB3)	07:42	08:32
	21:57		21:12	6 20:41 (WEA VB12)	20:01	67 08:40 (WEA ZB2)	18:48	22 08:32 (WEA ZB3)	16:42	16:09
10	05:11		05:57	08:06 (WEA ZB2)	06:52	07:33 (WEA ZB2)	07:45	08:11 (WEA ZB3)	07:44	08:33
	21:56		21:10	25 20:40 (WEA VB12)	19:59	67 08:40 (WEA ZB2)	18:46	18 08:29 (WEA ZB3)	16:41	16:09
11	05:12		05:59	08:01 (WEA ZB2)	06:53	07:33 (WEA ZB2)	07:47	08:13 (WEA ZB3)	07:45	08:34
	21:55		21:08	34 20:21 (WEA VB13)	19:56	67 08:40 (WEA ZB2)	18:43	13 08:26 (WEA ZB3)	16:39	16:09
12	05:13		06:01	07:58 (WEA ZB2)	06:55	07:34 (WEA ZB2)	07:48	08:15 (WEA ZB3)	07:47	08:35
	21:54		21:05	43 20:23 (WEA VB13)	19:54	65 08:39 (WEA ZB2)	18:41	8 08:23 (WEA ZB3)	16:37	16:08
13	05:14		06:02	07:55 (WEA ZB2)	06:57	07:33 (WEA ZB2)	07:50		07:49	08:36
	21:53		21:03	50 20:23 (WEA VB13)	19:52	64 08:37 (WEA ZB2)	18:39		16:36	16:08
14	05:15		06:04	07:54 (WEA ZB2)	06:59	07:34 (WEA ZB2)	07:52		07:51	08:37
	21:52		21:01	55 20:24 (WEA VB13)	19:49	62 08:36 (WEA ZB2)	18:36		16:34	16:08
15	05:17		06:06	07:52 (WEA ZB2)	07:00	07:35 (WEA ZB2)	07:54		07:53	08:38
	21:51		20:59	60 20:25 (WEA VB13)	19:47	60 08:35 (WEA ZB2)	18:34		16:32	16:08
16	05:18		06:08	07:50 (WEA ZB2)	07:02	07:35 (WEA ZB2)	07:56		07:55	08:39
	21:50		20:57	63 20:24 (WEA VB13)	19:44	58 08:33 (WEA ZB2)	18:32		16:31	16:08
17	05:19		06:09	07:49 (WEA ZB2)	07:04	07:36 (WEA ZB2)	07:58		07:57	08:40
	21:49		20:55	67 20:25 (WEA VB13)	19:42	58 08:34 (WEA ZB3)	18:30		16:29	16:08
18	05:21		06:11	07:48 (WEA ZB2)	07:06	07:37 (WEA ZB2)	08:00		07:59	08:41
	21:48		20:53	68 20:24 (WEA VB13)	19:39	59 08:36 (WEA ZB3)	18:27		16:28	16:09
19	05:22		06:13	07:46 (WEA ZB2)	07:07	07:38 (WEA ZB2)	08:01		08:00	08:41
	21:47		20:50	69 20:21 (WEA VB13)	19:37	60 08:38 (WEA ZB3)	18:25		16:27	16:09
20	05:23		06:15	07:45 (WEA ZB2)	07:09	07:38 (WEA ZB2)	08:03		08:02	08:42
	21:45		20:48	68 20:19 (WEA VB13)	19:34	61 08:39 (WEA ZB3)	18:23		16:25	16:09
21	05:25		06:16	07:44 (WEA ZB2)	07:11	07:40 (WEA ZB2)	08:05		08:04	08:43
	21:44		20:46	68 20:17 (WEA VB13)	19:32	60 08:40 (WEA ZB3)	18:21		16:24	16:10
22	05:26		06:18	07:42 (WEA ZB2)	07:13	07:42 (WEA ZB2)	08:07		08:06	08:43
	21:43		20:44	68 20:15 (WEA VB13)	19:29	59 08:41 (WEA ZB3)	18:18		16:23	16:10
23	05:28		06:20	07:41 (WEA ZB2)	07:14	07:43 (WEA ZB2)	08:09		08:08	08:44
	21:41		20:42	67 20:13 (WEA VB13)	19:27	58 08:41 (WEA ZB3)	18:16		16:21	16:11
24	05:29		06:22	07:41 (WEA ZB2)	07:16	07:46 (WEA ZB2)	08:11		08:09	08:44
	21:40		20:39	64 20:11 (WEA VB13)	19:25	55 08:41 (WEA ZB3)	18:14		16:20	16:11
25	05:31		06:23	07:39 (WEA ZB2)	07:18	07:49 (WEA ZB2)	07:13		08:11	08:45
	21:38		20:37	63 08:42 (WEA ZB2)	19:22	53 08:42 (WEA ZB3)	17:12		16:19	16:12
26	05:32		06:25	07:39 (WEA ZB2)	07:20	07:55 (WEA ZB2)	07:15		08:13	08:45
	21:37		20:35	64 08:43 (WEA ZB2)	19:20	47 08:42 (WEA ZB3)	17:10		16:18	16:13
27	05:34		06:27	07:38 (WEA ZB2)	07:21	08:01 (WEA ZB3)	07:17		08:14	08:45
	21:35		20:32	66 08:44 (WEA ZB2)	19:17	41 08:42 (WEA ZB3)	17:08		16:17	16:13
28	05:36		06:29	07:37 (WEA ZB2)	07:23	07:59 (WEA ZB3)	07:19		08:16	08:45
	21:33		20:30	66 08:43 (WEA ZB2)	19:15	42 08:41 (WEA ZB3)	17:05		16:16	16:14
29	05:37	20:41 (WEA VB12)	06:30	07:37 (WEA ZB2)	07:25	07:59 (WEA ZB3)	07:20		08:18	08:45
	21:32	5 20:46 (WEA VB12)	20:28	67 08:44 (WEA ZB2)	19:12	42 08:41 (WEA ZB3)	17:03		16:15	16:15
30	05:39	20:38 (WEA VB12)	06:32	07:36 (WEA ZB2)	07:27	07:59 (WEA ZB3)	07:22		08:19	08:46
	21:30	10 20:48 (WEA VB12)	20:25	68 08:44 (WEA ZB2)	19:10	42 08:41 (WEA ZB3)	17:01		16:14	16:16
31	05:40	20:37 (WEA VB12)	06:34	07:35 (WEA ZB2)			07:24			08:45
	21:28	12 20:49 (WEA VB12)	20:23	69 08:44 (WEA ZB2)			16:59			16:17
Sonnenscheinstunden	511		459		382		329		260	234
astr.max.mögl.Beschattung	48		1442		1799		344			

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO29 - Depenhausen 1

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni	
1	08:45	09:19 (WEA VB14)	08:16	07:19	07:04			05:55	06:48 (WEA ZB3)	05:06	05:46 (WEA ZB2)
	16:18	3 09:22 (WEA VB14)	17:09	18:05	20:02			20:57	22 07:10 (WEA ZB3)	21:47	46 06:32 (WEA ZB2)
2	08:45	09:19 (WEA VB14)	08:14	07:16	07:02			05:53	06:50 (WEA ZB3)	05:06	05:46 (WEA ZB2)
	16:20	4 09:23 (WEA VB14)	17:11	18:06	20:04			20:59	18 07:08 (WEA ZB3)	21:48	46 06:32 (WEA ZB2)
3	08:45	09:19 (WEA VB14)	08:12	07:14	06:59			05:51	06:52 (WEA ZB3)	05:05	05:45 (WEA ZB2)
	16:21	5 09:24 (WEA VB14)	17:13	18:08	20:06			21:01	13 07:05 (WEA ZB3)	21:49	47 06:32 (WEA ZB2)
4	08:45	09:18 (WEA VB14)	08:10	07:12	06:57			05:49	06:56 (WEA ZB3)	05:04	05:46 (WEA ZB2)
	16:22	5 09:23 (WEA VB14)	17:15	18:10	20:08			21:03	5 07:01 (WEA ZB3)	21:50	46 06:32 (WEA ZB2)
5	08:45	09:18 (WEA VB14)	08:09	07:09	06:54			05:47		05:03	05:46 (WEA ZB2)
	16:23	6 09:24 (WEA VB14)	17:17	18:12	20:10			21:04		21:51	46 06:32 (WEA ZB2)
6	08:44	09:17 (WEA VB14)	08:07	07:07	06:52			05:45		05:02	05:47 (WEA ZB2)
	16:24	7 09:24 (WEA VB14)	17:19	18:14	20:12			21:06		21:52	46 06:33 (WEA ZB2)
7	08:44	09:16 (WEA VB14)	08:05	07:05	06:50			05:44		05:02	05:47 (WEA ZB2)
	16:26	8 09:24 (WEA VB14)	17:21	18:16	20:13			21:08		21:53	46 06:33 (WEA ZB2)
8	08:43	09:16 (WEA VB14)	08:03	07:02	06:47			05:42		05:01	05:47 (WEA ZB2)
	16:27	9 09:25 (WEA VB14)	17:23	18:18	20:15			21:10		21:54	46 06:33 (WEA ZB2)
9	08:43	09:15 (WEA VB14)	08:01	07:00	06:45			05:40	06:06 (WEA ZB2)	05:01	05:47 (WEA ZB2)
	16:29	10 09:25 (WEA VB14)	17:25	18:20	20:17			21:11	6 06:12 (WEA ZB2)	21:55	46 06:33 (WEA ZB2)
10	08:42	09:14 (WEA VB14)	07:59	06:58	06:42		07:06 (WEA ZB3)	05:38	06:05 (WEA ZB2)	05:00	05:47 (WEA ZB2)
	16:30	11 09:25 (WEA VB14)	17:27	18:22	20:19	3	07:09 (WEA ZB3)	21:13	11 06:16 (WEA ZB2)	21:56	46 06:33 (WEA ZB2)
11	08:41	09:13 (WEA VB14)	07:57	06:55	06:40		07:04 (WEA ZB3)	05:36	06:03 (WEA ZB2)	05:00	05:47 (WEA ZB2)
	16:32	12 09:25 (WEA VB14)	17:29	18:24	20:21	8	07:12 (WEA ZB3)	21:15	15 06:18 (WEA ZB2)	21:57	46 06:33 (WEA ZB2)
12	08:41	09:13 (WEA VB14)	07:55	06:53	06:38		07:02 (WEA ZB3)	05:34	06:01 (WEA ZB2)	04:59	05:47 (WEA ZB2)
	16:33	12 09:25 (WEA VB14)	17:31	18:25	20:23	12	07:14 (WEA ZB3)	21:17	19 06:20 (WEA ZB2)	21:58	46 06:33 (WEA ZB2)
13	08:40	09:14 (WEA VB14)	07:53	06:50	06:35		06:59 (WEA ZB3)	05:33	06:00 (WEA ZB2)	04:59	05:48 (WEA ZB2)
	16:35	11 09:25 (WEA VB14)	17:33	18:27	20:24	16	07:15 (WEA ZB3)	21:18	22 06:22 (WEA ZB2)	21:58	46 06:34 (WEA ZB2)
14	08:39	09:15 (WEA VB14)	07:51	06:48	06:33		06:57 (WEA ZB3)	05:31	05:58 (WEA ZB2)	04:59	05:48 (WEA ZB2)
	16:36	9 09:24 (WEA VB14)	17:35	18:29	20:26	19	07:16 (WEA ZB3)	21:20	24 06:22 (WEA ZB2)	21:59	46 06:34 (WEA ZB2)
15	08:38	09:17 (WEA VB14)	07:49	06:45	06:31		06:55 (WEA ZB3)	05:29	05:57 (WEA ZB2)	04:58	05:49 (WEA ZB2)
	16:38	6 09:23 (WEA VB14)	17:37	18:31	20:28	22	07:17 (WEA ZB3)	21:22	27 06:24 (WEA ZB2)	22:00	45 06:34 (WEA ZB2)
16	08:37		07:47	06:43	06:28		06:52 (WEA ZB3)	05:28	05:55 (WEA ZB2)	04:58	05:49 (WEA ZB2)
	16:40		17:39	18:33	20:30	25	07:17 (WEA ZB3)	21:23	29 06:24 (WEA ZB2)	22:00	46 06:35 (WEA ZB2)
17	08:36		07:45	06:41	06:26		06:50 (WEA ZB3)	05:26	05:54 (WEA ZB2)	04:58	05:49 (WEA ZB2)
	16:41		17:41	18:35	20:32	28	07:18 (WEA ZB3)	21:25	32 06:26 (WEA ZB2)	22:01	46 06:35 (WEA ZB2)
18	08:35		07:43	06:38	06:24		06:48 (WEA ZB3)	05:24	05:52 (WEA ZB2)	04:58	05:49 (WEA ZB2)
	16:43		17:43	18:37	20:34	30	07:18 (WEA ZB3)	21:27	34 06:26 (WEA ZB2)	22:01	46 06:35 (WEA ZB2)
19	08:34		07:41	06:36	06:22		06:46 (WEA ZB3)	05:23	05:51 (WEA ZB2)	04:58	05:50 (WEA ZB2)
	16:45		17:45	18:39	20:35	32	07:18 (WEA ZB3)	21:28	36 06:27 (WEA ZB2)	22:01	45 06:35 (WEA ZB2)
20	08:33		07:39	06:33	06:19		06:45 (WEA ZB3)	05:21	05:50 (WEA ZB2)	04:58	05:50 (WEA ZB2)
	16:47		17:47	18:40	20:37	33	07:18 (WEA ZB3)	21:30	38 06:28 (WEA ZB2)	22:02	45 06:35 (WEA ZB2)
21	08:32		07:37	06:31	06:17		06:43 (WEA ZB3)	05:20	05:48 (WEA ZB2)	04:58	05:50 (WEA ZB2)
	16:48		17:49	18:42	20:39	34	07:17 (WEA ZB3)	21:31	40 06:28 (WEA ZB2)	22:02	45 06:35 (WEA ZB2)
22	08:30		07:34	06:28	06:15		06:43 (WEA ZB3)	05:18	05:47 (WEA ZB2)	04:59	05:50 (WEA ZB2)
	16:50		17:51	18:44	20:41	34	07:17 (WEA ZB3)	21:33	41 06:28 (WEA ZB2)	22:02	45 06:35 (WEA ZB2)
23	08:29		07:32	06:26	06:13		06:43 (WEA ZB3)	05:17	05:46 (WEA ZB2)	04:59	05:50 (WEA ZB2)
	16:52		17:53	18:46	20:43	34	07:17 (WEA ZB3)	21:34	43 06:29 (WEA ZB2)	22:02	45 06:35 (WEA ZB2)
24	08:28		07:30	06:24	06:10		06:44 (WEA ZB3)	05:16	05:46 (WEA ZB2)	04:59	05:50 (WEA ZB2)
	16:54		17:55	18:48	20:45	33	07:17 (WEA ZB3)	21:36	44 06:30 (WEA ZB2)	22:02	46 06:36 (WEA ZB2)
25	08:26		07:28	06:21	06:08		06:44 (WEA ZB3)	05:14	05:46 (WEA ZB2)	04:59	05:50 (WEA ZB2)
	16:56		17:57	18:50	20:46	32	07:16 (WEA ZB3)	21:37	44 06:30 (WEA ZB2)	22:02	46 06:36 (WEA ZB2)
26	08:25		07:25	06:19	06:06		06:44 (WEA ZB3)	05:13	05:45 (WEA ZB2)	05:00	05:51 (WEA ZB2)
	16:58		17:59	18:51	20:48	31	07:15 (WEA ZB3)	21:39	45 06:30 (WEA ZB2)	22:02	46 06:37 (WEA ZB2)
27	08:23		07:23	06:16	06:04		06:45 (WEA ZB3)	05:12	05:45 (WEA ZB2)	05:00	05:51 (WEA ZB2)
	17:00		18:01	18:53	20:50	30	07:15 (WEA ZB3)	21:40	45 06:30 (WEA ZB2)	22:02	46 06:37 (WEA ZB2)
28	08:22		07:21	06:14	06:02		06:45 (WEA ZB3)	05:11	05:45 (WEA ZB2)	05:01	05:51 (WEA ZB2)
	17:01		18:03	18:55	20:52	29	07:14 (WEA ZB3)	21:42	45 06:30 (WEA ZB2)	22:02	46 06:37 (WEA ZB2)
29	08:20			07:11	06:00		06:46 (WEA ZB3)	05:10	05:45 (WEA ZB2)	05:01	05:51 (WEA ZB2)
	17:03			19:57	20:54	27	07:13 (WEA ZB3)	21:43	45 06:30 (WEA ZB2)	22:02	46 06:37 (WEA ZB2)
30	08:19			07:09	05:58		06:47 (WEA ZB3)	05:08	05:46 (WEA ZB2)	05:02	05:52 (WEA ZB2)
	17:05			19:59	20:55	24	07:11 (WEA ZB3)	21:44	46 06:32 (WEA ZB2)	22:02	46 06:38 (WEA ZB2)
31	08:17			07:07				05:07	05:46 (WEA ZB2)		
	17:07			20:01				21:45	46 06:32 (WEA ZB2)		
Sonnenscheinstunden		251		274	367	419		493		509	
astr.max.mögl.Beschattung		118				536		835		1375	

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO29 - Depenhäusen 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November	Dezember	
1	05:03	05:51 (WEA ZB2)	05:42	06:12 (WEA ZB2)	06:36	07:03 (WEA ZB3)	07:29	07:26	08:21	08:55 (WEA VB14)
2	22:01	46 06:37 (WEA ZB2)	21:27	17 06:29 (WEA ZB2)	20:21	8 07:11 (WEA ZB3)	19:07	16:57	16:14	12 09:07 (WEA VB14)
3	05:03	05:52 (WEA ZB2)	05:44	06:14 (WEA ZB2)	06:38	07:05 (WEA ZB3)	07:30	07:28	08:22	08:57 (WEA VB14)
4	22:01	46 06:38 (WEA ZB2)	21:25	14 06:28 (WEA ZB2)	20:18	3 07:08 (WEA ZB3)	19:05	16:55	16:13	11 09:08 (WEA VB14)
5	05:04	05:52 (WEA ZB2)	05:45	06:16 (WEA ZB2)	06:39		07:32	07:30	08:24	08:58 (WEA VB14)
6	22:01	46 06:38 (WEA ZB2)	21:23	9 06:25 (WEA ZB2)	20:16		19:03	16:53	16:12	10 09:08 (WEA VB14)
7	05:05	05:52 (WEA ZB2)	05:47	06:17 (WEA ZB2)	06:41		07:34	07:32	08:25	09:00 (WEA VB14)
8	22:00	47 06:39 (WEA ZB2)	21:21	2 06:19 (WEA ZB2)	20:13		19:00	16:52	16:11	9 09:09 (WEA VB14)
9	05:06	05:52 (WEA ZB2)	05:49		06:43		07:36	07:34	08:27	09:01 (WEA VB14)
10	22:00	46 06:38 (WEA ZB2)	21:19		20:11		18:58	16:50	16:11	8 09:09 (WEA VB14)
11	05:07	05:52 (WEA ZB2)	05:50		06:45		07:38	07:36	08:28	09:03 (WEA VB14)
12	21:59	46 06:38 (WEA ZB2)	21:17		20:09		18:55	16:48	16:10	7 09:10 (WEA VB14)
13	05:08	05:52 (WEA ZB2)	05:52		06:46		07:39	07:38	08:29	09:04 (WEA VB14)
14	21:58	47 06:39 (WEA ZB2)	21:15		20:06		18:53	16:46	16:10	6 09:10 (WEA VB14)
15	05:09	05:53 (WEA ZB2)	05:54		06:48		07:41	07:40	08:31	09:06 (WEA VB14)
16	21:58	46 06:39 (WEA ZB2)	21:14		20:04		18:51	16:44	16:09	6 09:12 (WEA VB14)
17	05:10	05:53 (WEA ZB2)	05:56	07:03 (WEA ZB3)	06:50		07:43	07:42	08:32	09:07 (WEA VB14)
18	21:57	46 06:39 (WEA ZB2)	21:12	9 07:12 (WEA ZB3)	20:01		18:48	16:42	16:09	5 09:12 (WEA VB14)
19	05:11	05:53 (WEA ZB2)	05:57	07:00 (WEA ZB3)	06:52		07:45	07:44	08:33	09:08 (WEA VB14)
20	21:56	46 06:39 (WEA ZB2)	21:10	15 07:15 (WEA ZB3)	19:59		18:46	16:41	16:09	4 09:12 (WEA VB14)
21	05:12	05:53 (WEA ZB2)	05:59	06:58 (WEA ZB3)	06:53		07:47	07:45	08:34	09:09 (WEA VB14)
22	21:55	46 06:39 (WEA ZB2)	21:08	19 07:17 (WEA ZB3)	19:56		18:43	16:39	16:09	3 09:12 (WEA VB14)
23	05:13	05:53 (WEA ZB2)	06:01	06:56 (WEA ZB3)	06:55		07:48	07:47	08:35	09:11 (WEA VB14)
24	21:54	46 06:39 (WEA ZB2)	21:05	23 07:19 (WEA ZB3)	19:54		18:41	16:37	16:08	2 09:13 (WEA VB14)
25	05:14	05:53 (WEA ZB2)	06:02	06:55 (WEA ZB3)	06:57		07:50	07:49	08:36	09:12 (WEA VB14)
26	21:53	46 06:39 (WEA ZB2)	21:03	25 07:20 (WEA ZB3)	19:52		18:39	16:36	16:08	2 09:14 (WEA VB14)
27	05:15	05:55 (WEA ZB2)	06:04	06:53 (WEA ZB3)	06:59		07:52	07:51	08:37	09:13 (WEA VB14)
28	21:52	45 06:40 (WEA ZB2)	21:01	27 07:20 (WEA ZB3)	19:49		18:36	16:34	16:08	1 09:14 (WEA VB14)
29	05:17	05:55 (WEA ZB2)	06:06	06:53 (WEA ZB3)	07:00		07:54	07:53	08:38	
30	21:51	45 06:40 (WEA ZB2)	20:59	29 07:22 (WEA ZB3)	19:47		18:34	16:32	16:08	
31	05:18	05:55 (WEA ZB2)	06:08	06:51 (WEA ZB3)	07:02		07:56	07:55	08:39	
32	21:50	45 06:40 (WEA ZB2)	20:57	30 07:21 (WEA ZB3)	19:44		18:32	16:31	16:08	
33	05:19	05:55 (WEA ZB2)	06:09	06:51 (WEA ZB3)	07:04		07:58	07:57	08:40	
34	21:49	44 06:39 (WEA ZB2)	20:55	31 07:22 (WEA ZB3)	19:42		18:30	16:29	16:09	
35	05:21	05:55 (WEA ZB2)	06:11	06:50 (WEA ZB3)	07:06		08:00	07:59	08:41	
36	21:48	44 06:39 (WEA ZB2)	20:53	33 07:23 (WEA ZB3)	19:39		18:27	16:28	16:09	
37	05:22	05:56 (WEA ZB2)	06:13	06:49 (WEA ZB3)	07:07		08:01	08:00	08:41	
38	21:47	43 06:39 (WEA ZB2)	20:50	33 07:22 (WEA ZB3)	19:37		18:25	16:27	16:09	
39	05:23	05:56 (WEA ZB2)	06:15	06:49 (WEA ZB3)	07:09		08:03	08:02	08:42	
40	21:45	43 06:39 (WEA ZB2)	20:48	34 07:23 (WEA ZB3)	19:34		18:23	16:25	16:09	
41	05:25	05:56 (WEA ZB2)	06:16	06:49 (WEA ZB3)	07:11		08:05	08:04	08:43	
42	21:44	42 06:38 (WEA ZB2)	20:46	34 07:23 (WEA ZB3)	19:32		18:21	16:24	16:10	
43	05:26	05:58 (WEA ZB2)	06:18	06:48 (WEA ZB3)	07:13		08:07	08:06	08:43	
44	21:43	41 06:39 (WEA ZB2)	20:44	34 07:22 (WEA ZB3)	19:29		18:18	16:23	16:10	
45	05:28	05:59 (WEA ZB2)	06:20	06:48 (WEA ZB3)	07:14		08:09	08:07	08:44	
46	21:41	39 06:38 (WEA ZB2)	20:42	34 07:22 (WEA ZB3)	19:27		18:16	16:21	16:11	
47	05:29	06:01 (WEA ZB2)	06:22	06:50 (WEA ZB3)	07:16		08:11	08:09	08:44	
48	21:40	37 06:38 (WEA ZB2)	20:39	32 07:22 (WEA ZB3)	19:25		18:14	16:20	16:11	
49	05:31	06:02 (WEA ZB2)	06:23	06:51 (WEA ZB3)	07:18		07:13	08:11	08:45	
50	21:38	35 06:37 (WEA ZB2)	20:37	30 07:21 (WEA ZB3)	19:22		17:12	16:19	16:12	
51	05:32	06:03 (WEA ZB2)	06:25	06:53 (WEA ZB3)	07:20		07:15	08:13	08:45	
52	21:37	33 06:36 (WEA ZB2)	20:35	27 07:20 (WEA ZB3)	19:20		17:10	16:18	16:13	
53	05:34	06:05 (WEA ZB2)	06:27	06:55 (WEA ZB3)	07:21		07:17	08:14	08:45	
54	21:35	31 06:36 (WEA ZB2)	20:32	25 07:20 (WEA ZB3)	19:17		17:08	16:17	16:13	
55	05:36	06:06 (WEA ZB2)	06:29	06:56 (WEA ZB3)	07:23		07:19	08:16	08:45	
56	21:33	28 06:34 (WEA ZB2)	20:30	22 07:18 (WEA ZB3)	19:15		17:06	16:16	16:14	
57	05:37	06:08 (WEA ZB2)	06:31	06:58 (WEA ZB3)	07:25		07:20	08:18	08:45	09:20 (WEA VB14)
58	21:32	26 06:34 (WEA ZB2)	20:28	19 07:17 (WEA ZB3)	19:12		17:03	16:15	16:15	1 09:21 (WEA VB14)
59	05:39	06:09 (WEA ZB2)	06:32	07:00 (WEA ZB3)	07:27		07:22	08:19	08:45	09:20 (WEA VB14)
60	21:30	23 06:32 (WEA ZB2)	20:25	16 07:16 (WEA ZB3)	19:10		17:01	16:14	16:16	1 09:21 (WEA VB14)
61	05:40	06:11 (WEA ZB2)	06:34	07:01 (WEA ZB3)			07:24		08:45	09:20 (WEA VB14)
62	21:28	20 06:31 (WEA ZB2)	20:23	12 07:13 (WEA ZB3)			16:59		16:17	2 09:22 (WEA VB14)
Sonnenscheinstunden		511	459	382			329	260	235	90
astr.max.mögl.Beschattung		1264	635	11				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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO3 - Utwarfe 3
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar			Februar			März			April			Mai			Juni		
1	08:45	09:23 (WEA VB7)	08:15	09:30 (WEA VB7)	07:18				07:04			05:55	18:51 (WEA VB4)	05:06			
	16:18	110 14:59 (WEA VB5)	17:09	88 15:17 (WEA VB5)	18:04				20:02			20:57	34 19:25 (WEA VB4)	21:47			
2	08:45	09:23 (WEA VB7)	08:14	09:31 (WEA VB7)	07:16				07:02			05:53	18:52 (WEA VB4)	05:05			
	16:19	113 15:00 (WEA VB5)	17:11	86 15:17 (WEA VB5)	18:06				20:04			20:59	32 19:24 (WEA VB4)	21:48			
3	08:45	09:23 (WEA VB7)	08:12	09:32 (WEA VB7)	07:14				06:59			05:51	18:53 (WEA VB4)	05:04			
	16:20	114 15:01 (WEA VB5)	17:13	82 15:16 (WEA VB5)	18:08				20:06			21:01	29 19:22 (WEA VB4)	21:49			
4	08:45	09:23 (WEA VB7)	08:10	09:34 (WEA VB7)	07:12				06:57			19:11 (WEA VB4)	05:49	18:54 (WEA VB4)	05:04		
	16:22	115 15:02 (WEA VB5)	17:15	79 15:17 (WEA VB5)	18:10				20:08			19:16 (WEA VB4)	21:03	27 19:21 (WEA VB4)	21:50		
5	08:44	09:23 (WEA VB7)	08:09	09:35 (WEA VB7)	07:09				06:54			19:05 (WEA VB4)	05:47	18:56 (WEA VB4)	05:03		
	16:23	115 15:02 (WEA VB5)	17:17	76 15:16 (WEA VB5)	18:12				20:10			19:22 (WEA VB4)	21:04	23 19:19 (WEA VB4)	21:51		
6	08:44	09:24 (WEA VB7)	08:07	09:36 (WEA VB7)	07:07			17:36 (WEA VB3)	06:52			19:01 (WEA VB4)	05:45	18:58 (WEA VB4)	05:02		
	16:24	118 15:04 (WEA VB5)	17:19	72 15:16 (WEA VB5)	18:14			5 17:41 (WEA VB3)	20:11			19:24 (WEA VB4)	21:06	18 19:16 (WEA VB4)	21:52		
7	08:44	09:23 (WEA VB7)	08:05	09:38 (WEA VB7)	07:04				06:49			18:58 (WEA VB4)	05:43	19:03 (WEA VB4)	05:01		
	16:26	118 15:04 (WEA VB5)	17:21	66 15:15 (WEA VB5)	18:16			14 17:46 (WEA VB3)	20:13			19:45 (WEA VB2)	21:08	10 19:13 (WEA VB4)	21:53		
8	08:43	09:24 (WEA VB7)	08:03	09:41 (WEA VB7)	07:02				06:47			18:57 (WEA VB4)	05:41		05:01		
	16:27	119 15:06 (WEA VB5)	17:23	59 15:14 (WEA VB5)	18:18			18 17:47 (WEA VB3)	20:15			19:47 (WEA VB2)	21:10		21:54		
9	08:43	09:24 (WEA VB7)	08:01	09:44 (WEA VB7)	07:00				06:45			18:54 (WEA VB4)	05:40		05:00		
	16:28	119 15:06 (WEA VB5)	17:25	50 15:13 (WEA VB5)	18:20			22 17:49 (WEA VB3)	20:17			19:48 (WEA VB2)	21:11		21:55		
10	08:42	09:24 (WEA VB7)	07:59	14:36 (WEA VB5)	06:57				06:42			18:53 (WEA VB4)	05:38		05:00		
	16:30	121 15:07 (WEA VB5)	17:27	36 15:12 (WEA VB5)	18:22			24 17:49 (WEA VB3)	20:19			19:49 (WEA VB2)	21:13		21:56		
11	08:41	09:24 (WEA VB7)	07:57	14:37 (WEA VB5)	06:55				06:40			18:52 (WEA VB4)	05:36		04:59		
	16:31	121 15:08 (WEA VB5)	17:29	33 15:10 (WEA VB5)	18:23			25 17:50 (WEA VB3)	20:21			19:50 (WEA VB2)	21:15		21:57		
12	08:40	09:24 (WEA VB7)	07:55	14:39 (WEA VB5)	06:53				06:38			18:50 (WEA VB4)	05:34		04:59		
	16:33	121 15:09 (WEA VB5)	17:31	29 15:08 (WEA VB5)	18:25			27 17:50 (WEA VB3)	20:22			19:49 (WEA VB2)	21:17		21:57		
13	08:40	09:24 (WEA VB7)	07:53	14:41 (WEA VB5)	06:50				06:35			18:50 (WEA VB4)	05:32		04:59		
	16:35	121 15:09 (WEA VB5)	17:33	25 15:06 (WEA VB5)	18:27			28 17:51 (WEA VB3)	20:24			19:50 (WEA VB2)	21:18		21:58		
14	08:39	09:24 (WEA VB7)	07:51	14:45 (WEA VB5)	06:48				06:33			18:49 (WEA VB4)	05:31		04:58		
	16:36	121 15:10 (WEA VB5)	17:35	19 15:04 (WEA VB5)	18:29			28 17:50 (WEA VB3)	20:26			19:50 (WEA VB2)	21:20		21:59		
15	08:38	09:24 (WEA VB7)	07:49	14:50 (WEA VB5)	06:45				06:31			18:48 (WEA VB4)	05:29		04:58		
	16:38	121 15:11 (WEA VB5)	17:37	8 14:58 (WEA VB5)	18:31			28 17:50 (WEA VB3)	20:28			19:50 (WEA VB2)	21:22		21:59		
16	08:37	09:24 (WEA VB7)	07:47		06:43				06:28			18:47 (WEA VB4)	05:27		04:58		
	16:39	121 15:12 (WEA VB5)	17:39		18:33			30 18:07 (WEA VB1)	20:30			19:49 (WEA VB2)	21:23		22:00		
17	08:36	09:25 (WEA VB7)	07:45		06:40				06:26			18:47 (WEA VB4)	05:26		04:58		
	16:41	119 15:13 (WEA VB5)	17:41		18:35			32 18:08 (WEA VB1)	20:32			19:49 (WEA VB2)	21:25		22:00		
18	08:35	09:24 (WEA VB7)	07:43		06:38				06:24			18:47 (WEA VB4)	05:24		04:58		
	16:43	118 15:13 (WEA VB5)	17:43		18:36			34 18:11 (WEA VB1)	20:33			19:48 (WEA VB2)	21:27		22:01		
19	08:34	09:25 (WEA VB7)	07:41		06:36				06:21			18:47 (WEA VB4)	05:23		04:58		
	16:45	115 15:14 (WEA VB5)	17:45		18:38			35 18:12 (WEA VB1)	20:35			19:47 (WEA VB2)	21:28		22:01		
20	08:33	09:25 (WEA VB7)	07:39		06:33				06:19			18:46 (WEA VB4)	05:21		04:58		
	16:46	111 15:14 (WEA VB5)	17:47		18:40			35 18:14 (WEA VB1)	20:37			19:45 (WEA VB2)	21:30		22:02		
21	08:31	09:25 (WEA VB7)	07:36		06:31				06:17			18:46 (WEA VB4)	05:20		04:58		
	16:48	106 15:14 (WEA VB5)	17:49		18:42			35 18:15 (WEA VB1)	20:39			19:44 (WEA VB2)	21:31		22:02		
22	08:30	09:25 (WEA VB7)	07:34		06:28				06:15			18:46 (WEA VB4)	05:18		04:58		
	16:50	94 15:15 (WEA VB5)	17:51		18:44			32 18:18 (WEA VB1)	20:41			19:42 (WEA VB2)	21:33		22:02		
23	08:29	09:25 (WEA VB7)	07:32		06:26				06:12			18:46 (WEA VB4)	05:17		04:59		
	16:52	94 15:15 (WEA VB5)	17:53		18:46			25 18:17 (WEA VB1)	20:43			19:40 (WEA VB2)	21:34		22:02		
24	08:28	09:26 (WEA VB7)	07:30		06:23				06:10			18:46 (WEA VB4)	05:15		04:59		
	16:54	94 15:16 (WEA VB5)	17:55		18:48			14 18:16 (WEA VB1)	20:44			19:31 (WEA VB4)	21:36		22:02		
25	08:26	09:26 (WEA VB7)	07:28		06:21				06:08			18:47 (WEA VB4)	05:14		04:59		
	16:56	94 15:16 (WEA VB5)	17:57		18:49			11 18:14 (WEA VB1)	20:46			19:30 (WEA VB4)	21:37		22:02		
26	08:25	09:27 (WEA VB7)	07:25		06:19				06:06			18:47 (WEA VB4)	05:13		05:00		
	16:57	94 15:17 (WEA VB5)	17:59		18:51			5 18:11 (WEA VB1)	20:48			19:30 (WEA VB4)	21:39		22:02		
27	08:23	09:27 (WEA VB7)	07:23		06:16				06:04			18:48 (WEA VB4)	05:12		05:00		
	16:59	94 15:17 (WEA VB5)	18:00		18:53				20:50			19:29 (WEA VB4)	21:40		22:02		
28	08:22	09:27 (WEA VB7)	07:21		06:14				06:02			18:48 (WEA VB4)	05:10		05:01		
	17:01	94 15:17 (WEA VB5)	18:02		18:55				20:52			19:28 (WEA VB4)	21:41		22:02		
29	08:20	09:29 (WEA VB7)			07:11				05:59			18:49 (WEA VB4)	05:09		05:01		
	17:03	92 15:18 (WEA VB5)			19:57				20:54			19:27 (WEA VB4)	21:43		22:02		
30	08:19	09:29 (WEA VB7)			07:09				05:57			18:50 (WEA VB4)	05:08		05:02		
	17:05	90 15:17 (WEA VB5)			19:59				20:55			19:26 (WEA VB4)	21:44		22:02		
31	08:17	09:29 (WEA VB7)			07:06								05:07				
	17:07	89 15:17 (WEA VB5)			20:00								21:45				
Sonnenscheinstunden			251		367				420				493		509		
astr.max.mögl.Beschattung			3386		507				1300				173				

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO3 - Utwarfe 3
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Jul	August	September	Oktober	November	Dezember
1	05:02 22:01	05:42 21:27	06:36 20:20	18:51 (WEA VB4) 07:28 19:49 (WEA VB2) 19:07	18:03 (WEA VB3) 07:26 18:30 (WEA VB3) 16:57	14:04 (WEA VB5) 08:21 14:41 (WEA VB5) 16:13
2	05:03 22:01	05:43 21:25	06:37 20:18	18:52 (WEA VB4) 07:30 19:48 (WEA VB2) 19:05	18:02 (WEA VB3) 07:28 18:28 (WEA VB3) 16:55	09:12 (WEA VB7) 08:22 14:42 (WEA VB5) 16:13
3	05:04 22:01	05:45 21:23	06:39 20:16	18:52 (WEA VB4) 07:32 19:46 (WEA VB2) 19:02	18:03 (WEA VB3) 07:30 18:27 (WEA VB3) 16:53	09:10 (WEA VB7) 08:24 14:44 (WEA VB5) 16:12
4	05:05 22:00	05:47 21:21	06:41 20:13	18:54 (WEA VB4) 07:34 19:44 (WEA VB2) 19:00	18:04 (WEA VB3) 07:32 18:26 (WEA VB3) 16:51	09:08 (WEA VB7) 08:25 14:45 (WEA VB5) 16:11
5	05:06 22:00	05:49 21:19	06:43 20:11	18:55 (WEA VB4) 07:36 19:42 (WEA VB2) 18:58	18:05 (WEA VB3) 07:34 18:25 (WEA VB3) 16:49	09:06 (WEA VB7) 08:26 14:46 (WEA VB5) 16:11
6	05:06 21:59	05:50 21:17	19:11 (WEA VB4) 06:44 19:24 (WEA VB4) 20:08	18:57 (WEA VB4) 07:37 19:20 (WEA VB4) 18:55	18:07 (WEA VB3) 07:36 18:23 (WEA VB3) 16:48	09:04 (WEA VB7) 08:28 14:46 (WEA VB5) 16:10
7	05:07 21:58	05:52 21:15	19:08 (WEA VB4) 06:46 19:27 (WEA VB4) 20:06	19:00 (WEA VB4) 07:39 19:17 (WEA VB4) 18:53	18:09 (WEA VB3) 07:38 18:20 (WEA VB3) 16:46	09:03 (WEA VB7) 08:29 14:47 (WEA VB5) 16:10
8	05:08 21:58	05:54 21:13	19:05 (WEA VB4) 06:48 19:29 (WEA VB4) 20:04	19:05 (WEA VB4) 07:41 19:12 (WEA VB4) 18:50	07:40 16:44	09:02 (WEA VB7) 08:30 14:47 (WEA VB5) 16:09
9	05:09 21:57	05:55 21:11	19:03 (WEA VB4) 06:50 19:31 (WEA VB4) 20:01	07:43 18:48	07:41 16:42	09:01 (WEA VB7) 08:32 14:47 (WEA VB5) 16:09
10	05:11 21:56	05:57 21:09	19:01 (WEA VB4) 06:51 19:31 (WEA VB4) 19:59	07:45 18:46	07:43 16:40	09:01 (WEA VB7) 08:33 14:48 (WEA VB5) 16:09
11	05:12 21:55	05:59 21:07	19:00 (WEA VB4) 06:53 19:33 (WEA VB4) 19:56	07:46 18:43	07:45 16:39	09:00 (WEA VB7) 08:34 14:48 (WEA VB5) 16:08
12	05:13 21:54	06:01 21:05	18:59 (WEA VB4) 06:55 19:34 (WEA VB4) 19:54	07:48 18:41	07:47 16:37	09:00 (WEA VB7) 08:35 14:48 (WEA VB5) 16:08
13	05:14 21:53	06:02 21:03	18:57 (WEA VB4) 06:57 19:34 (WEA VB4) 19:51	07:50 18:39	07:49 16:35	08:59 (WEA VB7) 08:36 14:49 (WEA VB5) 16:08
14	05:15 21:52	06:04 21:01	18:56 (WEA VB4) 06:58 19:35 (WEA VB4) 19:49	07:52 18:36	07:51 16:34	09:00 (WEA VB7) 08:37 14:50 (WEA VB5) 16:08
15	05:16 21:51	06:06 20:59	18:56 (WEA VB4) 07:00 19:36 (WEA VB4) 19:47	07:54 18:34	07:53 16:32	09:00 (WEA VB7) 08:38 14:50 (WEA VB5) 16:08
16	05:18 21:50	06:08 20:57	18:54 (WEA VB4) 07:02 19:36 (WEA VB4) 19:44	07:56 18:32	07:55 16:31	09:00 (WEA VB7) 08:39 14:50 (WEA VB5) 16:08
17	05:19 21:49	06:09 20:55	18:54 (WEA VB4) 07:04 19:37 (WEA VB4) 19:42	07:58 18:29	07:57 16:29	09:00 (WEA VB7) 08:40 14:50 (WEA VB5) 16:08
18	05:20 21:48	06:11 20:53	18:53 (WEA VB4) 07:05 19:37 (WEA VB4) 19:39	07:59 18:27	07:58 16:28	09:00 (WEA VB7) 08:41 14:50 (WEA VB5) 16:09
19	05:22 21:46	06:13 20:50	18:52 (WEA VB4) 07:07 19:37 (WEA VB4) 19:37	08:01 18:25	08:00 16:26	09:00 (WEA VB7) 08:41 14:50 (WEA VB5) 16:09
20	05:23 21:45	06:15 20:48	18:52 (WEA VB4) 07:09 19:46 (WEA VB2) 19:34	08:03 18:23	08:02 16:25	09:00 (WEA VB7) 08:42 14:50 (WEA VB5) 16:09
21	05:25 21:44	06:16 20:46	18:50 (WEA VB4) 07:11 19:47 (WEA VB2) 19:32	08:05 18:20	08:04 16:24	09:01 (WEA VB7) 08:43 14:50 (WEA VB5) 16:10
22	05:26 21:42	06:18 20:44	18:50 (WEA VB4) 07:12 19:49 (WEA VB2) 19:29	08:07 18:18	08:06 16:22	09:01 (WEA VB7) 08:43 14:51 (WEA VB5) 16:10
23	05:28 21:41	06:20 20:41	18:50 (WEA VB4) 07:14 19:50 (WEA VB2) 19:27	08:09 18:16	08:07 16:21	09:02 (WEA VB7) 08:44 14:51 (WEA VB5) 16:11
24	05:29 21:40	06:22 20:39	18:49 (WEA VB4) 07:16 19:50 (WEA VB2) 19:24	08:11 18:14	08:09 16:20	09:02 (WEA VB7) 08:44 14:51 (WEA VB5) 16:11
25	05:31 21:38	06:23 20:37	18:49 (WEA VB4) 07:18 19:51 (WEA VB2) 19:22	07:13 17:12	08:11 16:19	09:02 (WEA VB7) 08:44 14:50 (WEA VB5) 16:12
26	05:32 21:37	06:25 20:35	18:50 (WEA VB4) 07:19 19:51 (WEA VB2) 19:19	07:15 17:10	08:13 16:18	09:02 (WEA VB7) 08:45 14:50 (WEA VB5) 16:12
27	05:34 21:35	06:27 20:32	18:49 (WEA VB4) 07:21 19:51 (WEA VB2) 19:17	07:16 17:07	08:14 16:17	09:03 (WEA VB7) 08:45 14:50 (WEA VB5) 16:13
28	05:35 21:33	06:29 20:30	18:49 (WEA VB4) 07:23 19:51 (WEA VB2) 19:15	07:18 17:05	08:16 16:16	09:04 (WEA VB7) 08:45 14:50 (WEA VB5) 16:14
29	05:37 21:32	06:30 20:28	18:50 (WEA VB4) 07:25 19:51 (WEA VB2) 19:12	07:20 17:03	08:17 16:15	09:05 (WEA VB7) 08:45 14:50 (WEA VB5) 16:15
30	05:39 21:30	06:32 20:25	18:49 (WEA VB4) 07:27 19:50 (WEA VB2) 19:10	07:22 17:01	08:19 16:14	09:05 (WEA VB7) 08:45 14:50 (WEA VB5) 16:16
31	05:40 21:28	06:34 20:23	18:50 (WEA VB4) 07:28 19:49 (WEA VB2) 19:09	07:24 16:59	14:06 (WEA VB5) 16:14 14:40 (WEA VB5) 16:14	08:45 16:17
Sonnenscheinstunden	511	459	382	329	260	234
astr.max.mögl.Beschattung		1191	668	269	2806	3412

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO30 - Purkswarfe 2

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März	April	Mai	Juni		
1	08:45	09:28 (WEA VB14)	08:16	07:19	07:04	05:55	05:06		
	16:18	09:45 (WEA VB14)	17:09	18:04	20:02	20:57	21:47		
2	08:45	09:29 (WEA VB14)	08:14	07:16	07:02	05:53	05:06		
	16:20	09:45 (WEA VB14)	17:11	18:06	20:04	20:59	21:48		
3	08:45	09:29 (WEA VB14)	08:12	07:14	06:59	05:51	05:05		
	16:21	09:45 (WEA VB14)	17:13	18:08	20:06	21:01	21:49		
4	08:45	09:30 (WEA VB14)	08:10	07:12	06:57	05:49	05:04		
	16:22	09:45 (WEA VB14)	17:15	18:10	20:08	21:03	21:50		
5	08:44	09:32 (WEA VB14)	08:09	07:09	06:54	05:47	05:03		
	16:23	09:46 (WEA VB14)	17:17	18:12	20:10	21:04	21:51		
6	08:44	09:32 (WEA VB14)	08:07	07:07	06:52	05:45	05:02		
	16:24	09:45 (WEA VB14)	17:19	18:14	20:12	21:06	21:52		
7	08:44	09:33 (WEA VB14)	08:05	07:05	06:50	05:44	05:02	21:17 (WEA VB13)	
	16:26	09:44 (WEA VB14)	17:21	18:16	20:13	21:08	21:53	1	21:18 (WEA VB13)
8	08:43	09:35 (WEA VB14)	08:03	07:02	06:47	05:42	05:01		21:16 (WEA VB13)
	16:27	09:44 (WEA VB14)	17:23	18:18	20:15	21:10	21:54	3	21:19 (WEA VB13)
9	08:43	09:37 (WEA VB14)	08:01	07:00	06:45	05:40	05:01		21:17 (WEA VB13)
	16:29	09:43 (WEA VB14)	17:25	18:20	20:17	21:11	21:55	3	21:20 (WEA VB13)
10	08:42		07:59	06:57	06:42	05:38	05:00		21:17 (WEA VB13)
	16:30		17:27	18:22	20:19	21:13	21:56	4	21:21 (WEA VB13)
11	08:41		07:57	06:55	06:40	05:36	05:00		21:17 (WEA VB13)
	16:32		17:29	18:24	20:21	21:15	21:57	4	21:21 (WEA VB13)
12	08:41		07:55	06:53	06:38	05:34	04:59		21:17 (WEA VB13)
	16:33		17:31	18:25	20:23	21:17	21:58	5	21:22 (WEA VB13)
13	08:40		07:53	06:50	06:35	05:33	04:59		21:18 (WEA VB13)
	16:35		17:33	18:27	20:24	21:18	21:58	5	21:23 (WEA VB13)
14	08:39		07:51	06:48	06:33	05:31	04:59		21:18 (WEA VB13)
	16:36		17:35	18:29	20:26	21:20	21:59	6	21:24 (WEA VB13)
15	08:38		07:49	06:45	06:31	05:29	04:58		21:18 (WEA VB13)
	16:38		17:37	18:31	20:28	21:22	21:59	6	21:24 (WEA VB13)
16	08:37		07:47	06:43	06:28	05:27	04:58		21:19 (WEA VB13)
	16:40		17:39	18:33	20:30	21:23	22:00	6	21:25 (WEA VB13)
17	08:36		07:45	06:41	06:26	05:26	04:58		21:18 (WEA VB13)
	16:41		17:41	18:35	20:32	21:25	22:00	6	21:24 (WEA VB13)
18	08:35		07:43	06:38	06:24	05:24	04:58		21:19 (WEA VB13)
	16:43		17:43	18:37	20:34	21:27	22:01	7	21:26 (WEA VB13)
19	08:34		07:41	06:36	06:22	05:23	04:58		21:19 (WEA VB13)
	16:45		17:45	18:38	20:35	21:28	22:01	7	21:26 (WEA VB13)
20	08:33		07:39	06:33	06:19	05:21	04:58		21:19 (WEA VB13)
	16:47		17:47	18:40	20:37	21:30	22:02	7	21:26 (WEA VB13)
21	08:32		07:37	06:31	06:17	05:20	04:58		21:19 (WEA VB13)
	16:48		17:49	18:42	20:39	21:31	22:02	7	21:26 (WEA VB13)
22	08:30		07:34	06:28	06:15	05:18	04:58		21:19 (WEA VB13)
	16:50		17:51	18:44	20:41	21:33	22:02	7	21:26 (WEA VB13)
23	08:29		07:32	06:26	06:13	05:17	04:59		21:19 (WEA VB13)
	16:52		17:53	18:46	20:43	21:34	22:02	7	21:26 (WEA VB13)
24	08:28		07:30	06:24	06:10	05:16	04:59		21:20 (WEA VB13)
	16:54		17:55	18:48	20:44	21:36	22:02	7	21:27 (WEA VB13)
25	08:26		07:28	06:21	06:08	05:14	04:59		21:20 (WEA VB13)
	16:56		17:57	18:50	20:46	21:37	22:02	7	21:27 (WEA VB13)
26	08:25		07:25	06:19	06:06	05:13	05:00		21:21 (WEA VB13)
	16:58		17:59	18:51	20:48	21:39	22:02	6	21:27 (WEA VB13)
27	08:23		07:23	06:16	06:04	05:12	05:00		21:20 (WEA VB13)
	17:00		18:01	18:53	20:50	21:40	22:02	7	21:27 (WEA VB13)
28	08:22		07:21	06:14	06:02	05:11	05:01		21:21 (WEA VB13)
	17:01		18:03	18:55	20:52	21:42	22:02	6	21:27 (WEA VB13)
29	08:20			07:11	06:00	05:10	05:01		21:21 (WEA VB13)
	17:03			19:57	20:54	21:43	22:02	5	21:26 (WEA VB13)
30	08:19			07:09	05:58	05:08	05:02		21:21 (WEA VB13)
	17:05			19:59	20:55	21:44	22:02	5	21:26 (WEA VB13)
31	08:17			07:07		05:07			
	17:07			20:01		21:45			
Sonnenscheinstunden		251	274	367	419	493	509	134	
astr.max.mögl.Beschattung		117							

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	(WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO30 - Purkswarfe 2

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember	
1	05:03	21:21 (WEA VB13)	05:42	06:36	07:28	07:26	08:21				
	22:01	21:26 (WEA VB13)	21:27	20:21	19:07	16:57	16:14				
2	05:03	21:22 (WEA VB13)	05:44	06:38	07:30	07:28	08:22				
	22:01	21:26 (WEA VB13)	21:25	20:18	19:05	16:55	16:13				
3	05:04	21:22 (WEA VB13)	05:45	06:39	07:32	07:30	08:24			09:20 (WEA VB14)	
	22:01	21:25 (WEA VB13)	21:23	20:16	19:03	16:53	16:12	6	09:26 (WEA VB14)		
4	05:05	21:23 (WEA VB13)	05:47	06:41	07:34	07:32	08:25			09:19 (WEA VB14)	
	22:00	21:25 (WEA VB13)	21:21	20:13	19:00	16:52	16:11	9	09:28 (WEA VB14)		
5	05:06	21:22 (WEA VB13)	05:49	06:43	07:36	07:34	08:27			09:18 (WEA VB14)	
	22:00	21:24 (WEA VB13)	21:19	20:11	18:58	16:50	16:11	11	09:29 (WEA VB14)		
6	05:07	21:23 (WEA VB13)	05:50	06:45	07:37	07:36	08:28			09:18 (WEA VB14)	
	21:59	21:24 (WEA VB13)	21:17	20:09	18:55	16:48	16:10	13	09:31 (WEA VB14)		
7	05:08		05:52	06:46	07:39	07:38	08:29			09:18 (WEA VB14)	
	21:58		21:15	20:06	18:53	16:46	16:10	14	09:32 (WEA VB14)		
8	05:09		05:54	06:48	07:41	07:40	08:31			09:18 (WEA VB14)	
	21:58		21:13	20:04	18:51	16:44	16:09	15	09:33 (WEA VB14)		
9	05:10		05:56	06:50	07:43	07:42	08:32			09:18 (WEA VB14)	
	21:57		21:12	20:01	18:48	16:42	16:09	16	09:34 (WEA VB14)		
10	05:11		05:57	06:52	07:45	07:43	08:33			09:18 (WEA VB14)	
	21:56		21:09	19:59	18:46	16:41	16:09	16	09:34 (WEA VB14)		
11	05:12		05:59	06:53	07:47	07:45	08:34			09:18 (WEA VB14)	
	21:55		21:07	19:56	18:43	16:39	16:09	17	09:35 (WEA VB14)		
12	05:13		06:01	06:55	07:48	07:47	08:35			09:19 (WEA VB14)	
	21:54		21:05	19:54	18:41	16:37	16:08	17	09:36 (WEA VB14)		
13	05:14		06:02	06:57	07:50	07:49	08:36			09:19 (WEA VB14)	
	21:53		21:03	19:52	18:39	16:36	16:08	18	09:37 (WEA VB14)		
14	05:15		06:04	06:58	07:52	07:51	08:37			09:19 (WEA VB14)	
	21:52		21:01	19:49	18:36	16:34	16:08	18	09:37 (WEA VB14)		
15	05:17		06:06	07:00	07:54	07:53	08:38			09:20 (WEA VB14)	
	21:51		20:59	19:47	18:34	16:32	16:08	18	09:38 (WEA VB14)		
16	05:18		06:08	07:02	07:56	07:55	08:39			09:19 (WEA VB14)	
	21:50		20:57	19:44	18:32	16:31	16:08	19	09:38 (WEA VB14)		
17	05:19		06:09	07:04	07:58	07:57	08:40			09:20 (WEA VB14)	
	21:49		20:55	19:42	18:30	16:29	16:09	18	09:38 (WEA VB14)		
18	05:21		06:11	07:05	08:00	07:58	08:41			09:20 (WEA VB14)	
	21:48		20:53	19:39	18:27	16:28	16:09	19	09:39 (WEA VB14)		
19	05:22		06:13	07:07	08:01	08:00	08:41			09:21 (WEA VB14)	
	21:47		20:50	19:37	18:25	16:27	16:09	19	09:40 (WEA VB14)		
20	05:23		06:15	07:09	08:03	08:02	08:42			09:21 (WEA VB14)	
	21:45		20:48	19:34	18:23	16:25	16:09	19	09:40 (WEA VB14)		
21	05:25		06:16	07:11	08:05	08:04	08:43			09:22 (WEA VB14)	
	21:44		20:46	19:32	18:21	16:24	16:10	19	09:41 (WEA VB14)		
22	05:26		06:18	07:13	08:07	08:06	08:43			09:22 (WEA VB14)	
	21:42		20:44	19:29	18:18	16:23	16:10	19	09:41 (WEA VB14)		
23	05:28		06:20	07:14	08:09	08:07	08:44			09:23 (WEA VB14)	
	21:41		20:42	19:27	18:16	16:21	16:11	19	09:42 (WEA VB14)		
24	05:29		06:22	07:16	08:11	08:09	08:44			09:23 (WEA VB14)	
	21:40		20:39	19:25	18:14	16:20	16:11	19	09:42 (WEA VB14)		
25	05:31		06:23	07:18	07:13	08:11	08:45			09:23 (WEA VB14)	
	21:38		20:37	19:22	17:12	16:19	16:12	19	09:42 (WEA VB14)		
26	05:32		06:25	07:20	07:15	08:13	08:45			09:25 (WEA VB14)	
	21:37		20:35	19:20	17:10	16:18	16:13	18	09:43 (WEA VB14)		
27	05:34		06:27	07:21	07:17	08:14	08:45			09:25 (WEA VB14)	
	21:35		20:32	19:17	17:08	16:17	16:13	19	09:44 (WEA VB14)		
28	05:36		06:29	07:23	07:18	08:16	08:45			09:26 (WEA VB14)	
	21:33		20:30	19:15	17:05	16:16	16:14	18	09:44 (WEA VB14)		
29	05:37		06:30	07:25	07:20	08:18	08:45			09:26 (WEA VB14)	
	21:32		20:28	19:12	17:03	16:15	16:15	18	09:44 (WEA VB14)		
30	05:39		06:32	07:27	07:22	08:19	08:45			09:27 (WEA VB14)	
	21:30		20:25	19:10	17:01	16:14	16:16	18	09:45 (WEA VB14)		
31	05:40		06:34		07:24		08:45			09:27 (WEA VB14)	
	21:28		20:23		16:59		16:17	17	09:44 (WEA VB14)		
Sonnenscheinstunden		511		459	382	329	260		235		485
astr.max.mögl.Beschattung		17									

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)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO31 - Purkswarfe 3

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar			Februar	März	April	Mai	Juni
1	08:45	09:31 (WEA VB19)	08:16	07:19	07:04	05:55	05:06
	16:18	3 09:34 (WEA VB19)	17:09	18:04	20:02	20:57	21:47
2	08:45		08:14	07:16	07:02	05:53	05:06
	16:20		17:11	18:06	20:04	20:59	21:48
3	08:45		08:12	07:14	06:59	05:51	05:05
	16:21		17:13	18:08	20:06	21:01	21:49
4	08:45		08:10	07:12	06:57	05:49	05:04
	16:22		17:15	18:10	20:08	21:03	21:50
5	08:44		08:09	07:09	06:54	05:47	05:03
	16:23		17:17	18:12	20:10	21:04	21:51
6	08:44		08:07	07:07	06:52	05:45	05:02
	16:24		17:19	18:14	20:12	21:06	21:52
7	08:44		08:05	07:05	06:50	05:43	05:02
	16:26		17:21	18:16	20:13	21:08	21:53
8	08:43		08:03	07:02	06:47	05:42	05:01
	16:27		17:23	18:18	20:15	21:10	21:54
9	08:43		08:01	07:00	06:45	05:40	05:01
	16:29		17:25	18:20	20:17	21:11	21:55
10	08:42		07:59	06:57	06:42	05:38	05:00
	16:30		17:27	18:22	20:19	21:13	21:56
11	08:41		07:57	06:55	06:40	05:36	05:00
	16:32		17:29	18:24	20:21	21:15	21:57
12	08:41		07:55	06:53	06:38	05:34	04:59
	16:33		17:31	18:25	20:23	21:17	21:57
13	08:40		07:53	06:50	06:35	05:33	04:59
	16:35		17:33	18:27	20:24	21:18	21:58
14	08:39		07:51	06:48	06:33	05:31	04:59
	16:36		17:35	18:29	20:26	21:20	21:59
15	08:38		07:49	06:45	06:31	05:29	04:58
	16:38		17:37	18:31	20:28	21:22	21:59
16	08:37		07:47	06:43	06:28	05:27	04:58
	16:40		17:39	18:33	20:30	21:23	22:00
17	08:36		07:45	06:41	06:26	05:26	04:58
	16:41		17:41	18:35	20:32	21:25	22:00
18	08:35		07:43	06:38	06:24	05:24	04:58
	16:43		17:43	18:37	20:34	21:27	22:01
19	08:34		07:41	06:36	06:22	05:23	04:58
	16:45		17:45	18:38	20:35	21:28	22:01
20	08:33		07:39	06:33	06:19	05:21	04:58
	16:47		17:47	18:40	20:37	21:30	22:02
21	08:32		07:37	06:31	06:17	05:20	04:58
	16:48		17:49	18:42	20:39	21:31	22:02
22	08:30		07:34	06:28	06:15	05:18	04:58
	16:50		17:51	18:44	20:41	21:33	22:02
23	08:29		07:32	06:26	06:13	05:17	04:59
	16:52		17:53	18:46	20:43	21:34	22:02
24	08:28		07:30	06:24	06:10	05:16	04:59
	16:54		17:55	18:48	20:44	21:36	22:02
25	08:26		07:28	06:21	06:08	05:14	04:59
	16:56		17:57	18:50	20:46	21:37	22:02
26	08:25		07:25	06:19	06:06	05:13	05:00
	16:58		17:59	18:51	20:48	21:39	22:02
27	08:23		07:23	06:16	06:04	05:12	05:00
	17:00		18:01	18:53	20:50	21:40	22:02
28	08:22		07:21	06:14	06:02	05:11	05:01
	17:01		18:03	18:55	20:52	21:41	22:02
29	08:20			07:11	06:00	05:10	05:01
	17:03			19:57	20:54	21:43	22:02
30	08:19			07:09	05:57	05:08	05:02
	17:05			19:59	20:55	21:44	22:02
31	08:17			07:06		05:07	
	17:07			20:01		21:45	
Sonnenscheinstunden	251		274	367	419	493	509
astr.max.mögl.Beschattung	3					31	

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	(WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattende	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO31 - Purkswarfe 3

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Jul	August	September	Oktober	November	Dezember	
1	05:03	05:42	06:36	07:28	07:26	08:21	
	22:01	21:27	20:21	19:07	16:57	16:13	
2	05:03	05:44	06:37	07:30	07:28	08:22	
	22:01	21:25	20:18	19:05	16:55	16:13	
3	05:04	05:45	06:39	07:32	07:30	08:24	
	22:01	21:23	20:16	19:03	16:53	16:12	
4	05:05	05:47	06:41	07:34	07:32	08:25	
	22:00	21:21	20:13	19:00	16:51	16:11	
5	05:06	05:49	06:43	07:36	07:34	08:26	
	22:00	21:19	20:11	18:58	16:50	16:11	
6	05:07	05:50	06:44	07:37	07:36	08:28	
	21:59	21:17	20:09	18:55	16:48	16:10	
7	05:08	05:52	06:46	07:39	07:38	08:29	
	21:58	21:15	20:06	18:53	16:46	16:10	
8	05:09	05:54	06:48	07:41	07:40	08:30	
	21:58	21:13	20:04	18:50	16:44	16:09	
9	05:10	05:56	06:50	07:43	07:42	08:32	
	21:57	21:11	20:01	18:48	16:42	16:09	
10	05:11	05:57	06:51	07:45	07:43	08:33	
	21:56	21:09	19:59	18:46	16:41	16:09	
11	05:12	05:59	06:53	07:47	07:45	08:34	09:22 (WEA VB19)
	21:55	21:07	19:56	18:43	16:39	16:09	2 09:24 (WEA VB19)
12	05:13	06:01	06:55	07:48	07:47	08:35	09:21 (WEA VB19)
	21:54	21:05	19:54	18:41	16:37	16:08	5 09:26 (WEA VB19)
13	05:14	06:02	06:57	07:50	07:49	08:36	09:21 (WEA VB19)
	21:53	21:03	19:52	18:39	16:36	16:08	7 09:28 (WEA VB19)
14	05:15	06:04	06:58	07:52	07:51	08:37	09:21 (WEA VB19)
	21:52	21:01	19:49	18:36	16:34	16:08	8 09:29 (WEA VB19)
15	05:17	06:06	07:00	07:54	07:53	08:38	09:21 (WEA VB19)
	21:51	20:59	19:47	18:34	16:32	16:08	9 09:30 (WEA VB19)
16	05:18	06:08	07:02	07:56	07:55	08:39	09:21 (WEA VB19)
	21:50	20:57	19:44	18:32	16:31	16:08	9 09:30 (WEA VB19)
17	05:19	06:09	07:04	07:58	07:57	08:40	09:21 (WEA VB19)
	21:49	20:55	19:42	18:29	16:29	16:08	10 09:31 (WEA VB19)
18	05:21	06:11	07:05	08:00	07:58	08:41	09:21 (WEA VB19)
	21:48	20:53	19:39	18:27	16:28	16:09	11 09:32 (WEA VB19)
19	05:22	06:13	07:07	08:01	08:00	08:41	09:22 (WEA VB19)
	21:46	20:50	19:37	18:25	16:27	16:09	10 09:32 (WEA VB19)
20	05:23	06:15	07:09	08:03	08:02	08:42	09:22 (WEA VB19)
	21:45	20:48	19:34	18:23	16:25	16:09	10 09:32 (WEA VB19)
21	05:25	06:16	07:11	08:05	08:04	08:43	09:23 (WEA VB19)
	21:44	20:46	19:32	18:20	16:24	16:10	10 09:33 (WEA VB19)
22	05:26	06:18	07:12	08:07	08:06	08:43	09:23 (WEA VB19)
	21:42	20:44	19:29	18:18	16:23	16:10	10 09:33 (WEA VB19)
23	05:28	06:20	07:14	08:09	08:07	08:44	09:24 (WEA VB19)
	21:41	20:41	19:27	18:16	16:21	16:11	10 09:34 (WEA VB19)
24	05:29	06:22	07:16	08:11	08:09	08:44	09:24 (WEA VB19)
	21:40	20:39	19:24	18:14	16:20	16:11	10 09:34 (WEA VB19)
25	05:31	06:23	07:18	08:11	08:11	08:44	09:24 (WEA VB19)
	21:38	20:37	19:22	17:12	16:19	16:12	10 09:34 (WEA VB19)
26	05:32	06:25	07:20	08:13	08:13	08:45	09:26 (WEA VB19)
	21:37	20:35	19:20	17:10	16:18	16:13	10 09:36 (WEA VB19)
27	05:34	06:27	07:21	08:14	08:14	08:45	09:26 (WEA VB19)
	21:35	20:32	19:17	17:08	16:17	16:13	10 09:36 (WEA VB19)
28	05:36	06:29	07:23	08:16	08:16	08:45	09:27 (WEA VB19)
	21:33	20:30	19:15	17:05	16:16	16:14	9 09:36 (WEA VB19)
29	05:37	06:30	07:25	08:18	08:18	08:45	09:28 (WEA VB19)
	21:32	20:28	19:12	17:03	16:15	16:15	8 09:36 (WEA VB19)
30	05:39	06:32	07:27	08:19	08:19	08:45	09:29 (WEA VB19)
	21:30	20:25	19:10	17:01	16:14	16:16	7 09:36 (WEA VB19)
31	05:40	06:34		07:24		08:45	09:29 (WEA VB19)
	21:28	20:23		16:59		16:17	6 09:35 (WEA VB19)
Sonnenscheinstunden		511				235	
astr.max.mögl.Beschattung		33	459	382	329	260	181

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)
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Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix.Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO32 - Putzwei 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

		Januar	Februar	März	April	Mai		Juni		Juli		August	September	Oktober	November	Dezember	
1	08:45	08:16	07:19	07:04	05:55		05:06	05:37 (WEA VB6)	05:03	05:40 (WEA VB6)	05:42	06:36	07:28	07:26	08:21		
	16:18	17:09	18:04	20:02	20:57		21:47	33	21:13 (WEA ZB2)	22:01	49	21:26 (WEA ZB2)	21:27	20:21	19:07	16:57	16:13
2	08:45	08:14	07:16	07:02	05:53		05:05	05:36 (WEA VB6)	05:03	05:41 (WEA VB6)	05:44	06:37	07:30	07:28	08:22		
	16:19	17:11	18:06	20:04	20:59		21:48	36	21:13 (WEA ZB2)	22:01	47	21:26 (WEA ZB2)	21:25	20:18	19:05	16:55	16:13
3	08:45	08:12	07:14	06:59	05:51		05:05	05:35 (WEA VB6)	05:04	05:41 (WEA VB6)	05:45	06:39	07:32	07:30	08:24		
	16:21	17:13	18:08	20:06	21:01		21:49	39	21:14 (WEA ZB2)	22:01	47	21:25 (WEA ZB2)	21:23	20:16	19:02	16:53	16:12
4	08:45	08:10	07:12	06:57	05:49		05:04	05:35 (WEA VB6)	05:05	05:41 (WEA VB6)	05:47	06:41	07:34	07:32	08:25		
	16:22	17:15	18:10	20:08	21:03		21:50	41	21:16 (WEA ZB2)	22:00	46	21:25 (WEA ZB2)	21:21	20:13	19:00	16:51	16:11
5	08:44	08:09	07:09	06:54	05:47		05:03	05:35 (WEA VB6)	05:06	05:41 (WEA VB6)	05:49	06:43	07:36	07:34	08:26		
	16:23	17:17	18:12	20:10	21:04		21:51	41	21:16 (WEA ZB2)	22:00	45	21:24 (WEA ZB2)	21:19	20:11	18:58	16:50	16:11
6	08:44	08:07	07:07	06:52	05:45		05:02	05:34 (WEA VB6)	05:07	05:41 (WEA VB6)	05:50	06:44	07:37	07:36	08:28		
	16:24	17:19	18:14	20:12	21:06		21:52	44	21:17 (WEA ZB2)	21:59	44	21:24 (WEA ZB2)	21:17	20:09	18:55	16:48	16:10
7	08:44	08:05	07:05	06:50	05:43		05:02	05:35 (WEA VB6)	05:08	05:41 (WEA VB6)	05:52	06:46	07:39	07:38	08:29		
	16:26	17:21	18:16	20:13	21:08		21:53	45	21:18 (WEA ZB2)	21:58	43	21:23 (WEA ZB2)	21:15	20:06	18:53	16:46	16:10
8	08:43	08:03	07:02	06:47	05:42		05:01	05:35 (WEA VB6)	05:09	05:41 (WEA VB6)	05:54	06:48	07:41	07:40	08:30		
	16:27	17:23	18:18	20:15	21:10		21:54	46	21:19 (WEA ZB2)	21:58	42	21:23 (WEA ZB2)	21:13	20:04	18:50	16:44	16:09
9	08:43	08:01	07:00	06:45	05:40		05:00	05:36 (WEA VB6)	05:10	05:42 (WEA VB6)	05:55	06:50	07:43	07:42	08:32		
	16:29	17:25	18:20	20:17	21:11		21:55	47	21:20 (WEA ZB2)	21:57	40	21:22 (WEA ZB2)	21:11	20:01	18:48	16:42	16:09
10	08:42	07:59	06:57	06:42	05:38		05:00	05:36 (WEA VB6)	05:11	05:43 (WEA VB6)	05:57	06:51	07:45	07:43	08:33		
	16:30	17:27	18:22	20:19	21:13		21:56	48	21:21 (WEA ZB2)	21:56	37	21:21 (WEA ZB2)	21:09	19:59	18:46	16:41	16:09
11	08:41	07:57	06:55	06:40	05:36		05:00	05:36 (WEA VB6)	05:12	05:44 (WEA VB6)	05:59	06:53	07:47	07:45	08:34		
	16:32	17:29	18:23	20:21	21:15		21:57	48	21:21 (WEA ZB2)	21:55	34	21:20 (WEA ZB2)	21:07	19:56	18:43	16:39	16:08
12	08:40	07:55	06:53	06:38	05:34		04:59	05:36 (WEA VB6)	05:13	05:45 (WEA VB6)	06:01	06:55	07:48	07:47	08:35		
	16:33	17:31	18:25	20:23	21:17		21:57	49	21:22 (WEA ZB2)	21:54	31	21:20 (WEA ZB2)	21:05	19:54	18:41	16:37	16:08
13	08:40	07:53	06:50	06:35	05:32		04:59	05:37 (WEA VB6)	05:14	05:46 (WEA VB6)	06:02	06:57	07:50	07:49	08:36		
	16:35	17:33	18:27	20:24	21:18		21:58	49	21:23 (WEA ZB2)	21:53	28	21:19 (WEA ZB2)	21:03	19:51	18:39	16:36	16:08
14	08:39	07:51	06:48	06:33	05:31		04:59	05:37 (WEA VB6)	05:15	05:48 (WEA VB6)	06:04	06:58	07:52	07:51	08:37		
	16:36	17:35	18:29	20:26	21:20		21:59	51	21:24 (WEA ZB2)	21:52	23	21:19 (WEA ZB2)	21:01	19:49	18:36	16:34	16:08
15	08:38	07:49	06:45	06:31	05:29		04:58	05:38 (WEA VB6)	05:17	05:49 (WEA VB6)	06:06	07:00	07:54	07:53	08:38		
	16:38	17:37	18:31	20:28	21:22		21:59	50	21:24 (WEA ZB2)	21:51	19	21:18 (WEA ZB2)	21:09	19:47	18:34	16:32	16:08
16	08:37	07:47	06:43	06:28	05:27		04:58	05:37 (WEA VB6)	05:18	05:50 (WEA VB6)	06:08	07:02	07:56	07:55	08:39		
	16:40	17:39	18:33	20:30	21:23		22:00	51	21:24 (WEA ZB2)	21:50	13	21:16 (WEA ZB2)	20:57	19:44	18:32	16:31	16:08
17	08:36	07:45	06:41	06:26	05:26		04:58	05:38 (WEA VB6)	05:19	05:51 (WEA VB6)	06:09	07:04	07:58	07:57	08:40		
	16:41	17:41	18:35	20:32	21:25		22:00	49	21:24 (WEA ZB2)	21:49	7	05:58 (WEA VB6)	20:55	19:42	18:29	16:29	16:08
18	08:35	07:43	06:38	06:24	05:24		04:58	05:38 (WEA VB6)	05:21	05:52 (WEA VB6)	06:11	07:05	07:59	07:58	08:41		
	16:43	17:43	18:37	20:33	21:27		22:01	50	21:25 (WEA ZB2)	21:48	5	05:57 (WEA VB6)	20:53	19:39	18:27	16:28	16:09
19	08:34	07:41	06:36	06:21	05:23		04:58	05:39 (WEA VB6)	05:22	05:54 (WEA VB6)	06:13	07:07	08:01	08:00	08:41		
	16:45	17:45	18:38	20:35	21:28		22:01	50	21:26 (WEA ZB2)	21:46	3	05:57 (WEA VB6)	20:50	19:37	18:25	16:27	16:09
20	08:33	07:39	06:33	06:19	05:21		04:58	05:39 (WEA VB6)	05:23			06:15	07:09	08:03	08:02	08:42	
	16:47	17:47	18:40	20:37	21:30		22:02	51	21:26 (WEA ZB2)	21:45		20:48	19:34	18:23	16:25	16:09	
21	08:32	07:37	06:31	06:17	05:20		04:58	05:39 (WEA VB6)	05:25			06:16	07:11	08:05	08:04	08:43	
	16:48	17:49	18:42	20:39	21:31		22:02	51	21:26 (WEA ZB2)	21:44		20:46	19:32	18:20	16:24	16:10	
22	08:30	07:34	06:28	06:15	05:18		04:58	05:39 (WEA VB6)	05:26			06:18	07:12	08:07	08:06	08:43	
	16:50	17:51	18:44	20:41	21:33		22:02	51	21:26 (WEA ZB2)	21:42		20:44	19:29	18:18	16:23	16:10	
23	08:29	07:32	06:26	06:12	05:17		04:59	05:39 (WEA VB6)	05:28			06:20	07:14	08:09	08:07	08:44	
	16:52	17:53	18:46	20:43	21:34		22:02	50	21:26 (WEA ZB2)	21:41		20:41	19:27	18:16	16:21	16:11	
24	08:28	07:30	06:24	06:10	05:16		04:59	05:40 (WEA VB6)	05:29			06:22	07:16	08:11	08:09	08:44	
	16:54	17:55	18:48	20:44	21:36	2	05:47 (WEA VB6)	22:02	50	21:27 (WEA ZB2)	21:40		20:39	19:24	18:14	16:20	16:11
25	08:26	07:28	06:21	06:08	05:14		04:59	05:40 (WEA VB6)	05:31			06:23	07:18	07:13	08:11	08:44	
	16:56	17:57	18:49	20:46	21:37	4	05:47 (WEA VB6)	22:02	50	21:27 (WEA ZB2)	21:38		20:37	19:22	17:12	16:19	16:12
26	08:25	07:25	06:19	06:06	05:13		05:42 (WEA VB6)	05:00	05:40 (WEA VB6)	05:32		06:25	07:20	07:15	08:13	08:45	
	16:58	17:59	18:51	20:48	21:39	6	05:48 (WEA VB6)	22:02	50	21:27 (WEA ZB2)	21:37		20:35	19:20	17:10	16:18	16:13
27	08:23	07:23	06:16	06:04	05:12		05:41 (WEA VB6)	05:00	05:40 (WEA VB6)	05:34		06:27	07:21	07:17	08:14	08:45	
	16:59	18:01	18:53	20:50	21:40	8	05:49 (WEA VB6)	22:02	51	21:27 (WEA ZB2)	21:35		20:32	19:17	17:08	16:17	16:13
28	08:22	07:21	06:14	06:02	05:11		05:40 (WEA VB6)	05:01	05:41 (WEA VB6)	05:35		06:29	07:23	07:18	08:16	08:45	
	17:01	18:02	18:55	20:52	21:41	15	21:07 (WEA ZB2)	22:02	50	21:27 (WEA ZB2)	21:33		20:30	19:15	17:05	16:16	16:14
29	08:20		07:11	06:00	05:09		05:39 (WEA VB6)	05:01	05:40 (WEA VB6)	05:37		06:30	07:25	07:20	08:17	08:45	
	17:03		19:57	20:54	21:43	22	21:09 (WEA ZB2)	22:02	49	21:26 (WEA ZB2)	21:32		20:28	19:12	17:03	16:15	16:15
30	08:19		07:09	05:57	05:08		05:38 (WEA VB6)	05:02	05:41 (WEA VB6)	05:39		06:32	07:27	07:22	08:19	08:45	
	17:05		19:59	20:55	21:44	26	21:10 (WEA ZB2)	22:02	48	21:26 (WEA ZB2)	21:30		20:25	19:10	17:01	16:14	16:16
31	08:17		07:06		05:07		05:38 (WEA VB6)			05:40			06:34		07:24		08:45
	17:07		20:01		21:45	29	21:12 (WEA ZB2)			21:28			20:23		16:59		16:17
Sonnenscheinstunden	251	274	367	419	493		509			511		459	382	329	260	235	
astr.max.mögl.Beschattung					112		1418			603							

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

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

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO33 - Westerhausen 5
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:45 16:18	08:16 17:09	07:19 18:04	16:04 (WEA ZB3) 07:04 17:20 (WEA ZB3) 20:02	16:58 (WEA ZB3) 05:55 19:34 (WEA ZB2) 20:57	06:28 (WEA VB6) 05:06 20:28 (WEA ZB1) 21:47
2	08:45 16:19	08:14 17:11	07:16 18:06	16:03 (WEA ZB3) 07:02 17:21 (WEA ZB3) 20:04	16:59 (WEA ZB3) 05:53 19:35 (WEA ZB2) 20:59	06:28 (WEA VB6) 05:05 20:29 (WEA ZB1) 21:48
3	08:45 16:21	08:12 17:13	07:14 18:08	16:02 (WEA ZB3) 06:59 17:21 (WEA ZB3) 20:06	17:01 (WEA ZB3) 05:51 19:36 (WEA ZB2) 21:01	06:29 (WEA VB6) 05:05 20:31 (WEA ZB1) 21:49
4	08:45 16:22	08:10 17:15	07:12 18:10	16:01 (WEA ZB3) 06:57 17:22 (WEA ZB3) 20:08	17:01 (WEA ZB3) 05:49 19:36 (WEA ZB2) 21:03	06:29 (WEA VB6) 05:04 20:32 (WEA ZB1) 21:50
5	08:44 16:23	08:09 17:17	07:09 18:12	15:59 (WEA ZB3) 06:54 17:22 (WEA ZB3) 20:10	17:03 (WEA ZB3) 05:47 19:36 (WEA ZB2) 21:04	06:30 (WEA VB6) 05:03 20:34 (WEA ZB1) 21:51
6	08:44 16:24	08:07 17:19	07:07 18:14	15:59 (WEA ZB3) 06:52 17:23 (WEA ZB3) 20:12	17:05 (WEA ZB3) 05:45 19:37 (WEA ZB2) 21:06	06:32 (WEA VB6) 05:02 20:35 (WEA ZB1) 21:52
7	08:44 16:26	08:05 17:21	07:05 18:16	15:59 (WEA ZB3) 06:50 17:24 (WEA ZB3) 20:13	17:06 (WEA ZB3) 05:43 19:36 (WEA ZB2) 21:08	06:34 (WEA VB6) 05:02 20:35 (WEA ZB1) 21:53
8	08:43 16:27	08:03 17:23	07:02 18:18	15:57 (WEA ZB3) 06:47 17:23 (WEA ZB3) 20:15	17:08 (WEA ZB3) 05:42 19:37 (WEA ZB2) 21:10	19:53 (WEA ZB1) 05:01 20:35 (WEA ZB1) 21:54
9	08:43 16:29	08:01 17:25	07:00 18:20	15:57 (WEA ZB3) 06:45 17:24 (WEA ZB3) 20:17	17:09 (WEA ZB3) 05:40 19:36 (WEA ZB2) 21:11	19:53 (WEA ZB1) 05:00 20:34 (WEA ZB1) 21:55
10	08:42 16:30	07:59 17:27	06:57 18:22	15:56 (WEA ZB3) 06:42 17:24 (WEA ZB3) 20:19	17:12 (WEA ZB3) 05:38 19:36 (WEA ZB2) 21:13	19:53 (WEA ZB1) 05:00 20:35 (WEA ZB1) 21:56
11	08:41 16:31	07:57 17:29	06:55 18:23	15:56 (WEA ZB3) 06:40 17:24 (WEA ZB3) 20:21	17:15 (WEA ZB3) 05:36 19:36 (WEA ZB2) 21:15	19:53 (WEA ZB1) 05:00 20:35 (WEA ZB1) 21:57
12	08:41 16:33	07:55 17:31	06:53 18:25	15:54 (WEA ZB3) 06:38 17:24 (WEA ZB3) 20:23	17:17 (WEA ZB3) 05:34 19:35 (WEA ZB2) 21:17	19:53 (WEA ZB1) 04:59 20:34 (WEA ZB1) 21:57
13	08:40 16:35	07:53 17:33	06:50 18:27	15:54 (WEA ZB3) 06:35 17:24 (WEA ZB3) 20:24	17:21 (WEA ZB3) 05:32 19:35 (WEA ZB2) 21:18	19:53 (WEA ZB1) 04:59 20:35 (WEA ZB1) 21:58
14	08:39 16:36	07:51 17:35	06:48 18:29	15:55 (WEA ZB3) 06:33 17:25 (WEA ZB3) 20:26	17:27 (WEA ZB3) 05:31 19:34 (WEA ZB2) 21:20	19:53 (WEA ZB1) 04:59 20:34 (WEA ZB1) 21:59
15	08:38 16:38	07:49 17:37	06:45 18:31	15:54 (WEA ZB3) 06:31 17:24 (WEA ZB3) 20:28	18:42 (WEA ZB2) 05:29 19:34 (WEA ZB2) 21:22	19:54 (WEA ZB1) 04:58 20:35 (WEA ZB1) 21:59
16	08:37 16:40	07:47 17:39	06:43 18:33	15:54 (WEA ZB3) 06:28 17:24 (WEA ZB3) 20:30	18:42 (WEA ZB2) 05:27 19:33 (WEA ZB2) 21:23	19:54 (WEA ZB1) 04:58 20:34 (WEA ZB1) 22:00
17	08:36 16:41	07:45 17:41	06:41 18:35	15:53 (WEA ZB3) 06:26 17:23 (WEA ZB3) 20:32	18:42 (WEA ZB2) 05:26 19:32 (WEA ZB2) 21:25	19:54 (WEA ZB1) 04:58 20:34 (WEA ZB1) 22:00
18	08:35 16:43	07:43 17:43	06:38 18:37	15:53 (WEA ZB3) 06:24 17:24 (WEA ZB3) 20:33	18:43 (WEA ZB2) 05:24 19:31 (WEA ZB2) 21:27	05:54 (WEA VB5) 04:58 20:33 (WEA ZB1) 22:01
19	08:34 16:45	07:41 17:45	06:36 18:38	15:53 (WEA ZB3) 06:21 17:23 (WEA ZB3) 20:35	18:44 (WEA ZB2) 05:23 19:31 (WEA ZB2) 21:28	05:52 (WEA VB5) 04:58 20:33 (WEA ZB1) 22:01
20	08:33 16:46	07:39 17:47	06:33 18:40	15:53 (WEA ZB3) 06:19 17:23 (WEA ZB3) 20:37	18:44 (WEA ZB2) 05:21 19:30 (WEA ZB2) 21:30	05:51 (WEA VB5) 04:58 20:33 (WEA ZB1) 22:02
21	08:32 16:48	07:37 17:49	06:31 18:42	15:53 (WEA ZB3) 06:17 17:22 (WEA ZB3) 20:39	18:44 (WEA ZB2) 05:20 19:28 (WEA ZB2) 21:31	05:49 (WEA VB5) 04:58 20:32 (WEA ZB1) 22:02
22	08:30 16:50	07:34 17:51	06:28 18:44	15:53 (WEA ZB3) 06:15 17:22 (WEA ZB3) 20:41	06:39 (WEA VB6) 05:18 19:27 (WEA ZB2) 21:33	05:48 (WEA VB5) 04:58 20:32 (WEA ZB1) 22:02
23	08:29 16:52	07:32 17:53	06:26 18:46	15:53 (WEA ZB3) 06:12 17:21 (WEA ZB3) 20:43	06:37 (WEA VB6) 05:17 19:26 (WEA ZB2) 21:34	05:48 (WEA VB5) 04:59 20:31 (WEA ZB1) 22:02
24	08:28 16:54	07:30 17:55	06:24 18:48	15:54 (WEA ZB3) 06:10 18:19 (WEA ZB2) 20:44	06:35 (WEA VB6) 05:16 20:16 (WEA ZB1) 21:36	05:48 (WEA VB5) 04:59 20:31 (WEA ZB1) 22:02
25	08:26 16:56	07:28 17:57	06:21 18:49	15:54 (WEA ZB3) 06:08 18:24 (WEA ZB2) 20:46	06:33 (WEA VB6) 05:14 20:17 (WEA ZB1) 21:37	05:46 (WEA VB5) 04:59 20:30 (WEA ZB1) 22:02
26	08:25 16:58	07:25 17:59	06:19 18:51	15:54 (WEA ZB3) 06:06 18:25 (WEA ZB2) 20:48	06:31 (WEA VB6) 05:13 20:19 (WEA ZB1) 21:39	05:46 (WEA VB5) 05:00 20:29 (WEA ZB1) 22:02
27	08:23 16:59	07:23 18:01	06:16 18:53	15:55 (WEA ZB3) 06:04 18:27 (WEA ZB2) 20:50	06:29 (WEA VB6) 05:12 20:21 (WEA ZB1) 21:40	05:46 (WEA VB5) 05:00 20:29 (WEA ZB1) 22:02
28	08:22 17:01	07:21 18:02	06:14 18:55	15:55 (WEA ZB3) 06:02 18:28 (WEA ZB2) 20:52	06:28 (WEA VB6) 05:11 20:23 (WEA ZB1) 21:41	05:46 (WEA VB5) 05:01 20:28 (WEA ZB1) 22:02
29	17:03 17:03		07:11 19:57	16:56 (WEA ZB3) 06:00 19:31 (WEA ZB2) 20:54	06:28 (WEA VB6) 05:09 20:24 (WEA ZB1) 21:43	05:46 (WEA VB5) 05:01 20:27 (WEA ZB1) 22:02
30	17:03 17:05		07:09 19:59	16:56 (WEA ZB3) 05:57 19:32 (WEA ZB2) 20:55	06:28 (WEA VB6) 05:08 20:26 (WEA ZB1) 21:44	05:46 (WEA VB5) 05:02 20:27 (WEA ZB1) 22:02
31	17:07 17:07		07:06 20:01	16:57 (WEA ZB3) 05:55 19:34 (WEA ZB2) 20:55	21:44 21:45	05:47 (WEA VB5) 05:02 20:27 (WEA ZB1) 22:02
Sonnenscheinstunden	251	274	367	419	493	509
astr.max.mögl.Beschattung		676	2891	2294	1486	790

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO33 - Westerhausen 5

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember	
1	05:03	05:52 (WEA VB5)	05:42	20:03 (WEA ZB1)	06:36	17:14 (WEA ZB3)	07:28	16:34 (WEA ZB3)	07:26	08:21	
	22:01	24 06:16 (WEA VB5)	21:27	42 20:45 (WEA ZB1)	20:21	94 19:35 (WEA ZB2)	19:07	90 18:04 (WEA ZB3)	16:57	16:13	
2	05:03	05:53 (WEA VB5)	05:44	20:03 (WEA ZB1)	06:37	17:11 (WEA ZB3)	07:30	16:33 (WEA ZB3)	07:28	08:22	
	22:01	24 06:17 (WEA VB5)	21:25	42 20:45 (WEA ZB1)	20:18	100 19:35 (WEA ZB2)	19:05	89 18:02 (WEA ZB3)	16:55	16:13	
3	05:04	05:53 (WEA VB5)	05:45	20:03 (WEA ZB1)	06:39	17:07 (WEA ZB3)	07:32	16:34 (WEA ZB3)	07:30	08:24	
	22:01	25 06:18 (WEA VB5)	21:23	42 20:45 (WEA ZB1)	20:16	105 19:34 (WEA ZB2)	19:02	88 18:02 (WEA ZB3)	16:53	16:12	
4	05:05	05:53 (WEA VB5)	05:47	20:03 (WEA ZB1)	06:41	17:05 (WEA ZB3)	07:34	16:34 (WEA ZB3)	07:32	08:25	
	22:00	25 06:18 (WEA VB5)	21:21	42 20:45 (WEA ZB1)	20:13	108 19:34 (WEA ZB2)	19:00	87 18:01 (WEA ZB3)	16:51	16:11	
5	05:06	05:53 (WEA VB5)	05:49	20:04 (WEA ZB1)	06:43	17:03 (WEA ZB3)	07:36	16:34 (WEA ZB3)	07:34	08:26	
	22:00	24 06:17 (WEA VB5)	21:19	41 20:45 (WEA ZB1)	20:11	111 19:33 (WEA ZB2)	18:58	87 18:01 (WEA ZB3)	16:50	16:11	
6	05:07	05:53 (WEA VB5)	05:50	06:43 (WEA VB6)	06:44	17:00 (WEA ZB3)	07:37	16:34 (WEA ZB3)	07:36	08:28	
	21:59	25 06:18 (WEA VB5)	21:17	48 20:44 (WEA ZB1)	20:09	114 19:32 (WEA ZB2)	18:55	86 18:00 (WEA ZB3)	16:48	16:10	
7	05:08	05:53 (WEA VB5)	05:52	06:41 (WEA VB6)	06:46	16:58 (WEA ZB3)	07:39	16:35 (WEA ZB3)	07:38	08:29	
	21:58	30 20:25 (WEA ZB1)	21:15	52 20:44 (WEA ZB1)	20:06	117 19:32 (WEA ZB2)	18:53	84 17:59 (WEA ZB3)	16:46	16:10	
8	05:09	05:53 (WEA VB5)	05:54	06:39 (WEA VB6)	06:48	16:57 (WEA ZB3)	07:41	16:35 (WEA ZB3)	07:40	08:30	
	21:58	35 20:28 (WEA ZB1)	21:13	54 20:43 (WEA ZB1)	20:04	118 19:31 (WEA ZB2)	18:50	83 17:58 (WEA ZB3)	16:44	16:09	
9	05:10	05:54 (WEA VB5)	05:55	06:38 (WEA VB6)	06:50	16:54 (WEA ZB3)	07:43	16:35 (WEA ZB3)	07:42	08:32	
	21:57	39 20:30 (WEA ZB1)	21:11	53 20:41 (WEA ZB1)	20:01	119 19:29 (WEA ZB2)	18:48	82 17:57 (WEA ZB3)	16:42	16:09	
10	05:11	05:54 (WEA VB5)	05:57	06:38 (WEA VB6)	06:51	16:53 (WEA ZB3)	07:45	16:35 (WEA ZB3)	07:43	08:33	
	21:56	41 20:31 (WEA ZB1)	21:09	52 20:40 (WEA ZB1)	19:59	121 19:29 (WEA ZB2)	18:46	81 17:56 (WEA ZB3)	16:41	16:09	
11	05:12	05:54 (WEA VB5)	05:59	06:37 (WEA VB6)	06:53	16:51 (WEA ZB3)	07:47	16:36 (WEA ZB3)	07:45	08:34	
	21:55	44 20:33 (WEA ZB1)	21:07	50 20:37 (WEA ZB1)	19:56	122 19:28 (WEA ZB2)	18:43	79 17:55 (WEA ZB3)	16:39	16:08	
12	05:13	05:54 (WEA VB5)	06:01	06:36 (WEA VB6)	06:55	16:49 (WEA ZB3)	07:48	16:37 (WEA ZB3)	07:47	08:35	
	21:54	46 20:34 (WEA ZB1)	21:05	50 20:36 (WEA ZB1)	19:54	121 19:26 (WEA ZB2)	18:41	76 17:53 (WEA ZB3)	16:37	16:08	
13	05:14	05:54 (WEA VB5)	06:02	06:36 (WEA VB6)	06:57	16:48 (WEA ZB3)	07:50	16:38 (WEA ZB3)	07:49	08:36	
	21:53	48 20:35 (WEA ZB1)	21:03	46 20:33 (WEA ZB1)	19:52	119 19:23 (WEA ZB2)	18:39	74 17:52 (WEA ZB3)	16:36	16:08	
14	05:15	05:55 (WEA VB5)	06:04	06:36 (WEA VB6)	06:58	16:47 (WEA ZB3)	07:52	16:39 (WEA ZB3)	07:51	08:37	
	21:52	49 20:36 (WEA ZB1)	21:01	57 20:31 (WEA ZB1)	19:49	118 19:21 (WEA ZB2)	18:36	72 17:51 (WEA ZB3)	16:34	16:08	
15	05:17	05:55 (WEA VB5)	06:06	06:36 (WEA VB6)	07:00	16:46 (WEA ZB3)	07:54	16:40 (WEA ZB3)	07:53	08:38	
	21:51	50 20:37 (WEA ZB1)	20:59	61 20:30 (WEA ZB1)	19:47	115 19:19 (WEA ZB2)	18:34	70 17:50 (WEA ZB3)	16:32	16:08	
16	05:18	05:55 (WEA VB5)	06:08	06:36 (WEA VB6)	07:02	16:44 (WEA ZB3)	07:56	16:41 (WEA ZB3)	07:55	08:39	
	21:50	52 20:38 (WEA ZB1)	20:57	63 20:27 (WEA ZB1)	19:44	114 19:16 (WEA ZB2)	18:32	67 17:48 (WEA ZB3)	16:31	16:08	
17	05:19	05:56 (WEA VB5)	06:09	06:38 (WEA VB6)	07:04	16:43 (WEA ZB3)	07:58	16:42 (WEA ZB3)	07:57	08:40	
	21:49	53 20:39 (WEA ZB1)	20:55	61 20:25 (WEA ZB1)	19:42	110 19:14 (WEA ZB2)	18:29	65 17:47 (WEA ZB3)	16:29	16:08	
18	05:21	05:56 (WEA VB5)	06:11	06:40 (WEA VB6)	07:05	16:42 (WEA ZB3)	07:59	16:43 (WEA ZB3)	07:58	08:41	
	21:48	53 20:39 (WEA ZB1)	20:53	57 20:24 (WEA ZB1)	19:39	107 19:12 (WEA ZB2)	18:27	62 17:45 (WEA ZB3)	16:28	16:09	
19	05:22	05:57 (WEA VB5)	06:13	06:41 (WEA VB6)	07:07	16:40 (WEA ZB3)	08:01	16:45 (WEA ZB3)	08:00	08:41	
	21:46	54 20:40 (WEA ZB1)	20:50	50 20:21 (WEA ZB1)	19:37	101 19:08 (WEA ZB2)	18:25	58 17:43 (WEA ZB3)	16:27	16:09	
20	05:23	05:57 (WEA VB5)	06:15	06:43 (WEA VB6)	07:09	16:40 (WEA ZB3)	08:03	16:47 (WEA ZB3)	08:02	08:42	
	21:45	55 20:41 (WEA ZB1)	20:48	46 19:32 (WEA ZB2)	19:34	87 18:07 (WEA ZB3)	18:23	54 17:41 (WEA ZB3)	16:25	16:09	
21	05:25	05:58 (WEA VB5)	06:16	18:51 (WEA ZB2)	07:11	16:39 (WEA ZB3)	08:05	16:49 (WEA ZB3)	08:04	08:43	
	21:44	53 20:41 (WEA ZB1)	20:46	42 19:33 (WEA ZB2)	19:32	88 18:07 (WEA ZB3)	18:20	50 17:39 (WEA ZB3)	16:24	16:10	
22	05:26	05:59 (WEA VB5)	06:18	18:49 (WEA ZB2)	07:12	16:38 (WEA ZB3)	08:07	16:51 (WEA ZB3)	08:06	08:43	
	21:42	53 20:42 (WEA ZB1)	20:44	44 19:33 (WEA ZB2)	19:29	89 18:07 (WEA ZB3)	18:18	45 17:36 (WEA ZB3)	16:23	16:10	
23	05:28	06:00 (WEA VB5)	06:20	18:48 (WEA ZB2)	07:14	16:37 (WEA ZB3)	08:09	16:53 (WEA ZB3)	08:07	08:44	
	21:41	53 20:43 (WEA ZB1)	20:41	46 19:34 (WEA ZB2)	19:27	89 18:06 (WEA ZB3)	18:16	41 17:34 (WEA ZB3)	16:21	16:11	
24	05:29	06:01 (WEA VB5)	06:22	18:47 (WEA ZB2)	07:16	16:36 (WEA ZB3)	08:11	16:56 (WEA ZB3)	08:09	08:44	
	21:40	51 20:43 (WEA ZB1)	20:39	48 19:35 (WEA ZB2)	19:24	90 18:06 (WEA ZB3)	18:14	34 17:30 (WEA ZB3)	16:20	16:11	
25	05:31	06:03 (WEA VB5)	06:23	18:45 (WEA ZB2)	07:18	16:36 (WEA ZB3)	07:13	16:00 (WEA ZB3)	08:11	08:45	
	21:38	49 20:44 (WEA ZB1)	20:37	49 19:34 (WEA ZB2)	19:22	90 18:06 (WEA ZB3)	17:12	26 16:26 (WEA ZB3)	16:19	16:12	
26	05:32	06:06 (WEA VB5)	06:25	18:45 (WEA ZB2)	07:20	16:36 (WEA ZB3)	07:15	16:06 (WEA ZB3)	08:13	08:45	
	21:37	43 20:44 (WEA ZB1)	20:35	50 19:35 (WEA ZB2)	19:20	90 18:06 (WEA ZB3)	17:10	14 16:20 (WEA ZB3)	16:18	16:13	
27	05:34	20:05 (WEA ZB1)	06:27	18:44 (WEA ZB2)	07:21	16:35 (WEA ZB3)	07:17	16:08 (WEA ZB3)	08:14	08:45	
	21:35	39 20:44 (WEA ZB1)	20:32	51 19:35 (WEA ZB2)	19:17	90 18:05 (WEA ZB3)	17:07	16:17	16:13		
28	05:35	20:04 (WEA ZB1)	06:29	18:43 (WEA ZB2)	07:23	16:34 (WEA ZB3)	07:18	16:16	16:14		
	21:33	40 20:44 (WEA ZB1)	20:30	52 19:35 (WEA ZB2)	19:15	91 18:05 (WEA ZB3)	17:05	16:15	16:15		
29	05:37	20:04 (WEA ZB1)	06:30	17:28 (WEA ZB3)	07:25	16:34 (WEA ZB3)	07:20	16:14	16:14		
	21:32	41 20:45 (WEA ZB1)	20:28	69 19:35 (WEA ZB2)	19:12	91 18:05 (WEA ZB3)	17:03	16:13	16:13		
30	05:39	20:03 (WEA ZB1)	06:32	17:22 (WEA ZB3)	07:27	16:34 (WEA ZB3)	07:22	16:12	16:12		
	21:30	42 20:45 (WEA ZB1)	20:25	81 19:36 (WEA ZB2)	19:10	90 18:04 (WEA ZB3)	17:01	16:11	16:11		
31	05:40	20:04 (WEA ZB1)	06:34	17:17 (WEA ZB3)			07:24	16:10	16:10		
	21:28	41 20:45 (WEA ZB1)	20:23	89 19:35 (WEA ZB2)			16:59	16:09	16:09		
Sonnenscheinstunden	511		459		382		329		260	235	
astr.max.mögl.Beschattung	1301		1630		3119		1744				

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO34 - Westerhausen 6 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar			Februar			März			April			Mai			Juni		
1	08:45		13:19 (WEA ZB3)	08:16		13:27 (WEA ZB3)	07:19		16:30 (WEA ZB2)	07:04		17:40 (WEA ZB2)	05:55		06:33 (WEA VB5)	05:06		
2	16:18	87	14:46 (WEA ZB3)	17:09	92	14:59 (WEA ZB3)	18:04	60	17:30 (WEA ZB2)	20:02	27	18:07 (WEA ZB2)	20:57	75	20:01 (WEA ZB1)	21:47		
3	08:45		13:20 (WEA ZB3)	08:14		13:27 (WEA ZB3)	07:16		16:29 (WEA ZB2)	07:02		17:44 (WEA ZB2)	05:53		06:33 (WEA VB5)	05:05		
4	16:19	86	14:46 (WEA ZB3)	17:11	91	14:58 (WEA ZB3)	18:06	62	17:31 (WEA ZB2)	20:04	20	19:37 (WEA VB13)	20:59	72	20:00 (WEA ZB1)	21:48		
5	08:45		13:19 (WEA ZB3)	08:12		13:27 (WEA ZB3)	07:14		16:27 (WEA ZB2)	06:59		19:36 (WEA VB13)	05:51		06:34 (WEA VB5)	05:05		
6	16:21	87	14:46 (WEA ZB3)	17:13	91	14:58 (WEA ZB3)	18:08	64	17:31 (WEA ZB2)	20:06	4	19:40 (WEA VB13)	21:01	70	20:00 (WEA ZB1)	21:49		
7	08:45		13:20 (WEA ZB3)	08:10		13:29 (WEA ZB3)	07:12		16:27 (WEA ZB2)	06:57		19:36 (WEA VB13)	05:49		06:35 (WEA VB5)	05:04		
8	16:22	87	14:47 (WEA ZB3)	17:15	90	14:59 (WEA ZB3)	18:10	65	17:32 (WEA ZB2)	20:08	5	19:41 (WEA VB13)	21:03	66	19:59 (WEA ZB1)	21:50		
9	08:44		13:21 (WEA ZB3)	08:09		13:29 (WEA ZB3)	07:09		16:26 (WEA ZB2)	06:54			05:47		06:36 (WEA VB5)	05:03		
10	16:23	88	14:49 (WEA ZB3)	17:17	90	14:59 (WEA ZB3)	18:12	66	17:32 (WEA ZB2)	20:10			21:04	62	19:58 (WEA ZB1)	21:51		
11	08:44		13:21 (WEA ZB3)	08:07		13:30 (WEA ZB3)	07:07		16:25 (WEA ZB2)	06:52		07:16 (WEA VB6)	05:45		06:39 (WEA VB5)	05:02		
12	16:24	88	14:49 (WEA ZB3)	17:19	88	14:58 (WEA ZB3)	18:14	67	17:32 (WEA ZB2)	20:12	4	07:20 (WEA VB6)	21:06	56	19:58 (WEA ZB1)	21:52		
13	08:44		13:21 (WEA ZB3)	08:05		13:30 (WEA ZB3)	07:05		16:25 (WEA ZB2)	06:50		07:13 (WEA VB6)	05:43		19:10 (WEA ZB1)	05:02		
14	16:26	88	14:49 (WEA ZB3)	17:21	88	14:58 (WEA ZB3)	18:16	68	17:33 (WEA ZB2)	20:13	23	19:46 (WEA ZB1)	21:08	47	19:57 (WEA ZB1)	21:53		
15	08:43		13:21 (WEA ZB3)	08:03		13:31 (WEA ZB3)	07:02		16:24 (WEA ZB2)	06:47		07:11 (WEA VB6)	05:42		19:11 (WEA ZB1)	05:01		
16	16:27	89	14:50 (WEA ZB3)	17:23	87	14:58 (WEA ZB3)	18:18	68	17:32 (WEA ZB2)	20:15	32	19:48 (WEA ZB1)	21:10	45	19:56 (WEA ZB1)	21:54		
17	08:43		13:21 (WEA ZB3)	08:01		13:32 (WEA ZB3)	07:00		16:24 (WEA ZB2)	06:45		07:08 (WEA VB6)	05:40		19:11 (WEA ZB1)	05:00		
18	16:29	90	14:51 (WEA ZB3)	17:25	85	14:57 (WEA ZB3)	18:20	69	17:33 (WEA ZB2)	20:17	40	19:49 (WEA ZB1)	21:11	44	19:55 (WEA ZB1)	21:55		
19	08:42		13:22 (WEA ZB3)	07:59		13:32 (WEA ZB3)	06:57		16:23 (WEA ZB2)	06:42		07:06 (WEA VB6)	05:38		19:13 (WEA ZB1)	05:00		
20	16:30	89	14:51 (WEA ZB3)	17:27	85	14:57 (WEA ZB3)	18:22	69	17:32 (WEA ZB2)	20:19	46	19:51 (WEA ZB1)	21:13	42	19:55 (WEA ZB1)	21:56		
21	08:41		13:22 (WEA ZB3)	07:57		13:33 (WEA ZB3)	06:55		16:23 (WEA ZB2)	06:40		07:05 (WEA VB6)	05:36		19:14 (WEA ZB1)	05:00		
22	16:32	90	14:52 (WEA ZB3)	17:29	83	14:56 (WEA ZB3)	18:23	70	17:33 (WEA ZB2)	20:21	52	19:54 (WEA ZB1)	21:15	40	19:54 (WEA ZB1)	21:57		
23	08:41		13:22 (WEA ZB3)	07:55		13:33 (WEA ZB3)	06:53		16:22 (WEA ZB2)	06:38		07:04 (WEA VB6)	05:34		19:14 (WEA ZB1)	04:59		
24	16:33	90	14:52 (WEA ZB3)	17:31	82	14:55 (WEA ZB3)	18:25	70	17:32 (WEA ZB2)	20:23	55	19:55 (WEA ZB1)	21:17	38	19:52 (WEA ZB1)	21:58		
25	08:40		13:22 (WEA ZB3)	07:53		13:35 (WEA ZB3)	06:50		16:23 (WEA ZB2)	06:35		07:05 (WEA VB6)	05:32		19:16 (WEA ZB1)	04:59		
26	16:35	91	14:53 (WEA ZB3)	17:33	79	14:54 (WEA ZB3)	18:27	69	17:32 (WEA ZB2)	20:24	56	19:57 (WEA ZB1)	21:18	36	19:52 (WEA ZB1)	21:58		
27	08:39		13:22 (WEA ZB3)	07:51		13:36 (WEA ZB3)	06:48		16:23 (WEA ZB2)	06:33		07:05 (WEA VB6)	05:31		19:17 (WEA ZB1)	04:59		
28	16:36	91	14:53 (WEA ZB3)	17:35	77	14:53 (WEA ZB3)	18:29	69	17:32 (WEA ZB2)	20:26	59	19:59 (WEA ZB1)	21:20	33	19:50 (WEA ZB1)	21:59		
29	08:38		13:23 (WEA ZB3)	07:49		13:37 (WEA ZB3)	06:45		16:22 (WEA ZB2)	06:31		07:07 (WEA VB6)	05:29		19:19 (WEA ZB1)	04:58		
30	16:38	91	14:54 (WEA ZB3)	17:37	76	14:53 (WEA ZB3)	18:31	69	17:31 (WEA ZB2)	20:28	58	20:01 (WEA ZB1)	21:22	30	19:49 (WEA ZB1)	21:59		
31	08:37		13:23 (WEA ZB3)	07:47		13:38 (WEA ZB3)	06:43		16:23 (WEA ZB2)	06:28		07:08 (WEA VB6)	05:27		19:20 (WEA ZB1)	04:58		
32	16:40	92	14:55 (WEA ZB3)	17:39	74	14:52 (WEA ZB3)	18:33	68	17:31 (WEA ZB2)	20:30	56	20:01 (WEA ZB1)	21:23	27	19:47 (WEA ZB1)	22:00		
33	08:36		13:23 (WEA ZB3)	07:45		13:40 (WEA ZB3)	06:41		16:22 (WEA ZB2)	06:26		19:11 (WEA ZB1)	05:26		19:23 (WEA ZB1)	04:58		
34	16:41	92	14:55 (WEA ZB3)	17:41	71	14:51 (WEA ZB3)	18:35	68	17:30 (WEA ZB2)	20:32	50	20:01 (WEA ZB1)	21:25	23	19:46 (WEA ZB1)	22:01		
35	08:35		13:23 (WEA ZB3)	07:43		13:41 (WEA ZB3)	06:38		16:23 (WEA ZB2)	06:24		19:10 (WEA ZB1)	05:24		19:24 (WEA ZB1)	04:58		
36	16:43	92	14:55 (WEA ZB3)	17:43	85	17:09 (WEA ZB2)	18:37	67	17:30 (WEA ZB2)	20:34	52	20:02 (WEA ZB1)	21:27	19	19:43 (WEA ZB1)	22:01		
37	08:34		13:23 (WEA ZB3)	07:41		13:43 (WEA ZB3)	06:36		16:23 (WEA ZB2)	06:21		19:10 (WEA ZB1)	05:23		19:28 (WEA ZB1)	04:58		
38	16:45	93	14:56 (WEA ZB3)	17:45	91	17:14 (WEA ZB2)	18:38	65	17:28 (WEA ZB2)	20:35	53	20:03 (WEA ZB1)	21:28	12	19:40 (WEA ZB1)	22:01		
39	08:33		13:24 (WEA ZB3)	07:39		13:45 (WEA ZB3)	06:33		16:24 (WEA ZB2)	06:19		06:44 (WEA VB5)	05:21			04:58		
40	16:47	93	14:57 (WEA ZB3)	17:47	93	17:17 (WEA ZB2)	18:40	64	17:28 (WEA ZB2)	20:37	58	20:03 (WEA ZB1)	21:30			22:02		
41	08:32		13:23 (WEA ZB3)	07:37		13:47 (WEA ZB3)	06:31		16:24 (WEA ZB2)	06:17		06:41 (WEA VB5)	05:20			04:58		
42	16:48	93	14:56 (WEA ZB3)	17:49	96	17:20 (WEA ZB2)	18:42	62	17:26 (WEA ZB2)	20:39	63	20:02 (WEA ZB1)	21:31			22:02		
43	08:30		13:24 (WEA ZB3)	07:34		13:49 (WEA ZB3)	06:28		16:25 (WEA ZB2)	06:15		06:39 (WEA VB5)	05:18			04:58		
44	16:50	93	14:57 (WEA ZB3)	17:51	94	17:21 (WEA ZB2)	18:44	61	17:26 (WEA ZB2)	20:41	67	20:02 (WEA ZB1)	21:33			22:02		
45	08:29		13:24 (WEA ZB3)	07:32		13:52 (WEA ZB3)	06:26		16:25 (WEA ZB2)	06:12		06:37 (WEA VB5)	05:17			04:59		
46	16:52	93	14:57 (WEA ZB3)	17:53	92	17:23 (WEA ZB2)	18:46	59	17:24 (WEA ZB2)	20:43	72	20:03 (WEA ZB1)	21:34			22:02		
47	08:28		13:25 (WEA ZB3)	07:30		13:56 (WEA ZB3)	06:24		16:26 (WEA ZB2)	06:10		06:35 (WEA VB5)	05:16			04:59		
48	16:54	93	14:58 (WEA ZB3)	17:55	90	17:25 (WEA ZB2)	18:48	57	17:23 (WEA ZB2)	20:44	75	20:03 (WEA ZB1)	21:36			22:02		
49	08:26		13:24 (WEA ZB3)	07:28		13:59 (WEA ZB3)	06:21		16:28 (WEA ZB2)	06:08		06:34 (WEA VB5)	05:14			04:59		
50	16:56	94	14:58 (WEA ZB3)	17:57	85	17:26 (WEA ZB2)	18:50	55	17:23 (WEA ZB2)	20:46	77	20:03 (WEA ZB1)	21:37			22:02		
51	08:25		13:25 (WEA ZB3)	07:25		14:05 (WEA ZB3)	06:19		16:28 (WEA ZB2)	06:06		06:34 (WEA VB5)	05:13			05:00		
52	16:58	94	14:59 (WEA ZB3)	17:59	76	17:27 (WEA ZB2)	18:51	52	17:20 (WEA ZB2)	20:48	76	20:02 (WEA ZB1)	21:39			22:02		
53	08:23		13:25 (WEA ZB3)	07:23		16:32 (WEA ZB2)	06:16		16:30 (WEA ZB2)	06:04		06:33 (WEA VB5)	05:12			05:00		
54	16:59	93	14:58 (WEA ZB3)	18:01	57	17:29 (WEA ZB2)	18:53	49	17:19 (WEA ZB2)	20:50	77	20:02 (WEA ZB1)	21:40			22:02		
55	08:22		13:25 (WEA ZB3)	07:21		16:30 (WEA ZB2)	06:14		16:31 (WEA ZB2)	06:02		06:33 (WEA VB5)	05:11			05:01		
56	17:01	93	14:58 (WEA ZB3)	18:02	59	17:29 (WEA ZB2)	18:55	46	17:17 (WEA ZB2)	20:52	77	20:02 (WEA ZB1)	21:42			22:02		
57	08:20		13:26 (WEA ZB3)				07:11		17:33 (WEA ZB2)	06:00		06:33 (WEA VB5)	05:09			05:01		
58	17:03	93	14:59 (WEA ZB3)				19:57	42	18:15 (WEA ZB2)	20:54	77	20:02 (WEA ZB1)	21:43			22:02		
59	08:19		13:26 (WEA ZB3)				07:09		17:34 (WEA ZB2)	05:57		06:33 (WEA VB5)	05:08			05:02		
60	17:05	93	14:59 (WEA ZB3)				19:59	38	18:12 (WEA ZB2)	20:55	75	20:01 (WEA ZB1)	21:44			22:02		
61	08:17		13:26 (WEA ZB3)				07:06		17:37 (WEA ZB2)				05:07					
62	17:07	93	14:59 (WEA ZB3)				20:01	33	18:10 (WEA ZB2)				21:45					
Sonnenscheinstunden		251		274		367			419			493			509			
astr.max.mögl.Beschattung		2819		2347		1891			1486			837						

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

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

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO34 - Westerhausen 6
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlrichtung
- Die Windenergieanlage/n ist/sind immer in Betrieb

		Juli		August		September		Oktober		November		Dezember	
1	05:03	05:42		19:24 (WEA ZB1)	06:36	07:04 (WEA VB6)	07:28	17:02 (WEA ZB2)	07:26	13:01 (WEA ZB3)	08:21	13:04 (WEA ZB3)	
	22:01	21:27	39	20:03 (WEA ZB1)	20:21	19:52 (WEA ZB1)	19:07	18:12 (WEA ZB2)	16:57	85	14:26 (WEA ZB3)	16:13	90
2	05:03	05:44		19:24 (WEA ZB1)	06:37	07:05 (WEA VB6)	07:30	17:01 (WEA ZB2)	07:28		13:01 (WEA ZB3)	16:12	
	22:01	21:25	40	20:04 (WEA ZB1)	20:18	19:50 (WEA ZB1)	19:05	18:10 (WEA ZB2)	16:55	86	14:27 (WEA ZB3)	16:13	89
3	05:04	05:45		19:22 (WEA ZB1)	06:39	07:06 (WEA VB6)	07:32	17:01 (WEA ZB2)	07:30		13:00 (WEA ZB3)	16:12	
	22:01	21:23	43	20:05 (WEA ZB1)	20:16	19:47 (WEA ZB1)	19:02	18:10 (WEA ZB2)	16:53	87	14:27 (WEA ZB3)	16:12	89
4	05:05	05:47		19:21 (WEA ZB1)	06:41	07:08 (WEA VB6)	07:34	17:01 (WEA ZB2)	07:32		13:00 (WEA ZB3)	16:13	
	22:00	21:21	45	20:06 (WEA ZB1)	20:13	19:45 (WEA ZB1)	19:00	18:10 (WEA ZB2)	16:51	88	14:28 (WEA ZB3)	16:11	88
5	05:06	05:49		19:21 (WEA ZB1)	06:42	07:09 (WEA VB6)	07:35	17:01 (WEA ZB2)	07:33		13:00 (WEA ZB3)	16:12	
	22:00	21:19	46	20:07 (WEA ZB1)	20:11	19:43 (WEA ZB1)	18:58	18:10 (WEA ZB2)	16:50	89	14:28 (WEA ZB3)	16:11	88
6	05:07	05:50		19:20 (WEA ZB1)	06:44	07:11 (WEA VB6)	07:37	17:01 (WEA ZB2)	07:36		12:59 (WEA ZB3)	16:11	
	21:59	21:17	51	20:07 (WEA ZB1)	20:09	07:15 (WEA VB6)	18:55	18:09 (WEA ZB2)	16:48	89	14:28 (WEA ZB3)	16:10	88
7	05:08	05:52		19:20 (WEA ZB1)	06:46	07:17 (WEA VB6)	07:39	17:01 (WEA ZB2)	07:38		12:58 (WEA ZB3)	16:10	
	21:58	21:15	60	20:08 (WEA ZB1)	20:06	18:53	18:53	18:09 (WEA ZB2)	16:46	91	14:29 (WEA ZB3)	16:10	88
8	05:09	05:54		19:20 (WEA ZB1)	06:48	19:31 (WEA VB13)	07:41	17:01 (WEA ZB2)	07:40		12:58 (WEA ZB3)	16:10	
	21:58	21:13	64	20:08 (WEA ZB1)	20:04	19:36 (WEA VB13)	18:50	18:08 (WEA ZB2)	16:44	91	14:29 (WEA ZB3)	16:09	88
9	05:10	05:55		19:20 (WEA ZB1)	06:50	19:29 (WEA VB13)	07:43	17:01 (WEA ZB2)	07:42		12:58 (WEA ZB3)	16:09	
	21:57	21:11	67	20:08 (WEA ZB1)	20:01	19:33 (WEA VB13)	18:48	18:06 (WEA ZB2)	16:42	91	14:29 (WEA ZB3)	16:09	88
10	05:11	05:57		19:20 (WEA ZB1)	06:51	17:38 (WEA ZB2)	07:45	17:01 (WEA ZB2)	07:43		12:57 (WEA ZB3)	16:08	
	21:56	21:09	70	20:09 (WEA ZB1)	19:47	19:31 (WEA VB13)	18:46	18:05 (WEA ZB2)	16:40	92	14:29 (WEA ZB3)	16:09	87
11	05:12	05:59		19:20 (WEA ZB1)	06:53	17:33 (WEA ZB2)	07:47	17:02 (WEA ZB2)	07:45		12:57 (WEA ZB3)	16:08	
	21:55	21:07	72	20:09 (WEA ZB1)	19:56	19:29 (WEA VB13)	18:43	18:05 (WEA ZB2)	16:39	93	14:30 (WEA ZB3)	16:08	87
12	05:13	06:01		19:20 (WEA ZB1)	06:55	17:29 (WEA ZB2)	07:48	17:02 (WEA ZB2)	07:47		12:57 (WEA ZB3)	16:08	
	21:54	21:05	73	20:09 (WEA ZB1)	19:54	18:01 (WEA ZB2)	18:41	18:04 (WEA ZB2)	16:37	93	14:30 (WEA ZB3)	16:08	86
13	05:14	06:02		19:20 (WEA ZB1)	06:57	17:26 (WEA ZB2)	07:50	17:03 (WEA ZB2)	07:49		12:58 (WEA ZB3)	16:08	
	21:53	21:03	76	20:09 (WEA ZB1)	19:52	18:03 (WEA ZB2)	18:39	18:03 (WEA ZB2)	16:36	93	14:31 (WEA ZB3)	16:08	86
14	05:15	06:04		19:20 (WEA ZB1)	06:58	17:24 (WEA ZB2)	07:52	17:04 (WEA ZB2)	07:51		12:58 (WEA ZB3)	16:08	
	21:52	21:01	76	20:09 (WEA ZB1)	19:49	18:05 (WEA ZB2)	18:36	18:02 (WEA ZB2)	16:34	93	14:31 (WEA ZB3)	16:08	85
15	05:17	06:06		19:20 (WEA ZB1)	07:00	17:21 (WEA ZB2)	07:54	14:44 (WEA ZB3)	07:53		12:58 (WEA ZB3)	16:08	
	21:51	20:59	77	20:09 (WEA ZB1)	19:41	18:07 (WEA ZB2)	18:34	18:00 (WEA ZB2)	16:32	93	14:31 (WEA ZB3)	16:07	86
16	05:18	06:08		19:20 (WEA ZB1)	07:02	17:19 (WEA ZB2)	07:56	14:35 (WEA ZB3)	07:55		12:58 (WEA ZB3)	16:08	
	21:50	20:57	76	20:09 (WEA ZB1)	19:44	18:07 (WEA ZB2)	18:32	17:59 (WEA ZB2)	16:31	93	14:31 (WEA ZB3)	16:08	85
17	05:19	06:09		19:20 (WEA ZB1)	07:04	17:17 (WEA ZB2)	07:58	14:30 (WEA ZB3)	07:57		12:58 (WEA ZB3)	16:08	
	21:49	20:55	76	20:09 (WEA ZB1)	19:42	18:09 (WEA ZB2)	18:29	17:57 (WEA ZB2)	16:29	94	14:32 (WEA ZB3)	16:08	85
18	05:21	06:11		19:20 (WEA ZB1)	07:05	17:15 (WEA ZB2)	08:00	14:26 (WEA ZB3)	07:58		12:59 (WEA ZB3)	16:08	
	21:48	20:53	75	20:09 (WEA ZB1)	19:39	18:10 (WEA ZB2)	18:27	17:56 (WEA ZB2)	16:28	93	14:32 (WEA ZB3)	16:09	85
19	05:22	06:13		19:20 (WEA ZB1)	07:07	17:13 (WEA ZB2)	08:01	14:22 (WEA ZB3)	08:00		12:59 (WEA ZB3)	16:09	
	21:47	20:50	74	20:08 (WEA ZB1)	19:37	18:10 (WEA ZB2)	18:25	17:54 (WEA ZB2)	16:27	93	14:32 (WEA ZB3)	16:09	85
20	05:23	06:15		19:20 (WEA ZB1)	07:09	17:12 (WEA ZB2)	08:03	14:19 (WEA ZB3)	08:02		12:59 (WEA ZB3)	16:09	
	21:45	20:48	71	20:08 (WEA ZB1)	19:34	18:11 (WEA ZB2)	18:24	14:32 (WEA ZB3)	16:25	96	14:32 (WEA ZB3)	16:12	85
21	05:25	06:16		19:20 (WEA ZB1)	07:11	17:11 (WEA ZB2)	08:05	14:17 (WEA ZB3)	08:04		12:59 (WEA ZB3)	16:10	
	21:44	20:46	68	20:08 (WEA ZB1)	19:32	18:11 (WEA ZB2)	18:20	14:17 (WEA ZB3)	16:24	93	14:32 (WEA ZB3)	16:10	85
22	05:26	06:18		19:20 (WEA ZB1)	07:12	17:10 (WEA ZB2)	08:07	14:15 (WEA ZB3)	16:23		13:00 (WEA ZB3)	16:10	
	21:42	20:44	63	20:07 (WEA ZB1)	19:29	18:12 (WEA ZB2)	18:18	14:15 (WEA ZB3)	16:23	93	14:33 (WEA ZB3)	16:10	85
23	05:28	06:20		19:20 (WEA ZB1)	07:14	17:08 (WEA ZB2)	08:09	14:13 (WEA ZB3)	16:21		13:00 (WEA ZB3)	16:11	
	21:41	20:41	55	20:07 (WEA ZB1)	19:27	18:11 (WEA ZB2)	18:16	14:13 (WEA ZB3)	16:21	93	14:33 (WEA ZB3)	16:11	85
24	05:29	06:22		19:20 (WEA ZB1)	07:16	17:07 (WEA ZB2)	08:11	14:11 (WEA ZB3)	16:20		13:01 (WEA ZB3)	16:11	
	21:40	20:39	52	20:06 (WEA ZB1)	19:24	18:12 (WEA ZB2)	18:14	14:11 (WEA ZB3)	16:20	92	14:33 (WEA ZB3)	16:11	85
25	05:31	06:23		19:20 (WEA ZB1)	07:18	17:06 (WEA ZB2)	07:13	13:09 (WEA ZB3)	16:19		13:00 (WEA ZB3)	16:12	
	21:38	20:37	52	20:05 (WEA ZB1)	19:22	18:12 (WEA ZB2)	17:12	14:21 (WEA ZB3)	16:19	92	14:32 (WEA ZB3)	16:12	85
26	05:32	06:24		19:20 (WEA ZB1)	07:19	17:08 (WEA ZB2)	07:17	13:01 (WEA ZB3)	16:18		13:00 (WEA ZB3)	16:13	
	21:37	20:35	50	20:04 (WEA ZB1)	19:20	18:12 (WEA ZB2)	17:10	14:22 (WEA ZB3)	16:18	92	14:33 (WEA ZB3)	16:13	86
27	05:34	06:27		19:20 (WEA ZB1)	07:21	17:04 (WEA VB6)	07:21	13:06 (WEA ZB3)	16:14		13:02 (WEA ZB3)	16:13	
	21:35	20:32	56	20:03 (WEA ZB1)	19:17	18:12 (WEA ZB2)	17:08	14:22 (WEA ZB3)	16:17	91	14:33 (WEA ZB3)	16:13	85
28	05:35	06:29		19:20 (WEA ZB1)	07:23	17:03 (WEA VB6)	07:18	13:05 (WEA ZB3)	16:16		13:02 (WEA ZB3)	16:13	
	21:33	20:30	58	20:01 (WEA ZB1)	19:15	18:12 (WEA ZB2)	17:05	14:23 (WEA ZB3)	16:16	91	14:33 (WEA ZB3)	16:14	86
29	05:37	06:30		19:20 (WEA ZB1)	07:25	17:03 (WEA VB6)	07:20	13:04 (WEA ZB3)	16:18		13:03 (WEA ZB3)	16:14	
	21:32	20:28	58	19:59 (WEA ZB1)	19:12	18:12 (WEA ZB2)	17:03	14:24 (WEA ZB3)	16:15	91	14:34 (WEA ZB3)	16:15	86
30	05:39	06:32		19:20 (WEA ZB1)	07:27	17:02 (WEA ZB2)	07:22	13:03 (WEA ZB3)	16:19		13:03 (WEA ZB3)	16:15	
	21:30	20:25	55	19:57 (WEA ZB1)	19:10	18:12 (WEA ZB2)	17:01	14:24 (WEA ZB3)	16:14	90	14:33 (WEA ZB3)	16:16	86
31	05:40	06:34		19:20 (WEA ZB1)	07:29	17:04 (WEA VB6)	07:24	13:02 (WEA ZB3)	16:14		13:04 (WEA ZB3)	16:16	
	21:28	20:23	54	19:54 (WEA ZB1)		18:12 (WEA ZB2)	16:59	14:25 (WEA ZB3)			13:05 (WEA ZB3)	16:17	87
Sonnenscheinstunden		511		459		382		329		260		234	
astr.max.mol.Beschattung		195		1892		1337		2335		2738		2679	

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO35 - Westerhausen 7 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni	
1	08:45	12:47 (WEA ZB3) 08:16	13:09 (WEA ZB3) 07:19	15:45 (WEA ZB2) 07:04	07:28 (WEA VB6) 05:55	18:55 (WEA ZB1) 05:06					
2	08:45	12:48 (WEA ZB3) 08:14	13:11 (WEA ZB3) 07:16	15:46 (WEA ZB2) 07:02	19:34 (WEA ZB1) 05:57	19:10 (WEA ZB1) 05:05					
3	08:45	12:48 (WEA ZB3) 08:12	13:13 (WEA ZB3) 07:14	15:46 (WEA ZB2) 06:59	19:34 (WEA ZB1) 05:59	19:34 (WEA ZB1) 05:05					
4	08:45	12:49 (WEA ZB3) 08:10	13:15 (WEA ZB3) 07:12	15:47 (WEA ZB2) 06:57	19:35 (WEA ZB1) 05:51	19:35 (WEA ZB1) 05:03					
5	08:44	12:50 (WEA ZB3) 08:09	13:17 (WEA ZB3) 07:09	15:48 (WEA ZB2) 06:54	19:36 (WEA ZB1) 05:47	19:36 (WEA ZB1) 05:03					
6	08:44	12:50 (WEA ZB3) 08:07	13:20 (WEA ZB3) 07:07	15:49 (WEA ZB2) 06:52	19:36 (WEA ZB1) 05:45	19:36 (WEA ZB1) 05:02					
7	08:44	12:50 (WEA ZB3) 08:05	13:23 (WEA ZB3) 07:05	15:50 (WEA ZB2) 06:50	19:36 (WEA ZB1) 05:43	19:36 (WEA ZB1) 05:02					
8	08:43	12:51 (WEA ZB3) 08:03	13:27 (WEA ZB3) 07:02	15:51 (WEA ZB2) 06:47	19:37 (WEA ZB1) 05:42	19:37 (WEA ZB1) 05:01					
9	08:43	12:51 (WEA ZB3) 08:01	13:34 (WEA ZB3) 07:00	15:53 (WEA ZB2) 06:45	19:37 (WEA ZB1) 05:40	19:37 (WEA ZB1) 05:00					
10	08:42	12:52 (WEA ZB3) 07:59	13:40 (WEA ZB3) 06:57	15:54 (WEA ZB2) 06:42	19:38 (WEA ZB1) 05:38	19:38 (WEA ZB1) 05:00					
11	08:41	12:52 (WEA ZB3) 07:57	13:49 (WEA ZB3) 06:55	15:56 (WEA ZB2) 06:40	19:39 (WEA ZB1) 05:36	19:39 (WEA ZB1) 05:00					
12	08:41	12:53 (WEA ZB3) 07:55	13:57 (WEA ZB3) 06:53	15:58 (WEA ZB2) 06:38	19:40 (WEA ZB1) 05:34	19:40 (WEA ZB1) 05:00					
13	08:40	12:53 (WEA ZB3) 07:53	14:05 (WEA ZB3) 06:50	16:01 (WEA ZB2) 06:35	19:41 (WEA ZB1) 05:32	19:41 (WEA ZB1) 05:00					
14	08:39	12:54 (WEA ZB3) 07:51	14:13 (WEA ZB3) 06:48	16:05 (WEA ZB2) 06:33	19:42 (WEA ZB1) 05:31	19:42 (WEA ZB1) 05:00					
15	08:38	12:54 (WEA ZB3) 07:49	14:21 (WEA ZB3) 06:45	16:10 (WEA ZB2) 06:31	19:43 (WEA ZB1) 05:29	19:43 (WEA ZB1) 05:00					
16	08:37	12:55 (WEA ZB3) 07:47	14:29 (WEA ZB3) 06:43	16:15 (WEA ZB2) 06:28	19:44 (WEA ZB1) 05:27	19:44 (WEA ZB1) 05:00					
17	08:36	12:56 (WEA ZB3) 07:45	14:37 (WEA ZB3) 06:41	16:20 (WEA ZB2) 06:26	19:45 (WEA ZB1) 05:26	19:45 (WEA ZB1) 05:00					
18	08:35	12:56 (WEA ZB3) 07:43	14:45 (WEA ZB3) 06:38	16:25 (WEA ZB2) 06:24	19:46 (WEA ZB1) 05:24	19:46 (WEA ZB1) 05:00					
19	08:34	12:57 (WEA ZB3) 07:41	14:53 (WEA ZB3) 06:36	16:30 (WEA ZB2) 06:21	19:47 (WEA ZB1) 05:22	19:47 (WEA ZB1) 05:00					
20	08:33	12:58 (WEA ZB3) 07:39	15:01 (WEA ZB3) 06:33	16:35 (WEA ZB2) 06:19	19:48 (WEA ZB1) 05:20	19:48 (WEA ZB1) 05:00					
21	08:32	12:58 (WEA ZB3) 07:37	15:09 (WEA ZB3) 06:31	16:40 (WEA ZB2) 06:17	19:49 (WEA ZB1) 05:18	19:49 (WEA ZB1) 05:00					
22	08:30	12:59 (WEA ZB3) 07:34	15:17 (WEA ZB3) 06:28	16:45 (WEA ZB2) 06:15	19:50 (WEA ZB1) 05:16	19:50 (WEA ZB1) 05:00					
23	08:29	12:59 (WEA ZB3) 07:32	15:25 (WEA ZB3) 06:26	16:50 (WEA ZB2) 06:12	19:51 (WEA ZB1) 05:14	19:51 (WEA ZB1) 05:00					
24	08:28	13:00 (WEA ZB3) 07:30	15:33 (WEA ZB3) 06:24	16:55 (WEA ZB2) 06:10	19:52 (WEA ZB1) 05:12	19:52 (WEA ZB1) 05:00					
25	08:26	13:01 (WEA ZB3) 07:28	15:41 (WEA ZB3) 06:21	17:00 (WEA ZB2) 06:08	19:53 (WEA ZB1) 05:10	19:53 (WEA ZB1) 05:00					
26	08:25	13:02 (WEA ZB3) 07:25	15:49 (WEA ZB3) 06:19	17:05 (WEA ZB2) 06:06	19:54 (WEA ZB1) 05:08	19:54 (WEA ZB1) 05:00					
27	08:23	13:03 (WEA ZB3) 07:23	15:57 (WEA ZB3) 06:16	17:10 (WEA ZB2) 06:04	19:55 (WEA ZB1) 05:06	19:55 (WEA ZB1) 05:00					
28	08:22	13:04 (WEA ZB3) 07:21	16:05 (WEA ZB3) 06:14	17:15 (WEA ZB2) 06:02	19:56 (WEA ZB1) 05:04	19:56 (WEA ZB1) 05:00					
29	08:20	13:06 (WEA ZB3) 07:19	16:13 (WEA ZB3) 06:11	17:20 (WEA ZB2) 06:00	19:57 (WEA ZB1) 05:02	19:57 (WEA ZB1) 05:00					
30	08:19	13:07 (WEA ZB3) 07:17	16:21 (WEA ZB3) 06:09	17:25 (WEA ZB2) 05:58	19:58 (WEA ZB1) 05:00	19:58 (WEA ZB1) 05:00					
31	08:17	13:08 (WEA ZB3) 07:15	16:29 (WEA ZB3) 06:07	17:30 (WEA ZB2) 05:56	19:59 (WEA ZB1) 04:58	19:59 (WEA ZB1) 05:00					
Sonnenscheinstunden		251	274	367	419	493					
astr.max.mögl.Beschattung		2391	2050	1028	1867	15					

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO35 - Westerhausen 7

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli		August		September		Oktober		November		Dezember	
1	05:03	05:35 (WEA VB4)	05:42		06:36	07:03 (WEA VB5)	07:28	16:39 (WEA ZB2)	07:26	15:18 (WEA ZB2)	08:21	12:34 (WEA ZB3)
2	05:03	5 05:40 (WEA VB4)	21:27		20:21	19:34 (WEA ZB1)	19:07	34 17:13 (WEA ZB2)	16:57	59 16:17 (WEA ZB2)	16:13	78 13:52 (WEA ZB3)
3	05:03		05:44		06:37	18:35 (WEA ZB1)	07:30	39 17:13 (WEA ZB2)	07:28	72 13:02 (WEA ZB2)	08:22	12:35 (WEA ZB3)
4	05:04		05:45		06:39	18:34 (WEA ZB1)	07:32	43 17:14 (WEA ZB2)	16:55	82 16:17 (WEA ZB2)	16:13	78 13:53 (WEA ZB3)
5	05:05		05:46		06:41	19:33 (WEA ZB1)	19:02	47 17:16 (WEA ZB2)	16:53	86 16:16 (WEA ZB2)	16:12	77 13:52 (WEA ZB3)
6	05:05		05:47		06:41	07:21 (WEA VB6)	07:34	43 16:31 (WEA ZB2)	07:32	82 12:52 (WEA ZB2)	08:25	12:35 (WEA ZB3)
7	05:06		05:48		06:43	19:32 (WEA ZB1)	19:00	46 17:17 (WEA ZB2)	16:51	87 16:15 (WEA ZB2)	16:11	78 13:53 (WEA ZB3)
8	05:07		05:49		06:43	07:19 (WEA VB6)	07:36	50 16:29 (WEA ZB2)	16:50	91 12:49 (WEA ZB2)	08:27	12:35 (WEA ZB3)
9	05:08		05:50		06:44	19:32 (WEA ZB1)	18:58	50 17:14 (WEA ZB2)	16:50	91 16:14 (WEA ZB2)	16:11	78 13:53 (WEA ZB3)
10	05:09		05:51		06:44	07:17 (WEA VB6)	07:37	53 16:27 (WEA ZB2)	16:48	93 12:47 (WEA ZB2)	08:28	12:36 (WEA ZB3)
11	05:10		05:52		06:46	19:31 (WEA ZB1)	18:55	53 16:20 (WEA ZB2)	16:48	93 16:13 (WEA ZB2)	16:10	78 13:54 (WEA ZB3)
12	05:11		05:53		06:46	07:17 (WEA VB6)	07:39	55 16:26 (WEA ZB2)	16:48	95 12:45 (WEA ZB2)	08:29	12:36 (WEA ZB3)
13	05:12		05:54		06:48	19:30 (WEA ZB1)	18:53	55 16:21 (WEA ZB2)	16:46	95 16:12 (WEA ZB2)	16:10	78 13:54 (WEA ZB3)
14	05:13		05:55		06:48	07:16 (WEA VB6)	07:41	57 16:24 (WEA ZB2)	16:40	95 12:43 (WEA ZB2)	08:31	12:37 (WEA ZB3)
15	05:14		05:56		06:49	19:30 (WEA ZB1)	18:50	57 17:21 (WEA ZB2)	16:44	95 16:10 (WEA ZB2)	16:09	78 13:55 (WEA ZB3)
16	05:15		05:57		06:50	07:16 (WEA VB6)	07:43	59 16:22 (WEA ZB2)	16:42	96 12:41 (WEA ZB2)	08:32	12:37 (WEA ZB3)
17	05:16		05:58		06:51	19:28 (WEA ZB1)	18:48	59 17:21 (WEA ZB2)	16:42	96 16:09 (WEA ZB2)	16:09	78 13:55 (WEA ZB3)
18	05:17		05:59		06:51	07:18 (WEA VB6)	07:45	61 16:21 (WEA ZB2)	16:43	94 12:40 (WEA ZB2)	08:33	12:37 (WEA ZB3)
19	05:18		06:00		06:52	19:27 (WEA ZB1)	18:46	61 17:22 (WEA ZB2)	16:41	94 16:07 (WEA ZB2)	16:09	79 13:56 (WEA ZB3)
20	05:19		06:01		06:53	07:20 (WEA VB6)	07:47	62 16:20 (WEA ZB2)	16:45	94 12:39 (WEA ZB2)	08:34	12:37 (WEA ZB3)
21	05:20		06:02		06:53	19:27 (WEA ZB1)	18:43	62 17:22 (WEA ZB2)	16:39	92 16:05 (WEA ZB2)	16:08	79 13:56 (WEA ZB3)
22	05:21		06:03		06:55	07:21 (WEA VB6)	07:48	64 16:19 (WEA ZB2)	16:47	92 12:38 (WEA ZB2)	08:35	12:39 (WEA ZB3)
23	05:22		06:04		06:55	19:26 (WEA VB13)	18:41	64 17:23 (WEA ZB2)	16:37	90 16:03 (WEA ZB2)	16:08	78 13:57 (WEA ZB3)
24	05:23		06:05		06:57	07:23 (WEA VB6)	07:50	65 16:18 (WEA ZB2)	16:36	90 12:38 (WEA ZB2)	08:36	12:39 (WEA ZB3)
25	05:24		06:06		06:57	19:23 (WEA VB13)	18:39	65 17:23 (WEA ZB2)	16:36	87 16:02 (WEA ZB2)	16:08	79 13:58 (WEA ZB3)
26	05:25		06:07		06:58	18:37 (WEA ZB1)	07:52	65 16:18 (WEA ZB2)	07:51	83 12:37 (WEA ZB2)	08:37	12:39 (WEA ZB3)
27	05:26		06:08		06:59	19:21 (WEA VB13)	18:36	65 17:18 (WEA ZB2)	16:34	83 15:59 (WEA ZB2)	16:08	79 13:58 (WEA ZB3)
28	05:27		06:09		07:00	18:39 (WEA ZB1)	07:54	66 16:17 (WEA ZB2)	07:53	83 12:36 (WEA ZB2)	08:38	12:40 (WEA ZB3)
29	05:28		06:10		07:01	19:19 (WEA VB13)	18:34	66 17:23 (WEA ZB2)	16:32	74 15:53 (WEA ZB2)	16:08	79 13:59 (WEA ZB3)
30	05:29		06:11		07:02	18:39 (WEA ZB1)	07:56	66 16:16 (WEA ZB2)	07:55	74 12:36 (WEA ZB2)	08:39	12:40 (WEA ZB3)
31	05:30		06:12		07:03	19:16 (WEA ZB1)	18:32	68 17:24 (WEA ZB2)	16:31	67 13:43 (WEA ZB3)	16:08	78 13:58 (WEA ZB3)
32	05:31		06:13		07:04	18:41 (WEA ZB1)	07:58	68 16:16 (WEA ZB2)	07:57	67 12:35 (WEA ZB2)	08:40	12:40 (WEA ZB3)
33	05:32		06:14		07:05	19:14 (WEA ZB1)	18:29	68 17:24 (WEA ZB2)	16:29	69 13:44 (WEA ZB3)	16:08	79 13:59 (WEA ZB3)
34	05:33		06:15		07:06	18:43 (WEA ZB1)	08:00	68 16:16 (WEA ZB2)	07:58	69 12:35 (WEA ZB2)	08:41	12:41 (WEA ZB3)
35	05:34		06:16		07:07	19:12 (WEA ZB1)	18:27	68 17:24 (WEA ZB2)	16:28	70 13:45 (WEA ZB3)	16:09	78 13:59 (WEA ZB3)
36	05:35		06:17		07:08	18:45 (WEA ZB1)	08:01	68 16:15 (WEA ZB2)	08:00	70 12:34 (WEA ZB2)	08:41	12:42 (WEA ZB3)
37	05:36		06:18		07:09	19:08 (WEA ZB1)	18:25	68 17:23 (WEA ZB2)	16:27	71 13:45 (WEA ZB3)	16:09	78 14:00 (WEA ZB3)
38	05:37		06:19		07:10	18:49 (WEA ZB1)	08:03	68 16:15 (WEA ZB2)	08:02	71 12:34 (WEA ZB2)	08:42	12:41 (WEA ZB3)
39	05:38		06:20		07:11	19:05 (WEA ZB1)	18:23	68 17:23 (WEA ZB2)	16:25	72 13:46 (WEA ZB3)	16:09	79 14:00 (WEA ZB3)
40	05:39		06:21		07:12		08:05	68 16:15 (WEA ZB2)	08:04	72 12:34 (WEA ZB2)	08:43	12:42 (WEA ZB3)
41	05:40		06:22		07:13		08:07	68 17:23 (WEA ZB2)	16:24	73 13:47 (WEA ZB3)	16:10	79 14:01 (WEA ZB3)
42	05:41		06:23		07:14		08:09	68 16:15 (WEA ZB2)	08:06	73 12:34 (WEA ZB2)	08:43	12:42 (WEA ZB3)
43	05:42		06:24		07:15		08:11	68 17:23 (WEA ZB2)	16:23	73 13:47 (WEA ZB3)	16:10	79 14:01 (WEA ZB3)
44	05:43		06:25		07:16		08:13	68 16:15 (WEA ZB2)	08:07	73 12:34 (WEA ZB2)	08:44	12:43 (WEA ZB3)
45	05:44		06:26		07:17		08:15	68 17:23 (WEA ZB2)	16:21	74 13:48 (WEA ZB3)	16:11	79 14:02 (WEA ZB3)
46	05:45		06:27		07:18		08:17	68 16:15 (WEA ZB2)	08:09	74 12:34 (WEA ZB2)	08:44	12:44 (WEA ZB3)
47	05:46		06:28		07:19		08:19	67 17:22 (WEA ZB2)	16:20	75 13:49 (WEA ZB3)	16:11	78 14:02 (WEA ZB3)
48	05:47		06:29		07:20		08:21	67 15:15 (WEA ZB2)	08:11	75 12:33 (WEA ZB2)	08:45	12:44 (WEA ZB3)
49	05:48		06:30		07:21		08:23	67 16:22 (WEA ZB2)	16:19	75 13:48 (WEA ZB3)	16:12	78 14:02 (WEA ZB3)
50	05:49		06:31		07:22		08:25	67 15:15 (WEA ZB2)	08:13	75 12:33 (WEA ZB2)	08:45	12:45 (WEA ZB3)
51	05:50		06:32		07:23		08:27	66 16:15 (WEA ZB2)	16:18	75 13:49 (WEA ZB3)	16:13	79 14:04 (WEA ZB3)
52	05:51		06:33		07:24		08:29	66 15:15 (WEA ZB2)	08:14	76 12:34 (WEA ZB2)	08:45	12:45 (WEA ZB3)
53	05:52		06:34		07:25		08:31	66 16:20 (WEA ZB2)	16:17	76 13:50 (WEA ZB3)	16:13	79 14:04 (WEA ZB3)
54	05:53		06:35		07:26		08:33	66 15:16 (WEA ZB2)	08:16	76 12:34 (WEA ZB2)	08:45	12:46 (WEA ZB3)
55	05:54		06:36		07:27		08:35	66 16:20 (WEA ZB2)	16:16	76 13:50 (WEA ZB3)	16:14	79 14:04 (WEA ZB3)
56	05:55		06:37		07:28		08:37	66 15:16 (WEA ZB2)	08:18	76 12:34 (WEA ZB2)	08:45	12:46 (WEA ZB3)
57	05:56		06:38		07:29		08:39	66 15:17 (WEA ZB2)	16:15	77 13:51 (WEA ZB3)	16:15	79 14:05 (WEA ZB3)
58	05:57		06:39		07:30		08:41	66 15:17 (WEA ZB2)	08:19	77 12:34 (WEA ZB2)	08:45	12:47 (WEA ZB3)
59	05:58		06:40		07:31		08:43	62 16:19 (WEA ZB2)	16:14	77 13:51 (WEA ZB3)	16:16	78 14:05 (WEA ZB3)
60	05:59		06:41		07:32		08:45	61 15:17 (WEA ZB2)			08:45	12:46 (WEA ZB3)
61	06:00		06:42		07:33		08:47	61 16:18 (WEA ZB2)			16:17	79 14:05 (WEA ZB3)
Sonnenscheinstunden 511 459 382 1119 329 1879 2391 2431												
astr.max.mögl.Beschattung 5 1161 1119 329 1879 2391 2431												

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO36 - Westerhausen 10
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni
1	08:45 16:18	13:19 (WEA ZB3) 14:35 (WEA ZB3)	08:16 17:09	13:38 (WEA ZB3) 14:37 (WEA ZB3)	07:19 18:04	16:03 (WEA ZB2) 17:03 (WEA ZB2)	07:04 20:02	07:27 (WEA VB6) 19:34 (WEA ZB1)	05:55 20:57	05:06 21:47
2	08:45 16:19	13:20 (WEA ZB3) 14:35 (WEA ZB3)	08:14 17:11	13:39 (WEA ZB3) 16:34 (WEA ZB2)	07:16 18:06	16:03 (WEA ZB2) 17:03 (WEA ZB2)	07:02 20:04	07:25 (WEA VB6) 19:35 (WEA ZB1)	05:53 20:59	05:05 21:48
3	08:45 16:21	13:20 (WEA ZB3) 14:35 (WEA ZB3)	08:12 17:13	13:41 (WEA ZB3) 16:41 (WEA ZB2)	07:14 18:08	16:03 (WEA ZB2) 17:01 (WEA ZB2)	06:59 20:06	07:23 (WEA VB6) 19:36 (WEA ZB1)	05:51 21:01	05:05 21:49
4	08:45 16:22	13:21 (WEA ZB3) 14:36 (WEA ZB3)	08:10 17:15	13:43 (WEA ZB3) 16:44 (WEA ZB2)	07:12 18:10	16:04 (WEA ZB2) 17:01 (WEA ZB2)	06:57 20:08	07:20 (WEA VB6) 19:35 (WEA ZB1)	05:49 21:03	05:04 21:50
5	08:44 16:23	13:22 (WEA ZB3) 14:37 (WEA ZB3)	08:09 17:17	13:45 (WEA ZB3) 16:47 (WEA ZB2)	07:09 18:12	16:04 (WEA ZB2) 17:00 (WEA ZB2)	06:54 20:10	07:21 (WEA VB6) 19:36 (WEA ZB1)	05:47 21:04	05:03 21:51
6	08:44 16:24	13:22 (WEA ZB3) 14:37 (WEA ZB3)	08:07 17:19	13:47 (WEA ZB3) 16:49 (WEA ZB2)	07:07 18:14	16:05 (WEA ZB2) 16:59 (WEA ZB2)	06:52 20:12	07:21 (WEA VB6) 19:36 (WEA ZB1)	05:45 21:06	05:02 21:52
7	08:44 16:26	13:22 (WEA ZB3) 14:37 (WEA ZB3)	08:05 17:21	13:49 (WEA ZB3) 16:51 (WEA ZB2)	07:05 18:16	16:06 (WEA ZB2) 16:58 (WEA ZB2)	06:50 20:13	07:21 (WEA VB6) 19:35 (WEA ZB1)	05:43 21:08	05:02 21:53
8	08:43 16:27	13:23 (WEA ZB3) 14:38 (WEA ZB3)	08:03 17:23	13:51 (WEA ZB3) 16:53 (WEA ZB2)	07:02 18:18	16:07 (WEA ZB2) 16:57 (WEA ZB2)	06:47 20:15	07:22 (WEA VB6) 19:36 (WEA ZB1)	05:42 21:10	05:01 21:54
9	08:43 16:29	13:23 (WEA ZB3) 14:38 (WEA ZB3)	08:01 17:25	13:55 (WEA ZB3) 16:55 (WEA ZB2)	07:00 18:20	16:08 (WEA ZB2) 16:56 (WEA ZB2)	06:45 20:17	07:23 (WEA VB6) 19:35 (WEA ZB1)	05:40 21:11	05:00 21:55
10	08:42 16:30	13:23 (WEA ZB3) 14:39 (WEA ZB3)	07:59 17:27	13:59 (WEA ZB3) 16:57 (WEA ZB2)	06:57 18:22	16:09 (WEA ZB2) 16:53 (WEA ZB2)	06:42 20:19	18:42 (WEA ZB1) 19:35 (WEA ZB1)	05:38 21:13	05:00 21:56
11	08:41 16:31	13:24 (WEA ZB3) 14:39 (WEA ZB3)	07:57 17:29	14:05 (WEA ZB3) 16:59 (WEA ZB2)	06:55 18:23	16:11 (WEA ZB2) 16:52 (WEA ZB2)	06:40 20:21	18:42 (WEA ZB1) 19:34 (WEA ZB1)	05:36 21:15	05:00 21:57
12	08:41 16:33	13:24 (WEA ZB3) 14:39 (WEA ZB3)	07:55 17:31	16:08 (WEA ZB2) 16:59 (WEA ZB2)	06:53 18:25	16:12 (WEA ZB2) 16:50 (WEA ZB2)	06:38 20:23	07:01 (WEA VB5) 19:33 (WEA ZB1)	05:34 21:17	04:59 21:58
13	08:40 16:35	13:25 (WEA ZB3) 14:39 (WEA ZB3)	07:53 17:33	16:07 (WEA ZB2) 17:00 (WEA ZB2)	06:50 18:27	16:15 (WEA ZB2) 16:48 (WEA ZB2)	06:35 20:24	06:59 (WEA VB5) 19:33 (WEA ZB1)	05:32 21:18	04:59 21:58
14	08:39 16:36	13:25 (WEA ZB3) 14:40 (WEA ZB3)	07:51 17:35	16:07 (WEA ZB2) 17:01 (WEA ZB2)	06:48 18:29	16:18 (WEA ZB2) 16:45 (WEA ZB2)	06:33 20:26	06:57 (WEA VB5) 19:33 (WEA ZB1)	05:31 21:20	04:59 21:59
15	08:38 16:38	13:26 (WEA ZB3) 14:40 (WEA ZB3)	07:49 17:37	16:06 (WEA ZB2) 17:02 (WEA ZB2)	06:45 18:31	16:21 (WEA ZB2) 16:41 (WEA ZB2)	06:31 20:28	06:55 (WEA VB5) 19:32 (WEA ZB1)	05:29 21:22	04:58 21:59
16	08:37 16:40	13:26 (WEA ZB3) 14:41 (WEA ZB3)	07:47 17:39	16:06 (WEA ZB2) 17:02 (WEA ZB2)	06:43 18:33	16:29 (WEA ZB2) 16:33 (WEA ZB2)	06:28 20:30	06:53 (WEA VB5) 19:30 (WEA ZB1)	05:27 21:23	04:58 22:00
17	08:36 16:41	13:27 (WEA ZB3) 14:41 (WEA ZB3)	07:45 17:41	16:05 (WEA ZB2) 17:03 (WEA ZB2)	06:41 18:35	4	06:26 20:32	06:52 (WEA VB5) 19:30 (WEA ZB1)	05:26 21:25	04:58 22:01
18	08:35 16:43	13:27 (WEA ZB3) 14:40 (WEA ZB3)	07:43 17:43	16:04 (WEA ZB2) 17:03 (WEA ZB2)	06:38 18:37		06:24 20:34	06:52 (WEA VB5) 19:29 (WEA ZB1)	05:24 21:27	04:58 22:01
19	08:34 16:45	13:28 (WEA ZB3) 14:41 (WEA ZB3)	07:41 17:45	16:04 (WEA ZB2) 17:04 (WEA ZB2)	06:36 18:38		06:21 20:35	06:52 (WEA VB5) 19:28 (WEA ZB1)	05:23 21:28	04:58 22:01
20	08:33 16:46	13:29 (WEA ZB3) 14:41 (WEA ZB3)	07:39 17:47	16:04 (WEA ZB2) 17:04 (WEA ZB2)	06:33 18:40		06:19 20:37	06:52 (WEA VB5) 19:27 (WEA ZB1)	05:21 21:30	04:58 22:02
21	08:32 16:48	13:29 (WEA ZB3) 14:41 (WEA ZB3)	07:37 17:49	16:03 (WEA ZB2) 17:05 (WEA ZB2)	06:31 18:42		06:17 20:39	06:51 (WEA VB5) 19:25 (WEA ZB1)	05:20 21:31	04:58 22:02
22	08:30 16:50	13:30 (WEA ZB3) 14:41 (WEA ZB3)	07:34 17:51	16:02 (WEA ZB2) 17:04 (WEA ZB2)	06:28 18:44		06:15 20:41	06:51 (WEA VB5) 19:23 (WEA ZB1)	05:18 21:33	04:58 22:02
23	08:29 16:52	13:30 (WEA ZB3) 14:41 (WEA ZB3)	07:32 17:53	16:03 (WEA ZB2) 17:04 (WEA ZB2)	06:26 18:46	18:06 (WEA ZB1)	06:12 20:43	06:51 (WEA VB5) 19:22 (WEA ZB1)	05:17 21:34	04:59 22:02
24	08:28 16:54	13:31 (WEA ZB3) 14:41 (WEA ZB3)	07:30 17:55	16:03 (WEA ZB2) 17:05 (WEA ZB2)	06:24 18:48	18:02 (WEA ZB1)	06:10 20:44	06:52 (WEA VB5) 19:20 (WEA ZB1)	05:16 21:36	04:59 22:02
25	08:26 16:56	13:31 (WEA ZB3) 14:40 (WEA ZB3)	07:28 17:57	16:02 (WEA ZB2) 17:04 (WEA ZB2)	06:21 18:50	17:59 (WEA ZB1)	06:08 20:46	06:53 (WEA VB5) 19:17 (WEA ZB1)	05:14 21:37	04:59 22:02
26	08:25 16:58	13:33 (WEA ZB3) 14:41 (WEA ZB3)	07:25 17:59	16:02 (WEA ZB2) 17:04 (WEA ZB2)	06:19 18:51	17:56 (WEA ZB1)	06:06 20:48	06:54 (WEA VB5) 19:14 (WEA ZB1)	05:13 21:39	05:00 22:02
27	08:23 16:59	13:33 (WEA ZB3) 14:40 (WEA ZB3)	07:23 18:01	16:03 (WEA ZB2) 17:04 (WEA ZB2)	06:16 18:53	17:55 (WEA ZB1)	06:04 20:50	06:56 (WEA VB5) 19:09 (WEA ZB1)	05:12 21:40	05:00 22:02
28	08:22 17:01	13:34 (WEA ZB3) 14:39 (WEA ZB3)	07:21 18:02	16:02 (WEA ZB2) 17:03 (WEA ZB2)	06:14 18:55	18:27 (WEA ZB1)	06:02 20:52		05:11 21:42	05:01 22:02
29	08:20 17:03	13:36 (WEA ZB3) 14:40 (WEA ZB3)			07:11 19:57	18:51 (WEA ZB1)	06:00 20:54		05:09 21:43	05:01 22:02
30	08:19 17:05	13:36 (WEA ZB3) 14:39 (WEA ZB3)			07:09 19:59	19:31 (WEA VB13)	05:57 20:55		05:08 21:44	05:02 22:02
31	08:17 17:07	13:37 (WEA ZB3) 14:38 (WEA ZB3)			07:06 20:01	07:32 (WEA VB6)			05:07 21:45	
Sonnenscheinstunden		251	274	367	419	419	1594	493	509	
astr.max.mögl.Beschattung		2233	1775	994						

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO36 - Westerhausen 10 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli		August		September		Oktober		November		Dezember	
1	05:03	05:42			06:36	18:41 (WEA ZB1)	07:28	16:53 (WEA ZB2)	07:26	13:26 (WEA ZB3)	08:21	13:06 (WEA ZB3)
	22:01	21:27			20:21	19:33 (WEA ZB1)	19:07	17:29 (WEA ZB2)	16:57	16:26 (WEA ZB2)	16:13	14:21 (WEA ZB3)
2	05:03	05:44			06:37	18:41 (WEA ZB1)	07:30	16:50 (WEA ZB2)	07:28	13:24 (WEA ZB3)	08:22	13:06 (WEA ZB3)
	22:01	21:25			20:18	19:34 (WEA ZB1)	19:05	17:29 (WEA ZB2)	16:55	16:25 (WEA ZB2)	16:13	14:22 (WEA ZB3)
3	05:04	05:45			06:39	07:21 (WEA VB6)	07:32	16:48 (WEA ZB2)	07:30	13:21 (WEA ZB3)	08:24	13:06 (WEA ZB3)
	22:01	21:23			20:16	19:33 (WEA ZB1)	19:02	17:31 (WEA ZB2)	16:53	16:22 (WEA ZB2)	16:12	14:22 (WEA ZB3)
4	05:05	05:47			06:41	07:19 (WEA VB6)	07:34	16:46 (WEA ZB2)	07:32	13:18 (WEA ZB3)	08:25	13:07 (WEA ZB3)
	22:00	21:21			20:13	19:33 (WEA ZB1)	19:00	17:32 (WEA ZB2)	16:51	16:20 (WEA ZB2)	16:11	14:22 (WEA ZB3)
5	05:06	05:49			06:43	07:18 (WEA VB6)	07:36	16:44 (WEA ZB2)	07:34	13:16 (WEA ZB3)	08:27	13:07 (WEA ZB3)
	22:00	21:19			20:11	19:32 (WEA ZB1)	18:58	17:33 (WEA ZB2)	16:50	16:18 (WEA ZB2)	16:11	14:22 (WEA ZB3)
6	05:07	05:50			06:44	07:16 (WEA VB6)	07:37	16:43 (WEA ZB2)	07:36	13:14 (WEA ZB3)	08:28	13:08 (WEA ZB3)
	21:59	21:17			20:09	19:31 (WEA ZB1)	18:55	17:34 (WEA ZB2)	16:48	16:16 (WEA ZB2)	16:10	14:23 (WEA ZB3)
7	05:08	05:52			06:46	07:16 (WEA VB6)	07:39	16:42 (WEA ZB2)	07:38	13:13 (WEA ZB3)	08:29	13:08 (WEA ZB3)
	21:58	21:15			20:06	19:31 (WEA ZB1)	18:53	17:35 (WEA ZB2)	16:46	16:14 (WEA ZB2)	16:10	14:23 (WEA ZB3)
8	05:09	05:54			06:48	07:15 (WEA VB6)	07:41	16:41 (WEA ZB2)	07:40	13:11 (WEA ZB3)	08:31	13:09 (WEA ZB3)
	21:58	21:13			20:04	19:30 (WEA ZB1)	18:50	17:35 (WEA ZB2)	16:44	16:12 (WEA ZB2)	16:09	14:24 (WEA ZB3)
9	05:10	05:55			06:50	07:16 (WEA VB6)	07:43	16:39 (WEA ZB2)	07:42	13:10 (WEA ZB3)	08:32	13:09 (WEA ZB3)
	21:57	21:11			20:01	19:29 (WEA ZB1)	18:48	17:35 (WEA ZB2)	16:42	15:07 (WEA ZB3)	16:09	14:24 (WEA ZB3)
10	05:11	05:57			06:51	07:18 (WEA VB6)	07:45	16:38 (WEA ZB2)	07:43	13:09 (WEA ZB3)	08:33	13:09 (WEA ZB3)
	21:56	21:09			19:59	19:28 (WEA ZB1)	18:46	17:35 (WEA ZB2)	16:41	15:08 (WEA ZB3)	16:09	14:24 (WEA ZB3)
11	05:12	05:59			06:53	07:20 (WEA VB6)	07:47	16:37 (WEA ZB2)	07:45	13:08 (WEA ZB3)	08:34	13:09 (WEA ZB3)
	21:55	21:07			19:56	19:28 (WEA ZB1)	18:43	17:36 (WEA ZB2)	16:39	15:09 (WEA ZB3)	16:08	14:25 (WEA ZB3)
12	05:13	06:01			06:55	07:21 (WEA VB6)	07:48	16:36 (WEA ZB2)	07:47	13:07 (WEA ZB3)	08:35	13:11 (WEA ZB3)
	21:54	21:05			19:54	19:26 (WEA ZB1)	18:41	17:36 (WEA ZB2)	16:37	15:10 (WEA ZB3)	16:08	14:26 (WEA ZB3)
13	05:14	06:02			06:57	07:23 (WEA VB6)	07:50	16:36 (WEA ZB2)	07:49	13:07 (WEA ZB3)	08:36	13:11 (WEA ZB3)
	21:53	21:03			19:52	19:23 (WEA VB13)	18:39	17:36 (WEA ZB2)	16:36	15:12 (WEA ZB3)	16:08	14:26 (WEA ZB3)
14	05:15	06:04			06:58	18:41 (WEA ZB1)	07:52	16:35 (WEA ZB2)	07:51	13:07 (WEA ZB3)	08:37	13:12 (WEA ZB3)
	21:52	21:01			19:49	19:21 (WEA VB13)	18:36	17:36 (WEA ZB2)	16:34	15:12 (WEA ZB3)	16:08	14:27 (WEA ZB3)
15	05:17	06:06		07:07 (WEA VB5)	07:00	18:42 (WEA ZB1)	07:54	16:35 (WEA ZB2)	07:53	13:06 (WEA ZB3)	08:38	13:12 (WEA ZB3)
	21:51	20:59	3	07:10 (WEA VB5)	19:47	19:19 (WEA VB13)	18:34	17:36 (WEA ZB2)	16:32	15:13 (WEA ZB3)	16:08	14:27 (WEA ZB3)
16	05:18	06:08		07:02 (WEA VB5)	07:02	18:43 (WEA ZB1)	07:56	16:34 (WEA ZB2)	07:55	13:06 (WEA ZB3)	08:39	13:12 (WEA ZB3)
	21:50	20:57	23	19:18 (WEA ZB1)	19:44	19:16 (WEA ZB1)	18:32	17:36 (WEA ZB2)	16:31	15:14 (WEA ZB3)	16:08	14:27 (WEA ZB3)
17	05:19	06:09		07:00 (WEA VB5)	07:04	18:44 (WEA ZB1)	07:58	16:34 (WEA ZB2)	07:57	13:05 (WEA ZB3)	08:40	13:12 (WEA ZB3)
	21:49	20:55	35	19:22 (WEA ZB1)	19:42	19:14 (WEA ZB1)	18:29	17:36 (WEA ZB2)	16:29	15:14 (WEA ZB3)	16:08	14:27 (WEA ZB3)
18	05:21	06:11		06:59 (WEA VB5)	07:05	18:46 (WEA ZB1)	08:00	16:34 (WEA ZB2)	07:58	13:05 (WEA ZB3)	08:41	13:13 (WEA ZB3)
	21:48	20:53	44	19:25 (WEA ZB1)	19:39	19:12 (WEA ZB1)	18:27	17:36 (WEA ZB2)	16:28	15:15 (WEA ZB3)	16:09	14:28 (WEA ZB3)
19	05:22	06:13		06:58 (WEA VB5)	07:07	18:48 (WEA ZB1)	08:01	16:34 (WEA ZB2)	08:00	13:05 (WEA ZB3)	08:41	13:14 (WEA ZB3)
	21:47	20:50	49	19:26 (WEA ZB1)	19:37	19:08 (WEA ZB1)	18:25	17:36 (WEA ZB2)	16:27	15:16 (WEA ZB3)	16:09	14:29 (WEA ZB3)
20	05:23	06:15		06:57 (WEA VB5)	07:09	18:51 (WEA ZB1)	08:03	16:34 (WEA ZB2)	08:02	13:05 (WEA ZB3)	08:42	13:14 (WEA ZB3)
	21:45	20:48	54	19:28 (WEA ZB1)	19:34	19:06 (WEA ZB1)	18:23	17:35 (WEA ZB2)	16:25	15:16 (WEA ZB3)	16:09	14:29 (WEA ZB3)
21	05:25	06:16		06:57 (WEA VB5)	07:11		08:05	16:34 (WEA ZB2)	08:04	13:05 (WEA ZB3)	08:43	13:15 (WEA ZB3)
	21:44	20:46	57	19:29 (WEA ZB1)	19:32		18:20	17:35 (WEA ZB2)	16:24	15:17 (WEA ZB3)	16:10	14:30 (WEA ZB3)
22	05:26	06:18		06:55 (WEA VB5)	07:12		08:07	16:34 (WEA ZB2)	08:06	13:05 (WEA ZB3)	08:43	13:15 (WEA ZB3)
	21:42	20:44	62	19:30 (WEA ZB1)	19:29		18:18	17:34 (WEA ZB2)	16:23	15:17 (WEA ZB3)	16:10	14:30 (WEA ZB3)
23	05:28	06:20		06:55 (WEA VB5)	07:14		08:09	16:34 (WEA ZB2)	08:07	13:05 (WEA ZB3)	08:44	13:16 (WEA ZB3)
	21:41	20:41	64	19:31 (WEA ZB1)	19:27		18:16	17:34 (WEA ZB2)	16:21	15:18 (WEA ZB3)	16:11	14:31 (WEA ZB3)
24	05:29	06:22		06:55 (WEA VB5)	07:16		08:11	16:34 (WEA ZB2)	08:09	13:05 (WEA ZB3)	08:44	13:16 (WEA ZB3)
	21:40	20:39	67	19:32 (WEA ZB1)	19:24		18:14	17:33 (WEA ZB2)	16:20	15:18 (WEA ZB3)	16:11	14:31 (WEA ZB3)
25	05:31	06:23		06:55 (WEA VB5)	07:18		07:13	15:35 (WEA ZB2)	08:11	13:04 (WEA ZB3)	08:45	13:16 (WEA ZB3)
	21:38	20:37	67	19:32 (WEA ZB1)	19:22		17:12	16:33 (WEA ZB2)	16:19	14:18 (WEA ZB3)	16:12	14:31 (WEA ZB3)
26	05:32	06:25		06:55 (WEA VB5)	07:20		07:15	15:35 (WEA ZB2)	08:13	13:04 (WEA ZB3)	08:45	13:17 (WEA ZB3)
	21:37	20:35	68	19:33 (WEA ZB1)	19:20		17:10	16:32 (WEA ZB2)	16:18	14:19 (WEA ZB3)	16:13	14:32 (WEA ZB3)
27	05:34	06:27		06:56 (WEA VB5)	07:21		07:17	15:36 (WEA ZB2)	08:14	13:05 (WEA ZB3)	08:45	13:18 (WEA ZB3)
	21:35	20:32	68	19:33 (WEA ZB1)	19:17		17:07	16:31 (WEA ZB2)	16:17	14:19 (WEA ZB3)	16:13	14:33 (WEA ZB3)
28	05:35	06:29		06:56 (WEA VB5)	07:23	17:04 (WEA ZB2)	07:18	15:36 (WEA ZB2)	08:16	13:05 (WEA ZB3)	08:45	13:18 (WEA ZB3)
	21:33	20:30	68	19:33 (WEA ZB1)	19:15	17:20 (WEA ZB2)	17:05	16:30 (WEA ZB2)	16:16	14:20 (WEA ZB3)	16:14	14:33 (WEA ZB3)
29	05:37	06:30		06:58 (WEA VB5)	07:25	16:59 (WEA ZB2)	07:20	15:37 (WEA ZB2)	08:18	13:06 (WEA ZB3)	08:45	13:18 (WEA ZB3)
	21:32	20:28	65	19:33 (WEA ZB1)	19:12	17:24 (WEA ZB2)	17:03	16:29 (WEA ZB2)	16:15	14:21 (WEA ZB3)	16:15	14:34 (WEA ZB3)
30	05:39	06:32		07:00 (WEA VB5)	07:27	16:56 (WEA ZB2)	07:22	15:38 (WEA ZB2)	08:19	13:05 (WEA ZB3)	08:45	13:19 (WEA ZB3)
	21:30	20:25	63	19:34 (WEA ZB1)	19:10	17:26 (WEA ZB2)	17:01	16:28 (WEA ZB2)	16:14	14:20 (WEA ZB3)	16:16	14:34 (WEA ZB3)
31	05:40	06:34		07:01 (WEA VB5)			07:24	13:32 (WEA ZB3)			08:45	13:19 (WEA ZB3)
	21:28	20:23	58	19:33 (WEA ZB1)			16:59	16:27 (WEA ZB2)			16:17	14:34 (WEA ZB3)
Sonnenscheinstunden	511	459			382		329		260		234	
astr.max.mögl.Beschattung			915		1071		1722		2122		2329	

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO37 - Westerhausen 1

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März		April		Mai		Juni
1	08:45	08:16	07:19		07:04	19:15 (WEA ZB3)	05:55	19:05 (WEA ZB3)	05:06
	16:18	17:09	18:04		20:02	19:35 (WEA ZB3)	20:57	20:28 (WEA ZB1)	21:47
2	08:45	08:14	07:16		07:02	19:12 (WEA ZB3)	05:53	19:06 (WEA ZB3)	05:05
	16:19	17:11	18:06		20:04	19:37 (WEA ZB3)	20:59	20:29 (WEA ZB1)	21:48
3	08:45	08:12	07:14		06:59	19:10 (WEA ZB3)	05:51	19:08 (WEA ZB3)	05:05
	16:21	17:13	18:08		20:06	19:40 (WEA ZB3)	21:01	20:31 (WEA ZB1)	21:49
4	08:45	08:10	07:12		06:57	19:07 (WEA ZB3)	05:49	19:10 (WEA ZB3)	05:04
	16:22	17:15	18:10		20:08	19:41 (WEA ZB3)	21:03	20:32 (WEA ZB1)	21:50
5	08:44	08:09	07:09		06:54	19:06 (WEA ZB3)	05:47	19:14 (WEA ZB3)	05:03
	16:23	17:17	18:12		20:10	19:43 (WEA ZB3)	21:04	20:34 (WEA ZB1)	21:51
6	08:44	08:07	07:07		06:52	19:04 (WEA ZB3)	05:45	19:45 (WEA ZB2)	05:02
	16:24	17:19	18:14		20:11	19:44 (WEA ZB3)	21:06	20:35 (WEA ZB1)	21:52
7	08:44	08:05	07:05		06:50	19:03 (WEA ZB3)	05:43	20:19 (WEA ZB1)	05:02
	16:26	17:21	18:16		20:13	19:46 (WEA ZB3)	21:08	20:38 (WEA ZB1)	21:53
8	08:43	08:03	07:02		06:47	19:02 (WEA ZB3)	05:42	20:18 (WEA ZB1)	05:01
	16:27	17:23	18:18		20:15	19:48 (WEA ZB3)	21:10	20:39 (WEA ZB1)	21:54
9	08:43	08:01	07:00		06:45	19:01 (WEA ZB3)	05:40	20:18 (WEA ZB1)	05:00
	16:29	17:25	18:20		20:17	19:47 (WEA ZB3)	21:11	20:40 (WEA ZB1)	21:55
10	08:42	07:59	06:57		06:42	19:00 (WEA ZB3)	05:38	20:18 (WEA ZB1)	05:00
	16:30	17:27	18:22		20:19	19:48 (WEA ZB3)	21:13	20:43 (WEA ZB1)	21:56
11	08:41	07:57	06:55		06:40	18:59 (WEA ZB3)	05:36	20:18 (WEA ZB1)	05:00
	16:31	17:29	18:23		20:21	19:49 (WEA ZB3)	21:15	20:44 (WEA ZB1)	21:57
12	08:40	07:55	06:53		06:38	18:58 (WEA ZB3)	05:34	20:17 (WEA ZB1)	04:59
	16:33	17:31	18:25		20:22	19:55 (WEA ZB2)	21:17	20:45 (WEA ZB1)	21:57
13	08:40	07:53	06:50		06:35	18:58 (WEA ZB3)	05:32	20:18 (WEA ZB1)	04:59
	16:35	17:33	18:27		20:24	19:57 (WEA ZB2)	21:18	20:47 (WEA ZB1)	21:58
14	08:39	07:51	06:48		06:33	18:58 (WEA ZB3)	05:31	20:18 (WEA ZB1)	04:59
	16:36	17:35	18:29		20:26	19:59 (WEA ZB2)	21:20	20:46 (WEA ZB1)	21:59
15	08:38	07:49	06:45		06:31	18:58 (WEA ZB3)	05:29	20:18 (WEA ZB1)	04:58
	16:38	17:37	18:31		20:28	20:01 (WEA ZB2)	21:22	20:46 (WEA ZB1)	21:59
16	08:37	07:47	06:43		06:28	18:56 (WEA ZB3)	05:27	05:55 (WEA VB7)	04:58
	16:40	17:39	18:33		20:30	20:02 (WEA ZB2)	21:23	20:46 (WEA ZB1)	22:00
17	08:36	07:45	06:41		06:26	18:57 (WEA ZB3)	05:26	05:54 (WEA VB7)	04:58
	16:41	17:41	18:35		20:32	20:04 (WEA ZB2)	21:25	20:46 (WEA ZB1)	22:00
18	08:35	07:43	06:38		06:24	18:57 (WEA ZB3)	05:24	05:52 (WEA VB7)	04:58
	16:43	17:43	18:37		20:33	20:05 (WEA ZB2)	21:27	20:45 (WEA ZB1)	22:01
19	08:34	07:41	06:36		06:21	18:57 (WEA ZB3)	05:23	05:51 (WEA VB7)	04:58
	16:45	17:45	18:38		20:35	20:07 (WEA ZB2)	21:28	20:45 (WEA ZB1)	22:01
20	08:33	07:39	06:33		06:19	18:57 (WEA ZB3)	05:21	05:50 (WEA VB7)	04:58
	16:46	17:47	18:40		20:37	20:09 (WEA ZB2)	21:30	20:45 (WEA ZB1)	22:02
21	08:31	07:36	06:31		06:17	18:56 (WEA ZB3)	05:20	05:48 (WEA VB7)	04:58
	16:48	17:49	18:42		20:39	20:10 (WEA ZB2)	21:31	20:43 (WEA ZB1)	22:02
22	08:30	07:34	06:28		06:15	18:57 (WEA ZB3)	05:18	05:47 (WEA VB7)	04:58
	16:50	17:51	18:44		20:41	20:11 (WEA ZB2)	21:33	20:43 (WEA ZB1)	22:02
23	08:29	07:32	06:26		06:12	18:57 (WEA ZB3)	05:17	05:46 (WEA VB7)	04:59
	16:52	17:53	18:46		20:43	20:11 (WEA ZB2)	21:34	20:43 (WEA ZB1)	22:02
24	08:28	07:30	06:23		06:10	18:58 (WEA ZB3)	05:16	05:45 (WEA VB7)	04:59
	16:54	17:55	18:48		20:44	20:11 (WEA ZB2)	21:36	20:42 (WEA ZB1)	22:02
25	08:26	07:28	06:21		06:08	18:59 (WEA ZB3)	05:14	05:43 (WEA VB7)	04:59
	16:56	17:57	18:49		20:46	20:10 (WEA ZB2)	21:37	20:40 (WEA ZB1)	22:02
26	08:25	07:25	06:19		06:06	18:59 (WEA ZB3)	05:13	05:42 (WEA VB7)	05:00
	16:58	17:59	18:51		20:48	20:10 (WEA ZB2)	21:39	20:39 (WEA ZB1)	22:02
27	08:23	07:23	06:16		06:04	19:00 (WEA ZB3)	05:12	05:42 (WEA VB7)	05:00
	16:59	18:01	18:53		20:50	20:09 (WEA ZB2)	21:40	20:37 (WEA ZB1)	22:02
28	08:22	07:21	06:14		06:02	19:01 (WEA ZB3)	05:11	05:42 (WEA VB7)	05:01
	17:01	18:02	18:55		20:52	20:09 (WEA ZB2)	21:41	20:35 (WEA ZB1)	22:02
29	08:20		07:11		06:00	19:02 (WEA ZB3)	05:09	05:43 (WEA VB7)	05:01
	17:03		19:57		20:54	20:08 (WEA ZB2)	21:43	05:59 (WEA VB7)	22:02
30	08:19		07:09		05:57	19:03 (WEA ZB3)	05:08	05:43 (WEA VB7)	05:02
	17:05		19:59		20:55	20:07 (WEA ZB2)	21:44	05:58 (WEA VB7)	22:02
31	08:17		07:06	19:19 (WEA ZB3)			05:07	05:45 (WEA VB7)	
	17:07		20:00	19:34 (WEA ZB3)			21:45	05:59 (WEA VB7)	
Sonnenscheinstunden	251	274	367	15	419		493		509
astr. max. mögl. Beschattung				15	1706		972		562

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO37 - Westerhausen 1

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli			August			September			Oktober		November		Dezember	
1	05:03		05:36 (WEA VB6)	05:42		20:28 (WEA ZB1)	06:36		18:58 (WEA ZB3)	07:28		07:26		08:21	
	22:01	18	05:54 (WEA VB6)	21:27	27	20:55 (WEA ZB1)	20:21	50	19:48 (WEA ZB3)	19:07		16:57		16:13	
2	05:03		05:37 (WEA VB6)	05:44		20:28 (WEA ZB1)	06:37		18:59 (WEA ZB3)	07:30		07:28		08:22	
	22:01	18	05:55 (WEA VB6)	21:25	26	20:54 (WEA ZB1)	20:18	48	19:47 (WEA ZB3)	19:05		16:55		16:13	
3	05:04		05:38 (WEA VB6)	05:45		20:28 (WEA ZB1)	06:39		18:59 (WEA ZB3)	07:32		07:30		08:24	
	22:01	17	05:55 (WEA VB6)	21:23	23	20:51 (WEA ZB1)	20:16	46	19:45 (WEA ZB3)	19:02		16:53		16:12	
4	05:05		05:39 (WEA VB6)	05:47		20:28 (WEA ZB1)	06:41		18:59 (WEA ZB3)	07:34		07:32		08:25	
	22:00	16	05:55 (WEA VB6)	21:21	22	20:50 (WEA ZB1)	20:13	46	19:45 (WEA ZB3)	19:00		16:51		16:11	
5	05:06		05:38 (WEA VB6)	05:49		20:29 (WEA ZB1)	06:43		19:00 (WEA ZB3)	07:36		07:34		08:26	
	22:00	16	05:54 (WEA VB6)	21:19	20	20:49 (WEA ZB1)	20:11	43	19:43 (WEA ZB3)	18:58		16:50		16:11	
6	05:07		05:39 (WEA VB6)	05:50		19:58 (WEA ZB2)	06:44		19:00 (WEA ZB3)	07:37		07:36		08:28	
	21:59	14	05:53 (WEA VB6)	21:17	23	20:46 (WEA ZB1)	20:09	40	19:40 (WEA ZB3)	18:55		16:48		16:10	
7	05:08		05:40 (WEA VB6)	05:52		19:55 (WEA ZB2)	06:46		19:01 (WEA ZB3)	07:39		07:38		08:29	
	21:58	18	06:01 (WEA VB7)	21:15	28	20:45 (WEA ZB1)	20:06	37	19:38 (WEA ZB3)	18:53		16:46		16:10	
8	05:09		05:41 (WEA VB6)	05:54		19:22 (WEA ZB3)	06:48		19:03 (WEA ZB3)	07:41		07:40		08:30	
	21:58	19	06:03 (WEA VB7)	21:13	45	20:43 (WEA ZB1)	20:04	33	19:36 (WEA ZB3)	18:50		16:44		16:09	
9	05:10		05:43 (WEA VB6)	05:55		19:19 (WEA ZB3)	06:50		19:03 (WEA ZB3)	07:43		07:42		08:32	
	21:57	18	06:04 (WEA VB7)	21:11	53	20:41 (WEA ZB1)	20:01	30	19:33 (WEA ZB3)	18:48		16:42		16:09	
10	05:11		05:45 (WEA VB6)	05:57		19:17 (WEA ZB3)	06:51		19:05 (WEA ZB3)	07:45		07:43		08:33	
	21:56	17	06:05 (WEA VB7)	21:09	57	20:40 (WEA ZB1)	19:59	26	19:31 (WEA ZB3)	18:46		16:41		16:09	
11	05:12		05:53 (WEA VB7)	05:59		19:14 (WEA ZB3)	06:53		19:07 (WEA ZB3)	07:47		07:45		08:34	
	21:55	12	06:05 (WEA VB7)	21:07	60	20:37 (WEA ZB1)	19:56	22	19:29 (WEA ZB3)	18:43		16:39		16:08	
12	05:13		05:52 (WEA VB7)	06:01		19:13 (WEA ZB3)	06:55		19:10 (WEA ZB3)	07:48		07:47		08:35	
	21:54	14	06:06 (WEA VB7)	21:05	61	20:15 (WEA ZB2)	19:54	16	19:26 (WEA ZB3)	18:41		16:37		16:08	
13	05:14		05:52 (WEA VB7)	06:02		19:10 (WEA ZB3)	06:57		19:18 (WEA ZB3)	07:50		07:49		08:36	
	21:53	15	06:07 (WEA VB7)	21:03	65	20:15 (WEA ZB2)	19:51	1	19:19 (WEA ZB3)	18:39		16:36		16:08	
14	05:15		05:51 (WEA VB7)	06:04		19:09 (WEA ZB3)	06:58			07:52		07:51		08:37	
	21:52	16	06:07 (WEA VB7)	21:01	67	20:16 (WEA ZB2)	19:49			18:36		16:34		16:08	
15	05:17		05:52 (WEA VB7)	06:06		19:08 (WEA ZB3)	07:00			07:54		07:53		08:38	
	21:51	16	06:08 (WEA VB7)	20:59	69	20:17 (WEA ZB2)	19:47			18:34		16:32		16:08	
16	05:18		05:51 (WEA VB7)	06:08		19:06 (WEA ZB3)	07:02			07:56		07:55		08:39	
	21:50	26	20:46 (WEA ZB1)	20:57	70	20:16 (WEA ZB2)	19:44			18:32		16:31		16:08	
17	05:19		05:51 (WEA VB7)	06:09		19:06 (WEA ZB3)	07:04			07:58		07:57		08:40	
	21:49	30	20:48 (WEA ZB1)	20:55	71	20:17 (WEA ZB2)	19:42			18:29		16:29		16:08	
18	05:21		05:52 (WEA VB7)	06:11		19:05 (WEA ZB3)	07:05			07:59		07:58		08:41	
	21:48	32	20:49 (WEA ZB1)	20:53	72	20:17 (WEA ZB2)	19:39			18:27		16:28		16:09	
19	05:22		05:54 (WEA VB7)	06:13		19:03 (WEA ZB3)	07:07			08:01		08:00		08:41	
	21:46	33	20:51 (WEA ZB1)	20:50	73	20:16 (WEA ZB2)	19:37			18:25		16:27		16:09	
20	05:23		05:55 (WEA VB7)	06:15		19:03 (WEA ZB3)	07:09			08:03		08:02		08:42	
	21:45	34	20:52 (WEA ZB1)	20:48	73	20:16 (WEA ZB2)	19:34			18:23		16:25		16:09	
21	05:25		05:56 (WEA VB7)	06:16		19:02 (WEA ZB3)	07:11			08:05		08:04		08:43	
	21:44	33	20:52 (WEA ZB1)	20:46	74	20:16 (WEA ZB2)	19:32			18:20		16:24		16:10	
22	05:26		05:58 (WEA VB7)	06:18		19:01 (WEA ZB3)	07:12			08:07		08:06		08:43	
	21:42	34	20:54 (WEA ZB1)	20:44	74	20:15 (WEA ZB2)	19:29			18:18		16:23		16:10	
23	05:28		05:59 (WEA VB7)	06:20		19:01 (WEA ZB3)	07:14			08:09		08:07		08:44	
	21:41	34	20:54 (WEA ZB1)	20:41	72	20:13 (WEA ZB2)	19:27			18:16		16:21		16:11	
24	05:29		06:00 (WEA VB7)	06:22		19:01 (WEA ZB3)	07:16			08:11		08:09		08:44	
	21:40	33	20:54 (WEA ZB1)	20:39	70	20:11 (WEA ZB2)	19:24			18:14		16:20		16:11	
25	05:31		06:02 (WEA VB7)	06:23		18:59 (WEA ZB3)	07:18			07:13		08:11		08:44	
	21:38	32	20:55 (WEA ZB1)	20:37	69	20:08 (WEA ZB2)	19:22			17:12		16:19		16:12	
26	05:32		06:03 (WEA VB7)	06:25		18:59 (WEA ZB3)	07:20			07:15		08:13		08:45	
	21:37	31	20:55 (WEA ZB1)	20:35	67	20:06 (WEA ZB2)	19:20			17:10		16:18		16:13	
27	05:34		06:05 (WEA VB7)	06:27		18:59 (WEA ZB3)	07:21			07:17		08:14		08:45	
	21:35	30	20:56 (WEA ZB1)	20:32	65	20:04 (WEA ZB2)	19:17			17:07		16:17		16:13	
28	05:35		06:06 (WEA VB7)	06:29		18:58 (WEA ZB3)	07:23			07:18		08:16		08:45	
	21:33	29	20:56 (WEA ZB1)	20:30	63	20:01 (WEA ZB2)	19:15			17:05		16:16		16:14	
29	05:37		20:29 (WEA ZB1)	06:30		18:59 (WEA ZB3)	07:25			07:20		08:17		08:45	
	21:32	28	20:57 (WEA ZB1)	20:28	60	19:59 (WEA ZB2)	19:12			17:03		16:15		16:15	
30	05:39		20:28 (WEA ZB1)	06:32		18:59 (WEA ZB3)	07:27			07:22		08:19		08:45	
	21:30	29	20:57 (WEA ZB1)	20:25	58	19:57 (WEA ZB2)	19:10			17:01		16:14		16:16	
31	05:40		20:28 (WEA ZB1)	06:34		18:58 (WEA ZB3)				07:24				08:45	
	21:28	29	20:57 (WEA ZB1)	20:23	56	19:54 (WEA ZB2)				16:59				16:17	
Sonnenscheinstunden			511				459				382				235
astr.max.mögl.Beschattung			741				1733				438				

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO4 - Utwarfe 4
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar			Februar			März			April			Mai			Juni		
1	08:45	09:19 (WEA VB7)	08:16	09:19 (WEA VB7)	07:19				07:04			05:55	18:37 (WEA VB4)	05:06			
	16:18	108 14:36 (WEA VB5)	17:09	79 14:44 (WEA VB5)	18:04				20:02			20:57	41 19:18 (WEA VB4)	21:47			
2	08:45	09:19 (WEA VB7)	08:14	09:19 (WEA VB7)	07:16				07:02			05:53	18:38 (WEA VB4)	05:05			
	16:19	109 14:37 (WEA VB5)	17:11	77 14:43 (WEA VB5)	18:06				20:04			20:59	39 19:17 (WEA VB4)	21:48			
3	08:45	09:18 (WEA VB7)	08:12	09:20 (WEA VB7)	07:14			17:25 (WEA VB3)	06:59		9	18:59 (WEA VB4)	05:51	18:39 (WEA VB4)	05:04		
	16:20	111 14:37 (WEA VB5)	17:13	73 14:42 (WEA VB5)	18:08		9	17:34 (WEA VB3)	20:06		20	19:14 (WEA VB4)	21:01	37 19:16 (WEA VB4)	21:49		
4	08:45	09:18 (WEA VB7)	08:10	09:22 (WEA VB7)	07:12			17:22 (WEA VB3)	06:57			18:54 (WEA VB4)	05:49	18:40 (WEA VB4)	05:04		
	16:22	113 14:38 (WEA VB5)	17:15	68 14:42 (WEA VB5)	18:10		16	17:38 (WEA VB3)	20:08		26	19:16 (WEA VB4)	21:03	34 19:14 (WEA VB4)	21:50		
5	08:44	09:17 (WEA VB7)	08:09	09:23 (WEA VB7)	07:09			17:19 (WEA VB3)	06:54			18:47 (WEA VB4)	05:47	18:42 (WEA VB4)	05:03		
	16:23	113 14:38 (WEA VB5)	17:17	64 14:41 (WEA VB5)	18:12		20	17:39 (WEA VB3)	20:10		31	19:18 (WEA VB4)	21:04	31 19:13 (WEA VB4)	21:51		
6	08:44	09:17 (WEA VB7)	08:07	09:24 (WEA VB7)	07:07			17:18 (WEA VB3)	06:52			18:45 (WEA VB4)	05:45	18:43 (WEA VB4)	05:02		
	16:24	115 14:39 (WEA VB5)	17:19	58 14:39 (WEA VB5)	18:14		23	17:41 (WEA VB3)	20:11		45	19:41 (WEA VB2)	21:06	28 19:11 (WEA VB4)	21:52		
7	08:44	09:16 (WEA VB7)	08:05	09:26 (WEA VB7)	07:04			17:17 (WEA VB3)	06:49			18:43 (WEA VB4)	05:43	18:46 (WEA VB4)	05:01		
	16:26	116 14:40 (WEA VB5)	17:21	49 14:37 (WEA VB5)	18:16		25	17:42 (WEA VB3)	20:13		55	19:44 (WEA VB2)	21:08	24 19:10 (WEA VB4)	21:53		
8	08:43	09:16 (WEA VB7)	08:03	09:28 (WEA VB7)	07:02			17:15 (WEA VB3)	06:47			18:42 (WEA VB4)	05:41	18:48 (WEA VB4)	05:01		
	16:27	118 14:41 (WEA VB5)	17:23	40 14:35 (WEA VB5)	18:18		27	17:42 (WEA VB3)	20:15		59	19:45 (WEA VB2)	21:10	19 19:07 (WEA VB4)	21:54		
9	08:43	09:16 (WEA VB7)	08:01	09:31 (WEA VB7)	07:00			17:15 (WEA VB3)	06:45			18:40 (WEA VB4)	05:40	18:52 (WEA VB4)	05:00		
	16:28	117 14:41 (WEA VB5)	17:25	27 14:31 (WEA VB5)	18:20		28	17:43 (WEA VB3)	20:17		66	19:46 (WEA VB2)	21:11	11 19:03 (WEA VB4)	21:55		
10	08:42	09:15 (WEA VB7)	07:59		06:57			17:14 (WEA VB3)	06:42			18:39 (WEA VB4)	05:38		05:00		
	16:30	119 14:42 (WEA VB5)	17:27		18:22		29	17:43 (WEA VB3)	20:19		68	19:47 (WEA VB2)	21:13		21:56		
11	08:41	09:15 (WEA VB7)	07:57		06:55			17:14 (WEA VB3)	06:40			18:38 (WEA VB4)	05:36		04:59		
	16:31	119 14:42 (WEA VB5)	17:29		18:23		29	17:43 (WEA VB3)	20:21		69	19:47 (WEA VB2)	21:15		21:57		
12	08:40	09:15 (WEA VB7)	07:55		06:53			17:13 (WEA VB3)	06:38			18:36 (WEA VB4)	05:34		04:59		
	16:33	119 14:43 (WEA VB5)	17:31		18:25		30	17:43 (WEA VB3)	20:22		71	19:47 (WEA VB2)	21:17		21:57		
13	08:40	09:15 (WEA VB7)	07:53		06:50			17:13 (WEA VB3)	06:35			18:36 (WEA VB4)	05:32		04:59		
	16:35	119 14:43 (WEA VB5)	17:33		18:27		30	17:43 (WEA VB3)	20:24		71	19:47 (WEA VB2)	21:18		21:58		
14	08:39	09:15 (WEA VB7)	07:51		06:48			17:12 (WEA VB3)	06:33			18:35 (WEA VB4)	05:31		04:58		
	16:36	118 14:44 (WEA VB5)	17:35		18:29		31	18:02 (WEA VB1)	20:26		72	19:47 (WEA VB2)	21:20		21:59		
15	08:38	09:15 (WEA VB7)	07:49		06:45			17:13 (WEA VB3)	06:31			18:35 (WEA VB4)	05:29		04:58		
	16:38	117 14:44 (WEA VB5)	17:37		18:31		32	18:04 (WEA VB1)	20:28		72	19:47 (WEA VB2)	21:22		21:59		
16	08:37	09:15 (WEA VB7)	07:47		06:43			17:14 (WEA VB3)	06:28			18:34 (WEA VB4)	05:27		04:58		
	16:39	117 14:45 (WEA VB5)	17:39		18:33		35	18:07 (WEA VB1)	20:30		72	19:46 (WEA VB2)	21:23		22:00		
17	08:36	09:15 (WEA VB7)	07:45		06:40			17:14 (WEA VB3)	06:26			18:34 (WEA VB4)	05:26		04:58		
	16:41	115 14:45 (WEA VB5)	17:41		18:35		36	18:08 (WEA VB1)	20:32		72	19:46 (WEA VB2)	21:25		22:00		
18	08:35	09:14 (WEA VB7)	07:43		06:38			17:15 (WEA VB3)	06:24			18:33 (WEA VB4)	05:24		04:58		
	16:43	112 14:45 (WEA VB5)	17:43		18:36		36	18:10 (WEA VB1)	20:33		72	19:45 (WEA VB2)	21:27		22:01		
19	08:34	09:15 (WEA VB7)	07:41		06:36			17:16 (WEA VB3)	06:21			18:33 (WEA VB4)	05:23		04:58		
	16:45	108 14:46 (WEA VB5)	17:45		18:38		36	18:12 (WEA VB1)	20:35		71	19:44 (WEA VB2)	21:28		22:01		
20	08:33	09:15 (WEA VB7)	07:39		06:33			17:18 (WEA VB3)	06:19			18:32 (WEA VB4)	05:21		04:58		
	16:46	102 14:46 (WEA VB5)	17:47		18:40		33	18:14 (WEA VB1)	20:37		70	19:42 (WEA VB2)	21:30		22:02		
21	08:32	09:15 (WEA VB7)	07:36		06:31			17:21 (WEA VB3)	06:17			18:33 (WEA VB4)	05:20		04:58		
	16:48	91 14:46 (WEA VB5)	17:49		18:42		28	18:15 (WEA VB1)	20:39		68	19:41 (WEA VB2)	21:31		22:02		
22	08:30	09:15 (WEA VB7)	07:34		06:28			17:57 (WEA VB1)	06:15			18:33 (WEA VB4)	05:18		04:58		
	16:50	91 14:46 (WEA VB5)	17:51		18:44		17	18:14 (WEA VB1)	20:41		66	19:39 (WEA VB2)	21:33		22:02		
23	08:29	09:15 (WEA VB7)	07:32		06:26			17:57 (WEA VB1)	06:12			18:33 (WEA VB4)	05:17		04:59		
	16:52	91 14:46 (WEA VB5)	17:53		18:46		15	18:12 (WEA VB1)	20:43		62	19:37 (WEA VB2)	21:34		22:02		
24	08:28	09:16 (WEA VB7)	07:30		06:23			18:00 (WEA VB1)	06:10			18:33 (WEA VB4)	05:15		04:59		
	16:54	91 14:47 (WEA VB5)	17:55		18:48		10	18:10 (WEA VB1)	20:44		50	19:23 (WEA VB4)	21:36		22:02		
25	08:26	09:15 (WEA VB7)	07:28		06:21			18:03 (WEA VB1)	06:08			18:34 (WEA VB4)	05:14		04:59		
	16:56	91 14:46 (WEA VB5)	17:57		18:49		2	18:05 (WEA VB1)	20:46		49	19:23 (WEA VB4)	21:37		22:02		
26	08:25	09:16 (WEA VB7)	07:25		06:19				06:06			18:34 (WEA VB4)	05:13		05:00		
	16:57	91 14:47 (WEA VB5)	17:59		18:51				20:48		48	19:22 (WEA VB4)	21:39		22:02		
27	08:23	09:16 (WEA VB7)	07:23		06:16				06:04			18:35 (WEA VB4)	05:12		05:00		
	16:59	89 14:46 (WEA VB5)	18:00		18:53				20:50		47	19:22 (WEA VB4)	21:40		22:02		
28	08:22	09:16 (WEA VB7)	07:21		06:14				06:02			18:35 (WEA VB4)	05:10		05:01		
	17:01	88 14:46 (WEA VB5)	18:02		18:55				20:52		46	19:21 (WEA VB4)	21:41		22:02		
29	08:20	09:18 (WEA VB7)			07:11				05:59			18:36 (WEA VB4)	05:09		05:01		
	17:03	86 14:46 (WEA VB5)			19:57				20:54		44	19:20 (WEA VB4)	21:43		22:02		
30	08:19	09:18 (WEA VB7)			07:09				05:57			18:37 (WEA VB4)	05:08		05:02		
	17:05	84 14:46 (WEA VB5)			19:59				20:55		42	19:19 (WEA VB4)	21:44		22:02		
31	08:17	09:18 (WEA VB7)			07:06								21:45		05:07		
	17:07	83 14:45 (WEA VB5)			20:00								493				
Sonnenscheinstunden			251			367			420						509		
astr.max.mögl.Beschattung			3261		535		577		1613			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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO4 - Utwarfe 4
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Jul	August	September	Oktober	November	Dezember
1	05:02 22:01	05:42 21:27	06:36 20:20	18:37 (WEA VB4) 07:28 19:46 (WEA VB2) 19:07	17:53 (WEA VB3) 07:26 18:23 (WEA VB3) 16:57	09:04 (WEA VB7) 08:21 09:09 (WEA VB7) 16:13
2	05:03 22:01	05:43 21:25	06:37 20:18	18:38 (WEA VB4) 07:30 19:46 (WEA VB2) 19:05	17:52 (WEA VB3) 07:28 18:21 (WEA VB3) 16:55	08:59 (WEA VB7) 08:22 14:00 (WEA VB5) 16:13
3	05:04 22:01	05:45 21:23	06:39 20:16	18:38 (WEA VB4) 07:32 19:44 (WEA VB2) 19:02	17:52 (WEA VB3) 07:30 18:21 (WEA VB3) 16:53	08:57 (WEA VB7) 08:24 14:05 (WEA VB5) 16:12
4	05:05 22:00	05:47 21:21	19:00 (WEA VB4) 06:41 19:15 (WEA VB4) 20:13	18:39 (WEA VB4) 07:34 19:42 (WEA VB2) 19:00	17:52 (WEA VB3) 07:32 18:20 (WEA VB3) 16:51	08:55 (WEA VB7) 08:25 14:07 (WEA VB5) 16:11
5	05:06 22:00	05:49 21:19	18:57 (WEA VB4) 06:43 19:17 (WEA VB4) 20:11	18:40 (WEA VB4) 07:36 19:41 (WEA VB2) 18:58	17:52 (WEA VB3) 07:34 18:20 (WEA VB3) 16:49	08:54 (WEA VB7) 08:26 14:09 (WEA VB5) 16:11
6	05:06 21:59	05:50 21:17	18:55 (WEA VB4) 06:44 19:20 (WEA VB4) 20:08	18:41 (WEA VB4) 07:37 19:37 (WEA VB2) 18:55	17:53 (WEA VB3) 07:36 18:19 (WEA VB3) 16:48	08:53 (WEA VB7) 08:28 14:11 (WEA VB5) 16:10
7	05:07 21:58	05:52 21:15	18:53 (WEA VB4) 06:46 19:22 (WEA VB4) 20:06	18:42 (WEA VB4) 07:39 19:14 (WEA VB4) 18:53	17:54 (WEA VB3) 07:38 18:18 (WEA VB3) 16:46	08:52 (WEA VB7) 08:29 14:12 (WEA VB5) 16:10
8	05:08 21:58	05:54 21:13	18:51 (WEA VB4) 06:48 19:23 (WEA VB4) 20:04	18:45 (WEA VB4) 07:41 19:11 (WEA VB4) 18:50	17:55 (WEA VB3) 07:40 18:16 (WEA VB3) 16:44	08:51 (WEA VB7) 08:30 14:13 (WEA VB5) 16:09
9	05:09 21:57	05:55 21:11	18:49 (WEA VB4) 06:50 19:24 (WEA VB4) 20:01	18:47 (WEA VB4) 07:43 19:07 (WEA VB4) 18:48	17:58 (WEA VB3) 07:41 18:13 (WEA VB3) 16:42	08:50 (WEA VB7) 08:32 14:14 (WEA VB5) 16:09
10	05:11 21:56	05:57 21:09	18:47 (WEA VB4) 06:51 19:25 (WEA VB4) 19:59	18:51 (WEA VB4) 07:45 19:02 (WEA VB4) 18:46	17:58 (WEA VB3) 07:43 18:11 (WEA VB3) 16:40	08:49 (WEA VB7) 08:33 14:15 (WEA VB5) 16:09
11	05:12 21:55	05:59 21:07	18:46 (WEA VB4) 06:53 19:26 (WEA VB4) 19:56	18:51 (WEA VB4) 07:46 19:02 (WEA VB4) 18:43	17:58 (WEA VB3) 07:45 18:03 (WEA VB3) 16:39	08:49 (WEA VB7) 08:34 14:16 (WEA VB5) 16:08
12	05:13 21:54	06:01 21:05	18:46 (WEA VB4) 06:55 19:27 (WEA VB4) 19:54	18:43 (WEA VB4) 07:48 19:27 (WEA VB4) 18:41	17:58 (WEA VB3) 07:47 18:03 (WEA VB3) 16:37	08:49 (WEA VB7) 08:35 14:17 (WEA VB5) 16:08
13	05:14 21:53	06:02 21:03	18:44 (WEA VB4) 06:57 19:27 (WEA VB4) 19:51	18:43 (WEA VB4) 07:49 19:27 (WEA VB4) 18:39	17:58 (WEA VB3) 07:49 18:03 (WEA VB3) 16:35	08:49 (WEA VB7) 08:36 14:18 (WEA VB5) 16:08
14	05:15 21:52	06:04 21:01	18:43 (WEA VB4) 06:58 19:28 (WEA VB4) 19:49	18:43 (WEA VB4) 07:52 19:28 (WEA VB4) 18:36	17:58 (WEA VB3) 07:51 18:03 (WEA VB3) 16:34	08:49 (WEA VB7) 08:37 14:19 (WEA VB5) 16:08
15	05:16 21:51	06:06 20:59	18:43 (WEA VB4) 07:00 19:29 (WEA VB4) 19:47	18:43 (WEA VB4) 07:54 19:29 (WEA VB4) 18:34	17:58 (WEA VB3) 07:53 18:03 (WEA VB3) 16:32	08:49 (WEA VB7) 08:38 14:19 (WEA VB5) 16:08
16	05:18 21:50	06:08 20:57	18:41 (WEA VB4) 07:02 19:29 (WEA VB4) 19:44	18:43 (WEA VB4) 07:56 19:29 (WEA VB4) 18:32	17:58 (WEA VB3) 07:55 18:03 (WEA VB3) 16:31	08:49 (WEA VB7) 08:39 14:20 (WEA VB5) 16:08
17	05:19 21:49	06:09 20:55	18:41 (WEA VB4) 07:04 19:29 (WEA VB4) 19:42	18:43 (WEA VB4) 07:58 19:29 (WEA VB4) 18:29	17:58 (WEA VB3) 07:57 18:03 (WEA VB3) 16:29	08:49 (WEA VB7) 08:40 14:20 (WEA VB5) 16:08
18	05:20 21:48	06:11 20:53	18:40 (WEA VB4) 07:05 19:30 (WEA VB4) 19:39	18:43 (WEA VB4) 07:59 19:30 (WEA VB4) 18:27	17:58 (WEA VB3) 07:58 18:03 (WEA VB3) 16:28	08:49 (WEA VB7) 08:41 14:21 (WEA VB5) 16:09
19	05:22 21:46	06:13 20:50	18:39 (WEA VB4) 07:07 19:30 (WEA VB4) 19:37	18:47 (WEA VB1) 08:01 18:56 (WEA VB1) 18:25	17:58 (WEA VB3) 08:00 18:03 (WEA VB3) 16:26	08:49 (WEA VB7) 08:41 14:21 (WEA VB5) 16:09
20	05:23 21:45	06:15 20:48	18:39 (WEA VB4) 07:09 19:30 (WEA VB4) 19:34	18:44 (WEA VB1) 08:03 18:58 (WEA VB1) 18:23	17:58 (WEA VB3) 08:02 18:03 (WEA VB3) 16:25	08:49 (WEA VB7) 08:42 14:21 (WEA VB5) 16:09
21	05:25 21:44	06:16 20:46	18:37 (WEA VB4) 07:11 19:30 (WEA VB4) 19:32	18:43 (WEA VB1) 08:05 18:59 (WEA VB1) 18:20	17:58 (WEA VB3) 08:04 18:03 (WEA VB3) 16:24	08:51 (WEA VB7) 08:43 14:22 (WEA VB5) 16:10
22	05:26 21:42	06:18 20:44	18:37 (WEA VB4) 07:12 19:30 (WEA VB4) 19:29	18:08 (WEA VB3) 08:07 19:00 (WEA VB1) 18:18	17:58 (WEA VB3) 08:06 18:03 (WEA VB3) 16:22	08:51 (WEA VB7) 08:43 14:22 (WEA VB5) 16:10
23	05:28 21:41	06:20 20:41	18:37 (WEA VB4) 07:14 19:30 (WEA VB4) 19:27	18:03 (WEA VB3) 08:09 18:58 (WEA VB1) 18:16	17:58 (WEA VB3) 08:07 18:03 (WEA VB3) 16:21	08:52 (WEA VB7) 08:44 14:23 (WEA VB5) 16:11
24	05:29 21:40	06:22 20:39	18:36 (WEA VB4) 07:16 19:30 (WEA VB4) 19:24	18:00 (WEA VB3) 08:11 18:56 (WEA VB1) 18:14	17:58 (WEA VB3) 08:09 18:03 (WEA VB3) 16:20	08:52 (WEA VB7) 08:44 14:23 (WEA VB5) 16:11
25	05:31 21:38	06:23 20:37	18:36 (WEA VB4) 07:18 19:30 (WEA VB4) 19:22	17:59 (WEA VB3) 08:13 18:54 (WEA VB1) 17:12	17:58 (WEA VB3) 08:11 18:03 (WEA VB3) 16:19	08:52 (WEA VB7) 08:44 14:22 (WEA VB5) 16:12
26	05:32 21:37	06:25 20:35	18:36 (WEA VB4) 07:19 19:30 (WEA VB4) 19:19	17:57 (WEA VB3) 08:15 18:52 (WEA VB1) 17:10	17:58 (WEA VB3) 08:13 18:03 (WEA VB3) 16:18	08:53 (WEA VB7) 08:45 14:23 (WEA VB5) 16:12
27	05:34 21:35	06:27 20:32	18:36 (WEA VB4) 07:21 19:30 (WEA VB4) 19:17	17:55 (WEA VB3) 08:16 18:48 (WEA VB1) 17:07	17:58 (WEA VB3) 08:14 18:03 (WEA VB3) 16:17	08:54 (WEA VB7) 08:45 14:23 (WEA VB5) 16:13
28	05:35 21:33	06:29 20:30	18:36 (WEA VB4) 07:23 19:30 (WEA VB4) 19:15	17:54 (WEA VB3) 08:18 18:46 (WEA VB1) 17:05	17:58 (WEA VB3) 08:16 18:03 (WEA VB3) 16:16	08:55 (WEA VB7) 08:45 14:24 (WEA VB5) 16:14
29	05:37 21:32	06:30 20:28	18:36 (WEA VB4) 07:25 19:30 (WEA VB4) 19:12	17:53 (WEA VB3) 08:20 18:44 (WEA VB1) 17:03	17:58 (WEA VB3) 08:17 18:03 (WEA VB3) 16:15	08:56 (WEA VB7) 08:45 14:24 (WEA VB5) 16:15
30	05:39 21:30	06:32 20:25	18:36 (WEA VB4) 07:27 19:30 (WEA VB4) 19:10	17:53 (WEA VB3) 08:22 18:23 (WEA VB3) 17:01	17:58 (WEA VB3) 08:19 18:03 (WEA VB3) 16:14	08:56 (WEA VB7) 08:45 14:24 (WEA VB5) 16:16
31	05:40 21:28	06:34 20:23	18:36 (WEA VB4) 07:29 19:30 (WEA VB4) 19:07	17:53 (WEA VB3) 08:24 18:23 (WEA VB3) 17:01	17:58 (WEA VB3) 08:19 18:03 (WEA VB3) 16:14	08:56 (WEA VB7) 08:45 14:24 (WEA VB5) 16:16
Sonnenscheinstunden	511	459	382	329	260	234
astr.max.mögl.Beschattung		1452	785	248	2550	3312

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO5 - Klein Buschhausen 3

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar		Februar		März		April	Mai	Juni
1	08:45	14:35 (WEA VB4)	08:16	16:33 (WEA VB1)	07:19	07:04	05:55	05:06	
	16:18	56	15:36 (WEA VB3)	17:09	4	16:37 (WEA VB1)	18:04	20:02	21:47
2	08:45	14:36 (WEA VB4)	08:14	16:33 (WEA VB1)	07:16	07:02	05:53	05:05	
	16:19	56	15:37 (WEA VB3)	17:11	6	16:39 (WEA VB1)	18:06	20:04	21:48
3	08:45	14:36 (WEA VB4)	08:12	16:32 (WEA VB1)	07:14	06:59	05:51	05:04	
	16:20	57	15:37 (WEA VB3)	17:13	9	16:41 (WEA VB1)	18:08	20:06	21:49
4	08:45	14:37 (WEA VB4)	08:10	16:33 (WEA VB1)	07:12	06:57	05:49	05:04	
	16:22	57	15:38 (WEA VB3)	17:15	11	16:44 (WEA VB1)	18:10	20:08	21:50
5	08:44	14:38 (WEA VB4)	08:09	16:33 (WEA VB1)	07:09	06:54	05:47	05:03	
	16:23	57	15:39 (WEA VB3)	17:17	13	16:46 (WEA VB1)	18:12	20:10	21:51
6	08:44	14:38 (WEA VB4)	08:07	16:32 (WEA VB2)	07:07	06:52	05:45	05:02	
	16:24	57	15:39 (WEA VB3)	17:19	17	16:49 (WEA VB1)	18:14	20:11	21:52
7	08:44	14:38 (WEA VB4)	08:05	16:31 (WEA VB2)	07:05	06:49	05:43	05:01	
	16:26	57	15:39 (WEA VB3)	17:21	20	16:51 (WEA VB1)	18:16	20:13	21:53
8	08:43	14:39 (WEA VB4)	08:03	16:30 (WEA VB2)	07:02	06:47	05:41	05:01	
	16:27	57	15:40 (WEA VB3)	17:23	20	16:50 (WEA VB2)	18:18	20:15	21:54
9	08:43	14:39 (WEA VB4)	08:01	16:29 (WEA VB2)	07:00	06:45	05:40	05:00	
	16:28	58	15:40 (WEA VB3)	17:25	22	16:51 (WEA VB2)	18:20	20:17	21:55
10	08:42	14:39 (WEA VB4)	07:59	16:29 (WEA VB2)	06:57	06:42	05:38	05:00	
	16:30	58	15:40 (WEA VB3)	17:27	23	16:52 (WEA VB2)	18:22	20:19	21:56
11	08:41	14:40 (WEA VB4)	07:57	16:27 (WEA VB2)	06:55	06:40	05:36	04:59	
	16:31	57	15:41 (WEA VB3)	17:29	25	16:52 (WEA VB2)	18:23	20:21	21:57
12	08:41	14:40 (WEA VB4)	07:55	16:27 (WEA VB2)	06:53	06:38	05:34	04:59	
	16:33	57	15:41 (WEA VB3)	17:31	25	16:52 (WEA VB2)	18:25	20:22	21:58
13	08:40	14:41 (WEA VB4)	07:53	16:27 (WEA VB2)	06:50	06:35	05:32	04:59	
	16:34	55	15:41 (WEA VB3)	17:33	25	16:52 (WEA VB2)	18:27	20:24	21:58
14	08:39	14:41 (WEA VB4)	07:51	16:28 (WEA VB2)	06:48	06:33	05:31	04:58	
	16:36	56	15:41 (WEA VB3)	17:35	24	16:52 (WEA VB2)	18:29	20:26	21:59
15	08:38	14:42 (WEA VB4)	07:49	16:28 (WEA VB2)	06:45	06:31	05:29	04:58	
	16:38	55	15:42 (WEA VB3)	17:37	24	16:52 (WEA VB2)	18:31	20:28	21:59
16	08:37	14:43 (WEA VB4)	07:47	16:28 (WEA VB2)	06:43	06:28	05:27	04:58	
	16:39	53	15:42 (WEA VB3)	17:39	24	16:52 (WEA VB2)	18:33	20:30	22:00
17	08:36	14:44 (WEA VB4)	07:45	16:29 (WEA VB2)	06:41	06:26	05:26	04:58	
	16:41	51	15:42 (WEA VB3)	17:41	23	16:52 (WEA VB2)	18:35	20:32	22:01
18	08:35	14:44 (WEA VB4)	07:43	16:29 (WEA VB2)	06:38	06:24	05:24	04:58	
	16:43	50	15:41 (WEA VB3)	17:43	21	16:50 (WEA VB2)	18:36	20:33	22:01
19	08:34	14:45 (WEA VB4)	07:41	16:30 (WEA VB2)	06:36	06:21	05:23	04:58	
	16:45	48	15:41 (WEA VB3)	17:45	19	16:49 (WEA VB2)	18:38	20:35	22:01
20	08:33	14:46 (WEA VB4)	07:39	16:32 (WEA VB2)	06:33	06:19	05:21	04:58	
	16:46	45	15:41 (WEA VB3)	17:47	16	16:48 (WEA VB2)	18:40	20:37	22:02
21	08:32	14:46 (WEA VB4)	07:36	16:35 (WEA VB2)	06:31	06:17	05:20	04:58	
	16:48	42	15:40 (WEA VB3)	17:49	11	16:46 (WEA VB2)	18:42	20:39	22:02
22	08:30	14:48 (WEA VB4)	07:34			06:28	06:15	05:18	04:58
	16:50	37	15:39 (WEA VB3)	17:51		18:44	20:41	21:33	22:02
23	08:29	14:48 (WEA VB4)	07:32			06:26	06:12	05:17	04:58
	16:52	31	15:36 (WEA VB3)	17:53		18:46	20:43	21:34	22:02
24	08:28	14:50 (WEA VB4)	07:30			06:23	06:10	05:15	04:59
	16:54	23	15:13 (WEA VB4)	17:55		18:48	20:44	21:36	22:02
25	08:26	14:52 (WEA VB4)	07:28			06:21	06:08	05:14	04:59
	16:56	19	15:11 (WEA VB4)	17:57		18:49	20:46	21:37	22:02
26	08:25	14:54 (WEA VB4)	07:25			06:19	06:06	05:13	05:00
	16:57	16	15:10 (WEA VB4)	17:59		18:51	20:48	21:39	22:02
27	08:23	14:57 (WEA VB4)	07:23			06:16	06:04	05:12	05:00
	16:59	11	15:08 (WEA VB4)	18:00		18:53	20:50	21:40	22:02
28	08:22		07:21			06:14	06:02	05:10	05:00
	17:01		18:02			18:55	20:52	21:42	22:02
29	08:20					07:11	05:59	05:09	05:01
	17:03					19:57	20:54	21:43	22:02
30	08:19					07:09	05:57	05:08	05:02
	17:05					19:59	20:55	21:44	22:02
31	08:17	16:34 (WEA VB1)				07:06		05:07	
	17:07	1	16:35 (WEA VB1)			20:00		21:45	
Sonnenscheinstunden	251		274		367	420	493	509	
astr.max.mögl.Beschattung	1277		382						

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO5 - Klein Buschhausen 3

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli	August	September	Oktober		November		Dezember		
1	05:02	05:42	06:36	07:28		07:26	15:58 (WEA VB2)	08:21	14:22 (WEA VB4)	
	22:01	21:27	20:20	19:07		16:57	22 16:20 (WEA VB2)	16:13	57 15:23 (WEA VB3)	
2	05:03	05:43	06:37	07:30		07:28	15:58 (WEA VB2)	08:22	14:22 (WEA VB4)	
	22:01	21:25	20:18	19:05		16:55	22 16:20 (WEA VB2)	16:13	59 15:24 (WEA VB3)	
3	05:04	05:45	06:39	07:32		07:30	16:00 (WEA VB2)	08:24	14:22 (WEA VB4)	
	22:01	21:23	20:16	19:02		16:53	20 16:20 (WEA VB2)	16:12	58 15:23 (WEA VB3)	
4	05:05	05:47	06:41	07:34		07:32	16:01 (WEA VB2)	08:25	14:23 (WEA VB4)	
	22:00	21:21	20:13	19:00		16:51	19 16:20 (WEA VB1)	16:11	57 15:24 (WEA VB3)	
5	05:06	05:49	06:43	07:36		07:34	16:02 (WEA VB2)	08:27	14:23 (WEA VB4)	
	22:00	21:19	20:11	18:58		16:49	16 16:18 (WEA VB1)	16:11	57 15:24 (WEA VB3)	
6	05:06	05:50	06:44	07:37		07:36	16:03 (WEA VB1)	08:28	14:24 (WEA VB4)	
	21:59	21:17	20:09	18:55		16:48	13 16:16 (WEA VB1)	16:10	57 15:25 (WEA VB3)	
7	05:07	05:52	06:46	07:39		07:38	16:03 (WEA VB1)	08:29	14:24 (WEA VB4)	
	21:58	21:15	20:06	18:53		16:46	11 16:14 (WEA VB1)	16:10	57 15:25 (WEA VB3)	
8	05:08	05:54	06:48	07:41		07:40	16:03 (WEA VB1)	08:30	14:25 (WEA VB4)	
	21:58	21:13	20:04	18:50		16:44	9 16:12 (WEA VB1)	16:09	57 15:26 (WEA VB3)	
9	05:09	05:55	06:50	07:43		07:42	16:04 (WEA VB1)	08:32	14:25 (WEA VB4)	
	21:57	21:11	20:01	18:48		16:42	6 16:10 (WEA VB1)	16:09	56 15:26 (WEA VB3)	
10	05:11	05:57	06:51	07:45		07:43	16:04 (WEA VB1)	08:33	14:25 (WEA VB4)	
	21:56	21:09	19:59	18:46		16:40	4 16:08 (WEA VB1)	16:09	56 15:26 (WEA VB3)	
11	05:12	05:59	06:53	07:46		07:45	16:05 (WEA VB1)	08:34	14:26 (WEA VB4)	
	21:55	21:07	19:56	18:43		16:39	1 16:06 (WEA VB1)	16:08	56 15:26 (WEA VB3)	
12	05:13	06:01	06:55	07:48		07:47		08:35	14:27 (WEA VB4)	
	21:54	21:05	19:54	18:41		16:37		16:08	55 15:27 (WEA VB3)	
13	05:14	06:02	06:57	07:50		07:49		08:36	14:27 (WEA VB4)	
	21:53	21:03	19:51	18:39		16:35		16:08	55 15:27 (WEA VB3)	
14	05:15	06:04	06:58	07:52		07:51		08:37	14:28 (WEA VB4)	
	21:52	21:01	19:49	18:36		16:34		16:08	53 15:27 (WEA VB3)	
15	05:16	06:06	07:00	07:54		07:53	14:30 (WEA VB4)	08:38	14:28 (WEA VB4)	
	21:51	20:59	19:47	18:34		16:32	11 14:41 (WEA VB4)	16:08	55 15:28 (WEA VB3)	
16	05:18	06:07	07:02	07:56		07:55	14:27 (WEA VB4)	08:39	14:28 (WEA VB4)	
	21:50	20:57	19:44	18:32		16:31	16 14:43 (WEA VB4)	16:08	53 15:27 (WEA VB3)	
17	05:19	06:09	07:04	07:58		07:57	14:26 (WEA VB4)	08:40	14:29 (WEA VB4)	
	21:49	20:55	19:42	18:29		16:29	19 14:45 (WEA VB4)	16:08	53 15:28 (WEA VB3)	
18	05:20	06:11	07:05	07:59		07:58	14:24 (WEA VB4)	08:41	14:29 (WEA VB4)	
	21:48	20:53	19:39	18:27		16:28	23 14:47 (WEA VB4)	16:08	54 15:28 (WEA VB3)	
19	05:22	06:13	07:07	08:01		08:00	14:23 (WEA VB4)	08:41	14:30 (WEA VB4)	
	21:47	20:50	19:37	18:25		16:26	31 15:11 (WEA VB3)	16:09	53 15:29 (WEA VB3)	
20	05:23	06:14	07:09	08:03		08:02	14:23 (WEA VB4)	08:42	14:30 (WEA VB4)	
	21:45	20:48	19:34	18:23	6	17:14 (WEA VB2)	37 15:14 (WEA VB3)	16:09	53 15:29 (WEA VB3)	
21	05:25	06:16	07:11	08:05		17:04 (WEA VB2)	08:04	14:22 (WEA VB4)	08:43	14:31 (WEA VB4)
	21:44	20:46	19:32	18:20	13	17:17 (WEA VB2)	42 15:16 (WEA VB3)	16:09	53 15:30 (WEA VB3)	
22	05:26	06:18	07:12	08:07		17:02 (WEA VB2)	08:06	14:22 (WEA VB4)	08:43	14:31 (WEA VB4)
	21:42	20:44	19:29	18:18	17	17:19 (WEA VB2)	45 15:17 (WEA VB3)	16:10	53 15:30 (WEA VB3)	
23	05:28	06:20	07:14	08:09		17:00 (WEA VB2)	08:07	14:22 (WEA VB4)	08:44	14:32 (WEA VB4)
	21:41	20:41	19:27	18:16	20	17:20 (WEA VB2)	48 15:18 (WEA VB3)	16:10	53 15:31 (WEA VB3)	
24	05:29	06:22	07:16	08:11		16:59 (WEA VB2)	08:09	14:22 (WEA VB4)	08:44	14:32 (WEA VB4)
	21:40	20:39	19:24	18:14	22	17:21 (WEA VB2)	50 15:19 (WEA VB3)	16:11	53 15:31 (WEA VB3)	
25	05:31	06:23	07:18	07:13		15:58 (WEA VB2)	08:11	14:21 (WEA VB4)	08:45	14:32 (WEA VB4)
	21:38	20:37	19:22	17:12	23	16:21 (WEA VB2)	52 15:19 (WEA VB3)	16:12	53 15:31 (WEA VB3)	
26	05:32	06:25	07:19	07:15		15:58 (WEA VB2)	08:13	14:21 (WEA VB4)	08:45	14:34 (WEA VB4)
	21:37	20:35	19:19	17:09	24	16:22 (WEA VB2)	53 15:20 (WEA VB3)	16:12	53 15:33 (WEA VB3)	
27	05:34	06:27	07:21	07:17		15:57 (WEA VB2)	08:14	14:21 (WEA VB4)	08:45	14:34 (WEA VB4)
	21:35	20:32	19:17	17:07	25	16:22 (WEA VB2)	55 15:21 (WEA VB3)	16:13	53 15:33 (WEA VB3)	
28	05:35	06:29	07:23	07:18		15:57 (WEA VB2)	08:16	14:21 (WEA VB4)	08:45	14:34 (WEA VB4)
	21:33	20:30	19:15	17:05	25	16:22 (WEA VB2)	57 15:22 (WEA VB3)	16:14	55 15:34 (WEA VB3)	
29	05:37	06:30	07:25	07:20		15:57 (WEA VB2)	08:18	14:22 (WEA VB4)	08:45	14:35 (WEA VB4)
	21:32	20:28	19:12	17:03	25	16:22 (WEA VB2)	56 15:22 (WEA VB3)	16:15	53 15:34 (WEA VB3)	
30	05:39	06:32	07:27	07:22		15:57 (WEA VB2)	08:19	14:21 (WEA VB4)	08:45	14:35 (WEA VB4)
	21:30	20:25	19:10	17:01	24	16:21 (WEA VB2)	57 15:22 (WEA VB3)	16:16	55 15:35 (WEA VB3)	
31	05:40	06:34		07:24		15:57 (WEA VB2)		08:45	14:35 (WEA VB4)	
	21:28	20:23		16:59	24	16:21 (WEA VB2)		16:17	55 15:35 (WEA VB3)	
Sonnenscheinstunden	511	459	382	329		260		234		
astr.max.mögl.Beschattung				248		795		1700		

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	(WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO6 - Bohnenburg 20
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni	
1	08:45 16:18	13:42 (WEA VB7) 15:30 (WEA VB6)	08:15 17:09	15:26 (WEA VB6) 15:33 (WEA VB6)	07:18 18:04	07:04 20:02	19:00 (WEA VB4) 19:31 (WEA VB2)	05:55 20:57	05:06 21:47		
2	08:45 16:19	13:43 (WEA VB7) 15:31 (WEA VB6)	08:14 17:11		07:16 18:06	07:01 20:04	19:18 (WEA VB2) 19:30 (WEA VB2)	05:53 20:59	05:05 21:48		
3	08:45 16:20	13:43 (WEA VB7) 15:32 (WEA VB6)	08:12 17:13		07:14 18:08	06:59 20:06	19:20 (WEA VB2) 19:28 (WEA VB2)	05:51 21:01	05:04 21:49		
4	08:45 16:22	13:44 (WEA VB7) 15:33 (WEA VB6)	08:10 17:15		07:12 18:10	06:57 20:08		05:49 21:02	05:04 21:50		
5	08:44 16:23	13:45 (WEA VB7) 15:33 (WEA VB6)	08:09 17:17		07:09 18:12	06:54 20:10		05:47 21:04	05:03 21:51		
6	08:44 16:24	13:46 (WEA VB7) 15:34 (WEA VB6)	08:07 17:19	16:38 (WEA VB5) 16:47 (WEA VB5)	07:07 18:14	17:46 (WEA VB3) 17:47 (WEA VB3)	06:52 20:11	05:45 21:06	05:02 21:52		
7	08:44 16:26	13:47 (WEA VB7) 15:35 (WEA VB6)	08:05 17:21	16:36 (WEA VB5) 16:49 (WEA VB5)	07:04 18:16	17:44 (WEA VB3) 17:50 (WEA VB3)	06:49 20:13	05:43 21:08	05:01 21:53		
8	08:43 16:27	13:49 (WEA VB7) 15:36 (WEA VB6)	08:03 17:23	16:34 (WEA VB5) 16:51 (WEA VB5)	07:02 18:18	17:42 (WEA VB3) 17:51 (WEA VB3)	06:47 20:15	05:41 21:10	05:01 21:54		
9	08:42 16:28	13:50 (WEA VB7) 15:37 (WEA VB6)	08:01 17:25	16:33 (WEA VB5) 16:53 (WEA VB5)	07:00 18:20	17:41 (WEA VB3) 17:53 (WEA VB3)	06:45 20:17	05:39 21:11	05:00 21:55		
10	08:42 16:30	13:51 (WEA VB7) 15:37 (WEA VB6)	07:59 17:27	16:31 (WEA VB5) 16:53 (WEA VB5)	06:57 18:21	17:40 (WEA VB3) 17:55 (WEA VB3)	06:42 20:19	05:38 21:13	05:00 21:56		
11	08:41 16:31	13:52 (WEA VB7) 15:38 (WEA VB6)	07:57 17:29	16:31 (WEA VB5) 16:53 (WEA VB5)	06:55 18:23	17:40 (WEA VB3) 17:57 (WEA VB3)	06:40 20:21	05:36 21:15	04:59 21:57		
12	08:40 16:33	13:53 (WEA VB7) 15:38 (WEA VB6)	07:55 17:31	16:30 (WEA VB5) 16:54 (WEA VB5)	06:53 18:25	17:39 (WEA VB3) 17:56 (WEA VB3)	06:38 20:22	05:34 21:17	04:59 21:57		
13	08:40 16:34	13:55 (WEA VB7) 15:39 (WEA VB6)	07:53 17:33	16:30 (WEA VB5) 16:55 (WEA VB5)	06:50 18:27	17:40 (WEA VB3) 17:55 (WEA VB3)	06:35 20:24	05:32 21:18	04:59 21:58		
14	08:39 16:36	13:57 (WEA VB7) 15:40 (WEA VB6)	07:51 17:35	16:30 (WEA VB5) 16:55 (WEA VB5)	06:48 18:29	17:40 (WEA VB3) 17:53 (WEA VB3)	06:33 20:26	05:31 21:20	04:58 21:59		
15	08:38 16:38	14:00 (WEA VB7) 15:40 (WEA VB6)	07:49 17:37	16:30 (WEA VB5) 16:55 (WEA VB5)	06:45 18:31	17:42 (WEA VB3) 17:52 (WEA VB3)	06:31 20:28	05:29 21:22	04:58 21:59		
16	08:37 16:39	15:10 (WEA VB6) 15:41 (WEA VB6)	07:47 17:39	16:31 (WEA VB5) 16:55 (WEA VB5)	06:43 18:33	17:47 (WEA VB3) 17:48 (WEA VB3)	06:28 20:30	05:27 21:23	04:58 22:00		
17	08:36 16:41	15:11 (WEA VB6) 15:41 (WEA VB6)	07:45 17:41	16:30 (WEA VB5) 16:54 (WEA VB5)	06:40 18:35	06:26 20:32		05:26 21:25	04:58 22:00		
18	08:35 16:43	15:10 (WEA VB6) 15:41 (WEA VB6)	07:43 17:43	16:31 (WEA VB5) 16:54 (WEA VB5)	06:38 18:36	06:24 20:33		05:24 21:26	04:58 22:01		
19	08:34 16:45	15:11 (WEA VB6) 15:42 (WEA VB6)	07:41 17:45	16:32 (WEA VB5) 16:53 (WEA VB5)	06:36 18:38	18:07 (WEA VB4) 18:12 (WEA VB4)	06:21 20:35	05:22 21:28	04:58 22:01		
20	08:33 16:46	15:12 (WEA VB6) 15:42 (WEA VB6)	07:39 17:47	16:33 (WEA VB5) 16:52 (WEA VB5)	06:33 18:40	18:04 (WEA VB4) 18:14 (WEA VB4)	06:19 20:37	05:21 21:30	04:58 22:02		
21	08:31 16:48	15:12 (WEA VB6) 15:42 (WEA VB6)	07:36 17:49	16:34 (WEA VB5) 16:51 (WEA VB5)	06:31 18:42	18:01 (WEA VB4) 18:15 (WEA VB4)	06:17 20:39	05:20 21:31	04:58 22:02		
22	08:30 16:50	15:13 (WEA VB6) 15:42 (WEA VB6)	07:34 17:51	16:36 (WEA VB5) 16:48 (WEA VB5)	06:28 18:44	18:00 (WEA VB4) 18:18 (WEA VB4)	06:15 20:41	05:18 21:33	04:58 22:02		
23	08:29 16:52	15:13 (WEA VB6) 15:42 (WEA VB6)	07:32 17:53	16:39 (WEA VB5) 16:45 (WEA VB5)	06:26 18:46	17:58 (WEA VB4) 18:18 (WEA VB4)	06:12 20:43	05:17 21:34	04:58 22:02		
24	08:28 16:54	15:14 (WEA VB6) 15:42 (WEA VB6)	07:30 17:55		06:23 18:48	17:58 (WEA VB4) 18:19 (WEA VB4)	06:10 20:44	05:15 21:36	04:59 22:02		
25	08:26 16:56	15:14 (WEA VB6) 15:41 (WEA VB6)	07:28 17:57		06:21 18:49	17:56 (WEA VB4) 18:18 (WEA VB4)	06:08 20:46	05:14 21:37	04:59 22:02		
26	08:25 16:57	15:16 (WEA VB6) 15:42 (WEA VB6)	07:25 17:58		06:19 18:51	17:57 (WEA VB4) 18:25 (WEA VB2)	06:06 20:48	05:13 21:39	05:00 22:02		
27	08:23 16:59	15:16 (WEA VB6) 15:41 (WEA VB6)	07:23 18:00		06:16 18:53	17:57 (WEA VB4) 18:27 (WEA VB2)	06:04 20:50	05:12 21:40	05:00 22:02		
28	08:22 17:01	15:17 (WEA VB6) 15:40 (WEA VB6)	07:21 18:02		06:14 18:55	17:56 (WEA VB4) 18:28 (WEA VB2)	06:01 20:52	05:10 21:41	05:00 22:02		
29	08:20 17:03	15:18 (WEA VB6) 15:39 (WEA VB6)			07:11 19:57	18:57 (WEA VB4) 19:31 (WEA VB2)	05:59 20:53	05:09 21:43	05:01 22:02		
30	08:19 17:05	15:21 (WEA VB6) 15:38 (WEA VB6)			07:09 19:59	18:57 (WEA VB4) 19:32 (WEA VB2)	05:57 20:55	05:08 21:44	05:02 22:02		
31	08:17 17:07	15:23 (WEA VB6) 15:36 (WEA VB6)			07:06 20:00	18:59 (WEA VB4) 19:32 (WEA VB2)		05:07 21:45			
Sonnenscheinstunden		251	274		367		420		493	509	
astr.max.mögl.Beschattung		1242	355		403		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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO6 - Bohnenburg 20

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Jul	August	September		Oktober		November		Dezember	
1	05:02	05:42	06:36		07:28	18:20 (WEA VB3)	07:26	16:01 (WEA VB5)	08:21	13:34 (WEA VB7)
	22:01	21:26	20:20		19:07	15 18:35 (WEA VB3)	16:57	21 16:22 (WEA VB5)	16:13	54 15:20 (WEA VB6)
2	05:03	05:43	06:37		07:30	18:18 (WEA VB3)	07:28	16:02 (WEA VB5)	08:22	13:34 (WEA VB7)
	22:01	21:25	20:18		19:05	17 18:35 (WEA VB3)	16:55	19 16:21 (WEA VB5)	16:13	55 15:20 (WEA VB6)
3	05:04	05:45	06:39		07:32	18:18 (WEA VB3)	07:30	16:04 (WEA VB5)	08:24	13:33 (WEA VB7)
	22:01	21:23	20:16		19:02	16 18:34 (WEA VB3)	16:53	17 16:21 (WEA VB5)	16:12	56 15:20 (WEA VB6)
4	05:05	05:47	06:41		07:34	18:18 (WEA VB3)	07:32	16:06 (WEA VB5)	08:25	13:33 (WEA VB7)
	22:00	21:21	20:13		19:00	13 18:31 (WEA VB3)	16:51	13 16:19 (WEA VB5)	16:11	57 15:20 (WEA VB6)
5	05:06	05:48	06:43		07:36	18:18 (WEA VB3)	07:34	16:08 (WEA VB5)	08:26	13:32 (WEA VB7)
	22:00	21:19	20:11		18:58	11 18:29 (WEA VB3)	16:49	8 16:16 (WEA VB5)	16:11	58 15:20 (WEA VB6)
6	05:06	05:50	06:44		07:37	18:19 (WEA VB3)	07:36		08:28	13:32 (WEA VB7)
	21:59	21:17	20:08		18:55	8 18:27 (WEA VB3)	16:48		16:10	59 15:21 (WEA VB6)
7	05:07	05:52	06:46		07:39	18:21 (WEA VB3)	07:38		08:29	13:32 (WEA VB7)
	21:58	21:15	20:06		18:53	3 18:24 (WEA VB3)	16:46		16:10	58 15:20 (WEA VB6)
8	05:08	05:54	06:48		07:41		07:40		08:30	13:32 (WEA VB7)
	21:58	21:13	20:04		18:50		16:44		16:09	60 15:21 (WEA VB6)
9	05:09	05:55	06:50	19:13 (WEA VB2)	07:43		07:41		08:32	13:32 (WEA VB7)
	21:57	21:11	20:01	8 19:21 (WEA VB2)	18:48		16:42		16:09	59 15:21 (WEA VB6)
10	05:10	05:57	06:51	19:11 (WEA VB2)	07:45		07:43		08:33	13:32 (WEA VB7)
	21:56	21:09	19:59	12 19:23 (WEA VB2)	18:46		16:40	7 15:04 (WEA VB6)	16:09	60 15:21 (WEA VB6)
11	05:12	05:59	06:53	18:54 (WEA VB4)	07:46		07:45	14:54 (WEA VB6)	08:34	13:32 (WEA VB7)
	21:55	21:07	19:56	23 19:24 (WEA VB2)	18:43		16:39	13 15:07 (WEA VB6)	16:08	58 15:20 (WEA VB6)
12	05:13	06:01	06:55	18:51 (WEA VB4)	07:48		07:47	14:52 (WEA VB6)	08:35	13:32 (WEA VB7)
	21:54	21:05	19:54	28 19:24 (WEA VB2)	18:41		16:37	17 15:09 (WEA VB6)	16:08	59 15:20 (WEA VB6)
13	05:14	06:02	06:57	18:49 (WEA VB4)	07:50		07:49	14:50 (WEA VB6)	08:36	13:33 (WEA VB7)
	21:53	21:03	19:51	32 19:23 (WEA VB2)	18:39		16:35	21 15:11 (WEA VB6)	16:08	58 15:21 (WEA VB6)
14	05:15	06:04	06:58	18:48 (WEA VB4)	07:52		07:51	14:50 (WEA VB6)	08:37	13:33 (WEA VB7)
	21:52	21:01	19:49	32 19:21 (WEA VB2)	18:36		16:34	23 15:13 (WEA VB6)	16:08	59 15:22 (WEA VB6)
15	05:16	06:06	07:00	18:46 (WEA VB4)	07:54		07:53	14:49 (WEA VB6)	08:38	13:33 (WEA VB7)
	21:51	20:59	19:46	31 19:18 (WEA VB2)	18:34		16:32	25 15:14 (WEA VB6)	16:08	57 15:21 (WEA VB6)
16	05:18	06:07	07:02	18:45 (WEA VB4)	07:56		07:55	14:49 (WEA VB6)	08:39	13:33 (WEA VB7)
	21:50	20:57	19:44	30 19:16 (WEA VB2)	18:32		16:31	26 15:15 (WEA VB6)	16:08	58 15:21 (WEA VB6)
17	05:19	06:09	07:04	18:45 (WEA VB4)	07:58		07:57	14:48 (WEA VB6)	08:40	13:34 (WEA VB7)
	21:49	20:55	19:42	27 19:14 (WEA VB2)	18:29		16:29	27 15:15 (WEA VB6)	16:08	58 15:22 (WEA VB6)
18	05:20	06:11	07:05	18:45 (WEA VB4)	07:59		07:58	14:48 (WEA VB6)	08:41	13:34 (WEA VB7)
	21:48	20:53	19:39	23 19:12 (WEA VB2)	18:27		16:28	28 15:16 (WEA VB6)	16:08	58 15:22 (WEA VB6)
19	05:22	06:13	07:07	18:44 (WEA VB4)	08:01	17:09 (WEA VB5)	08:00	14:48 (WEA VB6)	08:41	13:35 (WEA VB7)
	21:46	20:50	19:37	21 19:05 (WEA VB4)	18:25	9 17:18 (WEA VB5)	16:26	29 15:17 (WEA VB6)	16:09	57 15:23 (WEA VB6)
20	05:23	06:14	07:09	18:44 (WEA VB4)	08:03	17:06 (WEA VB5)	08:02	14:48 (WEA VB6)	08:42	13:35 (WEA VB7)
	21:45	20:48	19:34	21 19:05 (WEA VB4)	18:23	15 17:21 (WEA VB5)	16:25	29 15:17 (WEA VB6)	16:09	56 15:22 (WEA VB6)
21	05:25	06:16	07:11	18:45 (WEA VB4)	08:05	17:04 (WEA VB5)	08:04	14:48 (WEA VB6)	08:43	13:36 (WEA VB7)
	21:44	20:46	19:32	19 19:04 (WEA VB4)	18:20	18 17:22 (WEA VB5)	16:24	30 15:18 (WEA VB6)	16:09	56 15:23 (WEA VB6)
22	05:26	06:18	07:12	18:46 (WEA VB4)	08:07	17:03 (WEA VB5)	08:06	14:48 (WEA VB6)	08:43	13:36 (WEA VB7)
	21:42	20:44	19:29	16 19:02 (WEA VB4)	18:18	20 17:23 (WEA VB5)	16:22	30 15:18 (WEA VB6)	16:10	56 15:23 (WEA VB6)
23	05:28	06:20	07:14	18:47 (WEA VB4)	08:09	17:02 (WEA VB5)	08:07	14:48 (WEA VB6)	08:44	13:37 (WEA VB7)
	21:41	20:41	19:27	11 18:58 (WEA VB4)	18:16	22 17:24 (WEA VB5)	16:21	31 15:19 (WEA VB6)	16:10	56 15:24 (WEA VB6)
24	05:29	06:21	07:16	18:49 (WEA VB4)	08:11	17:01 (WEA VB5)	08:09	14:47 (WEA VB6)	08:44	13:37 (WEA VB7)
	21:40	20:39	19:24	7 18:56 (WEA VB4)	18:14	23 17:24 (WEA VB5)	16:20	31 15:18 (WEA VB6)	16:11	57 15:25 (WEA VB6)
25	05:31	06:23	07:18		07:13	16:00 (WEA VB5)	08:11	14:48 (WEA VB6)	08:44	13:37 (WEA VB7)
	21:38	20:37	19:22		17:12	25 16:25 (WEA VB5)	16:19	30 15:18 (WEA VB6)	16:12	58 15:25 (WEA VB6)
26	05:32	06:25	07:19		07:15	16:00 (WEA VB5)	08:13	14:48 (WEA VB6)	08:45	13:38 (WEA VB7)
	21:36	20:35	19:19		17:09	25 16:25 (WEA VB5)	16:18	31 15:19 (WEA VB6)	16:12	58 15:26 (WEA VB6)
27	05:34	06:27	07:21		07:16	16:00 (WEA VB5)	08:14	13:40 (WEA VB7)	08:45	13:39 (WEA VB7)
	21:35	20:32	19:17		17:07	25 16:25 (WEA VB5)	16:17	41 15:19 (WEA VB6)	16:13	58 15:27 (WEA VB6)
28	05:35	06:29	07:23	18:24 (WEA VB3)	07:18	16:00 (WEA VB5)	08:16	13:38 (WEA VB7)	08:45	13:39 (WEA VB7)
	21:33	20:30	19:15	8 18:32 (WEA VB3)	17:05	24 16:24 (WEA VB5)	16:16	46 15:20 (WEA VB6)	16:14	58 15:28 (WEA VB6)
29	05:37	06:30	07:25	18:22 (WEA VB3)	07:20	16:00 (WEA VB5)	08:17	13:36 (WEA VB7)	08:45	13:40 (WEA VB7)
	21:32	20:28	19:12	12 18:34 (WEA VB3)	17:03	24 16:24 (WEA VB5)	16:15	50 15:20 (WEA VB6)	16:15	58 15:28 (WEA VB6)
30	05:39	06:32	07:27	18:20 (WEA VB3)	07:22	16:00 (WEA VB5)	08:19	13:35 (WEA VB7)	08:45	13:41 (WEA VB7)
	21:30	20:25	19:10	15 18:35 (WEA VB3)	17:01	24 16:24 (WEA VB5)	16:14	51 15:19 (WEA VB6)	16:16	58 15:29 (WEA VB6)
31	05:40	06:34			07:24	16:00 (WEA VB5)			08:45	13:41 (WEA VB7)
	21:28	20:23			16:59	23 16:23 (WEA VB5)			16:17	58 15:29 (WEA VB6)
Sonnenscheinstunden	511	459	382		329		260		234	
astr.max.mögl.Beschattung			376		360		694		1785	

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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO7 - Sengwarder Chausseehaus Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlungsrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar			Februar			März			April			Mai			Juni		
1	08:45	12:57 (WEA VB7)	08:15	13:25 (WEA VB7)	07:18	16:44 (WEA VB5)	07:04		05:55	05:06							
	16:18	64 14:01 (WEA VB7)	17:09	68 15:52 (WEA VB6)	18:04	29 17:13 (WEA VB5)	20:02		20:57	21:47							
2	08:45	12:58 (WEA VB7)	08:14	13:28 (WEA VB7)	07:16	16:45 (WEA VB5)	07:01		05:53	05:05							
	16:19	64 14:02 (WEA VB7)	17:11	63 15:52 (WEA VB6)	18:06	28 17:13 (WEA VB5)	20:04		20:59	21:48							
3	08:45	12:57 (WEA VB7)	08:12	13:33 (WEA VB7)	07:14	16:45 (WEA VB5)	06:59		05:51	05:04							
	16:20	64 14:01 (WEA VB7)	17:13	52 15:52 (WEA VB6)	18:08	27 17:12 (WEA VB5)	20:06	10 19:28 (WEA VB4)	21:01	21:49							
4	08:45	12:58 (WEA VB7)	08:10	15:14 (WEA VB6)	07:12	16:46 (WEA VB5)	06:57		05:49	05:04							
	16:22	64 14:02 (WEA VB7)	17:15	37 15:51 (WEA VB6)	18:10	25 17:11 (WEA VB5)	20:08	15 19:40 (WEA VB4)	21:02	21:50							
5	08:44	12:58 (WEA VB7)	08:09	15:16 (WEA VB6)	07:09	16:47 (WEA VB5)	06:54		05:47	05:03							
	16:23	64 14:02 (WEA VB7)	17:17	36 15:52 (WEA VB6)	18:12	22 17:09 (WEA VB5)	20:10	20 19:43 (WEA VB2)	21:04	21:51							
6	08:44	12:59 (WEA VB7)	08:07	15:17 (WEA VB6)	07:07	16:49 (WEA VB5)	06:52		05:45	05:02							
	16:24	64 14:03 (WEA VB7)	17:19	34 15:51 (WEA VB6)	18:14	19 17:08 (WEA VB5)	20:11	23 19:44 (WEA VB2)	21:06	21:52							
7	08:44	13:00 (WEA VB7)	08:05	15:18 (WEA VB6)	07:04	16:51 (WEA VB5)	06:49		05:43	05:01							
	16:26	66 15:26 (WEA VB6)	17:21	33 15:51 (WEA VB6)	18:16	15 17:06 (WEA VB5)	20:13	26 19:46 (WEA VB2)	21:08	21:53							
8	08:43	13:01 (WEA VB7)	08:03	15:19 (WEA VB6)	07:02	16:54 (WEA VB5)	06:47		05:41	05:01							
	16:27	73 15:31 (WEA VB6)	17:23	31 15:50 (WEA VB6)	18:18	7 17:01 (WEA VB5)	20:15	28 19:48 (WEA VB2)	21:10	21:54							
9	08:42	13:01 (WEA VB7)	08:01	15:20 (WEA VB6)	07:00		06:45		05:40	05:00							
	16:28	77 15:33 (WEA VB6)	17:25	29 15:49 (WEA VB6)	18:20		20:17	30 19:19 (WEA VB4)	21:11	21:55							
10	08:42	13:01 (WEA VB7)	07:59	15:20 (WEA VB6)	06:57		06:42		05:38	05:00							
	16:30	80 15:35 (WEA VB6)	17:27	27 15:47 (WEA VB6)	18:21		20:19	32 19:51 (WEA VB2)	21:13	21:56							
11	08:41	13:02 (WEA VB7)	07:57	15:22 (WEA VB6)	06:55		06:40		05:36	04:59							
	16:31	81 15:36 (WEA VB6)	17:29	23 15:45 (WEA VB6)	18:23		20:21	32 19:51 (WEA VB2)	21:15	21:57							
12	08:40	13:02 (WEA VB7)	07:55	15:25 (WEA VB6)	06:53		06:38		05:34	04:59							
	16:33	85 15:38 (WEA VB6)	17:31	18 15:43 (WEA VB6)	18:25		20:22	31 19:49 (WEA VB2)	21:17	21:57							
13	08:40	13:03 (WEA VB7)	07:53	15:28 (WEA VB6)	06:50		06:35		05:32	04:59							
	16:34	85 15:39 (WEA VB6)	17:33	12 15:40 (WEA VB6)	18:27		20:24	31 19:49 (WEA VB2)	21:18	21:58							
14	08:39	13:04 (WEA VB7)	07:51		06:48		06:33		05:31	04:58							
	16:36	86 15:40 (WEA VB6)	17:35		18:29		20:26	28 19:47 (WEA VB2)	21:20	21:59							
15	08:38	13:04 (WEA VB7)	07:49		06:45		06:31		05:29	04:58							
	16:38	88 15:42 (WEA VB6)	17:37		18:31		20:28	25 19:45 (WEA VB2)	21:22	21:59							
16	08:37	13:05 (WEA VB7)	07:47		06:43		06:28		05:27	04:58							
	16:39	89 15:43 (WEA VB6)	17:39		18:33	6 18:01 (WEA VB3)	20:30	18 19:20 (WEA VB4)	21:23	22:00							
17	08:36	13:06 (WEA VB7)	07:45		06:40		06:26		05:26	04:58							
	16:41	90 15:44 (WEA VB6)	17:41	9 17:04 (WEA VB5)	18:35	10 18:08 (WEA VB3)	20:32	14 19:36 (WEA VB4)	21:25	22:00							
18	08:35	13:06 (WEA VB7)	07:43		06:38		06:24		05:24	04:58							
	16:43	91 15:45 (WEA VB6)	17:43	15 17:07 (WEA VB5)	18:36	14 18:11 (WEA VB3)	20:33	8 19:33 (WEA VB4)	21:26	22:01							
19	08:34	13:07 (WEA VB7)	07:41		06:36		06:21		05:23	04:58							
	16:45	91 15:46 (WEA VB6)	17:45	20 17:10 (WEA VB5)	18:38	16 18:12 (WEA VB3)	20:35		21:28	22:01							
20	08:33	13:08 (WEA VB7)	07:39		06:33		06:19		05:21	04:58							
	16:46	91 15:47 (WEA VB6)	17:47	22 17:11 (WEA VB5)	18:40	19 18:14 (WEA VB3)	20:37		21:30	22:02							
21	08:31	13:09 (WEA VB7)	07:36		06:31		06:17		05:20	04:58							
	16:48	90 15:47 (WEA VB6)	17:49	25 17:13 (WEA VB5)	18:42	18 18:13 (WEA VB3)	20:39		21:31	22:02							
22	08:30	13:10 (WEA VB7)	07:34		06:28		06:15		05:18	04:58							
	16:50	91 15:49 (WEA VB6)	17:51	27 17:13 (WEA VB5)	18:44	18 18:13 (WEA VB3)	20:41		21:33	22:02							
23	08:29	13:11 (WEA VB7)	07:32		06:26		06:12		05:17	04:58							
	16:52	90 15:49 (WEA VB6)	17:53	28 17:14 (WEA VB5)	18:46	16 18:11 (WEA VB3)	20:43		21:34	22:02							
24	08:28	13:12 (WEA VB7)	07:30		06:23		06:10		05:15	04:59							
	16:54	89 15:50 (WEA VB6)	17:55	29 17:14 (WEA VB5)	18:48	15 18:11 (WEA VB3)	20:44		21:36	22:02							
25	08:26	13:13 (WEA VB7)	07:28		06:21		06:08		05:14	04:59							
	16:56	88 15:50 (WEA VB6)	17:57	30 17:14 (WEA VB5)	18:49	12 18:08 (WEA VB3)	20:46		21:37	22:02							
26	08:25	13:15 (WEA VB7)	07:25		06:19		06:06		05:13	05:00							
	16:57	86 15:51 (WEA VB6)	17:58	30 17:14 (WEA VB5)	18:51	7 18:06 (WEA VB3)	20:48		21:39	22:02							
27	08:23	13:16 (WEA VB7)	07:23		06:16		06:04		05:12	05:00							
	16:59	85 15:51 (WEA VB6)	18:00	29 17:14 (WEA VB5)	18:53		20:50		21:40	22:02							
28	08:22	13:17 (WEA VB7)	07:21		06:14		06:02		05:10	05:01							
	17:01	82 15:51 (WEA VB6)	18:02	29 17:13 (WEA VB5)	18:55		20:52		21:41	22:02							
29	08:20	13:18 (WEA VB7)			07:11		05:59		05:09	05:01							
	17:03	80 15:51 (WEA VB6)			19:57		20:53		21:43	22:02							
30	08:19	13:21 (WEA VB7)			07:09		05:57		05:08	05:02							
	17:05	76 15:52 (WEA VB6)			19:59		20:55		21:44	22:02							
31	08:17	13:23 (WEA VB7)			07:06				05:07								
	17:07	73 15:52 (WEA VB6)			20:00				21:45								
Sonnenscheinstunden	251		274		367		420		493	509							
astr.max.mögl.Beschattung	2487		756		323		371										

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

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

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH

Helmut-A. Müller-Straße 1-5

DE-82152 Planegg / München

0049 89 85 602 0

Felix Bergholz / Felix.Bergholz@mbbm-ind.com

Berechnet:

17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO7 - Sengwarter Chausseehaus
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

		Juli	August	September		Oktober		November		Dezember	
	1	05:02	05:42	06:36	19:18 (WEA VB4)	07:28		07:26	14:50 (WEA VB6)	08:21	12:44 (WEA VB7)
		22:01	21:26	20:20	32 19:50 (WEA VB2)	19:07			15:17 (WEA VB6)	16:13	81 15:18 (WEA VB6)
	2	05:03	05:43	06:37	19:17 (WEA VB4)	07:30		27	14:48 (WEA VB6)	08:22	12:45 (WEA VB7)
		22:01	21:25	20:18	32 19:49 (WEA VB2)	19:05		30	15:18 (WEA VB6)	16:13	79 15:18 (WEA VB6)
	3	05:04	05:45	06:39	19:17 (WEA VB4)	07:32			14:48 (WEA VB6)	08:24	12:44 (WEA VB7)
		22:01	21:23	20:16	30 19:47 (WEA VB2)	19:02		32	15:20 (WEA VB6)	16:12	77 15:16 (WEA VB6)
	4	05:05	05:47	06:41	19:17 (WEA VB4)	07:34			14:47 (WEA VB6)	08:25	12:45 (WEA VB7)
		22:00	21:21	20:13	28 19:45 (WEA VB2)	19:00		33	15:20 (WEA VB6)	16:11	73 15:15 (WEA VB6)
	5	05:06	05:49	06:43	19:17 (WEA VB4)	07:36			14:46 (WEA VB6)	08:26	12:45 (WEA VB7)
		22:00	21:19	20:11	26 19:43 (WEA VB2)	18:58		35	15:21 (WEA VB6)	16:11	67 15:12 (WEA VB6)
	6	05:06	05:50	06:44	19:17 (WEA VB4)	07:37	17:29 (WEA VB5)	07:36	14:46 (WEA VB6)	08:28	12:46 (WEA VB7)
		21:59	21:17	20:08	23 19:40 (WEA VB2)	18:55	11 17:40 (WEA VB5)	16:48	15:22 (WEA VB6)	16:10	63 13:49 (WEA VB7)
	7	05:07	05:52	06:46	19:18 (WEA VB4)	07:39			14:45 (WEA VB6)	08:29	12:45 (WEA VB7)
		21:58	21:15	20:06	20 19:38 (WEA VB2)	18:53	17 17:43 (WEA VB5)	16:46	15:22 (WEA VB6)	16:10	64 13:49 (WEA VB7)
	8	05:08	05:54	06:48	19:20 (WEA VB4)	07:41			13:03 (WEA VB7)	08:30	12:46 (WEA VB7)
		21:58	21:13	20:04	15 19:35 (WEA VB4)	18:50	20 17:43 (WEA VB5)	16:44	15:22 (WEA VB6)	16:09	64 13:50 (WEA VB7)
	9	05:09	05:55	06:50	19:21 (WEA VB4)	07:43			12:59 (WEA VB7)	08:32	12:46 (WEA VB7)
		21:57	21:11	20:01	11 19:32 (WEA VB4)	18:48	23 17:44 (WEA VB5)	16:42	15:23 (WEA VB6)	16:09	64 13:50 (WEA VB7)
	10	05:11	05:57	06:51		07:45			12:56 (WEA VB7)	08:33	12:47 (WEA VB7)
		21:56	21:09	19:59		18:46	25 17:45 (WEA VB5)	16:40	15:23 (WEA VB6)	16:09	64 13:51 (WEA VB7)
	11	05:12	05:59	06:53		07:46			12:53 (WEA VB7)	08:34	12:47 (WEA VB7)
		21:55	21:07	19:56		18:43	27 17:46 (WEA VB5)	16:39	15:23 (WEA VB6)	16:08	64 13:51 (WEA VB7)
	12	05:13	06:01	06:55		07:48			12:52 (WEA VB7)	08:35	12:47 (WEA VB7)
		21:54	21:05	19:54		18:41	28 17:46 (WEA VB5)	16:37	15:23 (WEA VB6)	16:08	64 13:51 (WEA VB7)
	13	05:14	06:02	06:57		07:50			12:50 (WEA VB7)	08:36	12:48 (WEA VB7)
		21:53	21:03	19:51		18:39	30 17:47 (WEA VB5)	16:35	15:23 (WEA VB6)	16:08	65 13:53 (WEA VB7)
	14	05:15	06:04	06:58		07:52			12:50 (WEA VB7)	08:37	12:49 (WEA VB7)
		21:52	21:01	19:49		18:36	30 17:47 (WEA VB5)	16:34	15:24 (WEA VB6)	16:08	64 13:53 (WEA VB7)
	15	05:16	06:06	07:00		07:54			12:49 (WEA VB7)	08:38	12:48 (WEA VB7)
		21:51	20:59	19:46		18:34	30 17:47 (WEA VB5)	16:32	15:24 (WEA VB6)	16:08	65 13:53 (WEA VB7)
	16	05:18	06:07	07:02		07:56			12:48 (WEA VB7)	08:39	12:49 (WEA VB7)
		21:50	20:57	19:44		18:32	29 17:46 (WEA VB5)	16:31	15:24 (WEA VB6)	16:08	64 13:53 (WEA VB7)
	17	05:19	06:09	07:04	18:48 (WEA VB3)	07:58			12:47 (WEA VB7)	08:40	12:50 (WEA VB7)
		21:49	20:55	19:42	6 18:54 (WEA VB3)	18:29	29 17:46 (WEA VB5)	16:29	15:24 (WEA VB6)	16:08	64 13:54 (WEA VB7)
	18	05:20	06:11	07:05	18:45 (WEA VB3)	07:59			12:46 (WEA VB7)	08:41	12:50 (WEA VB7)
		21:48	20:53	19:39	11 18:56 (WEA VB3)	18:27	28 17:45 (WEA VB5)	16:28	15:24 (WEA VB6)	16:08	65 13:55 (WEA VB7)
	19	05:22	06:13	07:07	18:42 (WEA VB3)	08:01			12:45 (WEA VB7)	08:41	12:51 (WEA VB7)
		21:46	20:50	19:37	15 18:57 (WEA VB3)	18:25	28 17:45 (WEA VB5)	16:26	15:24 (WEA VB6)	16:09	64 13:55 (WEA VB7)
	20	05:23	06:14	07:09	18:41 (WEA VB3)	08:03			12:45 (WEA VB7)	08:42	12:51 (WEA VB7)
		21:45	20:48	19:34	17 18:58 (WEA VB3)	18:23	26 17:44 (WEA VB5)	16:25	15:24 (WEA VB6)	16:09	64 13:55 (WEA VB7)
	21	05:25	06:16	07:11	18:41 (WEA VB3)	08:05			12:45 (WEA VB7)	08:43	12:52 (WEA VB7)
		21:44	20:46	19:32	17 18:58 (WEA VB3)	18:20	24 17:43 (WEA VB5)	16:24	15:23 (WEA VB6)	16:10	64 13:56 (WEA VB7)
	22	05:26	06:18	07:12	18:40 (WEA VB3)	08:07			12:44 (WEA VB7)	08:43	12:52 (WEA VB7)
		21:42	20:44	19:29	18 18:58 (WEA VB3)	18:18	21 17:41 (WEA VB5)	16:22	15:23 (WEA VB6)	16:10	64 13:56 (WEA VB7)
	23	05:28	06:20	07:14	18:39 (WEA VB3)	08:09			12:44 (WEA VB7)	08:44	12:53 (WEA VB7)
		21:41	20:41	19:27	18 18:57 (WEA VB3)	18:16	18 17:39 (WEA VB5)	16:21	15:23 (WEA VB6)	16:10	64 13:57 (WEA VB7)
	24	05:29	06:22	07:16	18:39 (WEA VB3)	08:11			12:43 (WEA VB7)	08:44	12:53 (WEA VB7)
		21:40	20:39	19:24	17 18:56 (WEA VB3)	18:14	14 17:37 (WEA VB5)	16:20	15:22 (WEA VB6)	16:11	64 13:57 (WEA VB7)
	25	05:31	06:23	07:18	18:40 (WEA VB3)	07:13			12:43 (WEA VB7)	08:44	12:53 (WEA VB7)
		21:38	20:37	9 19:36 (WEA VB4)	14 18:54 (WEA VB3)	17:12	6 16:33 (WEA VB5)	16:19	15:21 (WEA VB6)	16:12	64 13:57 (WEA VB7)
	26	05:32	06:25	07:19	19:25 (WEA VB4)	07:15			12:43 (WEA VB7)	08:45	12:53 (WEA VB7)
		21:36	20:35	14 19:39 (WEA VB4)	12 18:52 (WEA VB3)	17:09			15:21 (WEA VB6)	16:12	65 13:58 (WEA VB7)
	27	05:34	06:27	07:21	19:22 (WEA VB4)	07:21			12:44 (WEA VB7)	08:45	12:55 (WEA VB7)
		21:35	20:32	18 19:40 (WEA VB4)	7 18:48 (WEA VB3)	17:16			15:21 (WEA VB6)	16:13	64 13:59 (WEA VB7)
	28	05:35	06:29	07:23	19:21 (WEA VB4)	07:15			12:44 (WEA VB7)	08:45	12:55 (WEA VB7)
		21:33	20:30	25 19:46 (WEA VB2)	19:15	3 18:46 (WEA VB3)	17:05	16:16	15:21 (WEA VB6)	16:14	64 13:59 (WEA VB7)
	29	05:37	06:30	07:25	19:20 (WEA VB4)	07:25			12:44 (WEA VB7)	08:45	12:56 (WEA VB7)
		21:32	20:28	28 19:48 (WEA VB2)	19:12	17:03	13 15:10 (WEA VB6)	16:15	15:20 (WEA VB6)	16:15	64 14:00 (WEA VB7)
	30	05:39	06:32	07:27	19:18 (WEA VB4)	07:27			12:44 (WEA VB7)	08:45	12:56 (WEA VB7)
		21:30	20:25	31 19:49 (WEA VB2)	19:10	17:01	19 15:13 (WEA VB6)	16:14	15:19 (WEA VB6)	16:16	64 14:00 (WEA VB7)
	31	05:40	06:34	07:24	19:18 (WEA VB4)	07:24			15:15 (WEA VB6)	16:17	64 14:00 (WEA VB7)
		21:28	20:23	31 19:49 (WEA VB2)		16:59	23 15:15 (WEA VB6)	16:17		16:17	64 14:00 (WEA VB7)
Sonnenscheinstunden		511	459	382		329		260		234	
astr.max.mögl.Beschattung			156	372		519		2141		2044	

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

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

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO8 - Idschenhausen 1

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April		Mai		Juni	
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02		05:55 20:57		05:06 21:47	20:42 (WEA VB7) 21:13 (WEA VB7)
2	08:45 16:19	08:14 17:11	07:16 18:06	07:01 20:04		05:53 20:59	30	05:05 21:48	20:41 (WEA VB7) 21:13 (WEA VB7)
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06		05:51 21:01	29	05:04 21:49	20:41 (WEA VB7) 21:14 (WEA VB7)
4	08:45 16:22	08:10 17:15	07:11 18:10	06:57 20:08		05:49 21:02	28	05:04 21:50	20:41 (WEA VB7) 21:14 (WEA VB7)
5	08:44 16:23	08:08 17:17	07:09 18:12	06:54 20:10		05:47 21:04	27	05:03 21:51	20:41 (WEA VB7) 21:15 (WEA VB7)
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11		05:45 21:06	25	05:02 21:52	20:41 (WEA VB7) 21:15 (WEA VB7)
7	08:43 16:26	08:05 17:21	07:04 18:16	06:49 20:13		05:43 21:08	24	05:01 21:53	20:41 (WEA VB7) 21:16 (WEA VB7)
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15		05:41 21:10	21	05:01 21:54	20:41 (WEA VB7) 21:15 (WEA VB7)
9	08:42 16:28	08:01 17:25	07:00 18:20	06:45 20:17		05:40 21:11	19	05:00 21:55	20:42 (WEA VB7) 21:16 (WEA VB7)
10	08:42 16:30	07:59 17:27	06:57 18:21	06:42 20:19		05:38 21:13	17	05:00 21:56	20:41 (WEA VB7) 21:16 (WEA VB7)
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21		05:36 21:15	14	04:59 21:57	20:41 (WEA VB7) 21:16 (WEA VB7)
12	08:40 16:33	07:55 17:31	06:53 18:25	06:38 20:22		05:34 21:16	11	04:59 21:57	20:42 (WEA VB7) 21:17 (WEA VB7)
13	08:40 16:34	07:53 17:33	06:50 18:27	06:35 20:24		05:32 21:18	4	04:59 21:58	20:42 (WEA VB7) 21:17 (WEA VB7)
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26		05:31 21:20		04:58 21:59	20:42 (WEA VB7) 21:17 (WEA VB7)
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28		05:29 21:22		04:58 21:59	20:42 (WEA VB7) 21:17 (WEA VB7)
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30		05:27 21:23		04:58 22:00	20:42 (WEA VB7) 21:18 (WEA VB7)
17	08:36 16:41	07:45 17:41	06:40 18:35	06:26 20:32		05:26 21:25		04:58 22:00	20:42 (WEA VB7) 21:18 (WEA VB7)
18	08:35 16:43	07:43 17:43	06:38 18:36	06:24 20:33		05:24 21:26		04:58 22:01	20:42 (WEA VB7) 21:18 (WEA VB7)
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35		05:23 21:28		04:58 22:01	20:43 (WEA VB7) 21:18 (WEA VB7)
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37		05:21 21:30		04:58 22:01	20:44 (WEA VB7) 21:19 (WEA VB7)
21	08:31 16:48	07:36 17:49	06:31 18:42	06:17 20:39		05:20 21:31	6	04:58 22:02	20:44 (WEA VB7) 21:19 (WEA VB7)
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41		05:18 21:33	9	04:58 22:02	20:44 (WEA VB7) 21:19 (WEA VB7)
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:42	20:05 (WEA VB6)	05:17 21:34	12	04:58 22:02	20:44 (WEA VB7) 21:19 (WEA VB7)
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	20:13 (WEA VB6)	05:15 21:36	15	04:58 22:02	20:45 (WEA VB7) 21:20 (WEA VB7)
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	20:02 (WEA VB6)	05:14 21:37	17	04:59 22:02	20:44 (WEA VB7) 21:20 (WEA VB7)
26	08:25 16:57	07:25 17:58	06:18 18:51	06:06 20:48	20:16 (WEA VB5)	05:13 21:39	20	05:00 22:02	20:44 (WEA VB7) 21:20 (WEA VB7)
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	20:00 (WEA VB5)	05:12 21:40	22	05:00 22:02	20:45 (WEA VB7) 21:20 (WEA VB7)
28	08:22 17:01	07:21 18:02	06:14 18:55	06:01 20:52	20:21 (WEA VB5)	05:10 21:41	23	05:01 22:02	20:45 (WEA VB7) 21:20 (WEA VB7)
29	08:20 17:03		07:11 19:57	05:59 20:53	19:57 (WEA VB6)	05:09 21:43	25	05:01 22:02	20:45 (WEA VB7) 21:21 (WEA VB7)
30	08:19 17:05		07:09 19:59	05:57 20:55	20:24 (WEA VB5)	05:08 21:44	27	05:02 22:02	20:46 (WEA VB7) 21:21 (WEA VB7)
31	08:17 17:07		07:06 20:00		19:55 (WEA VB6)	05:07 21:45	28	05:02 22:02	20:46 (WEA VB7) 21:21 (WEA VB7)
Sonnenscheinstunden	251	274	367	419		493	30	509	
astr.max.mögl.Beschattung				166		512		1041	

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	(WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO8 - Idschenhausen 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

Juli			August			September			Oktober	November	Dezember
1	05:02	20:46 (WEA VB7)	05:42		20:11 (WEA VB6)	06:36	07:28	07:26	08:21		
	22:01	35	21:21 (WEA VB7)	21:26	12	20:23 (WEA VB6)	20:20	19:07	16:57	16:13	
2	05:03		20:46 (WEA VB7)	05:43		20:09 (WEA VB6)	06:37	07:30	07:28	08:22	
	22:01	35	21:21 (WEA VB7)	21:25	16	20:25 (WEA VB6)	20:18	19:05	16:55	16:13	
3	05:04		20:47 (WEA VB7)	05:45		20:08 (WEA VB6)	06:39	07:32	07:30	08:24	
	22:00	34	21:21 (WEA VB7)	21:23	18	20:26 (WEA VB6)	20:16	19:02	16:53	16:12	
4	05:05		20:46 (WEA VB7)	05:47		20:07 (WEA VB6)	06:41	07:34	07:32	08:25	
	22:00	35	21:21 (WEA VB7)	21:21	20	20:27 (WEA VB6)	20:13	19:00	16:51	16:11	
5	05:06		20:47 (WEA VB7)	05:48		20:06 (WEA VB6)	06:43	07:35	07:34	08:26	
	21:59	34	21:21 (WEA VB7)	21:19	21	20:27 (WEA VB5)	20:11	18:57	16:49	16:11	
6	05:06		20:47 (WEA VB7)	05:50		20:05 (WEA VB6)	06:44	07:37	07:36	08:28	
	21:59	34	21:21 (WEA VB7)	21:17	25	20:30 (WEA VB5)	20:08	18:55	16:48	16:10	
7	05:07		20:48 (WEA VB7)	05:52		20:05 (WEA VB6)	06:46	07:39	07:38	08:29	
	21:58	33	21:21 (WEA VB7)	21:15	26	20:31 (WEA VB5)	20:06	18:53	16:46	16:10	
8	05:08		20:48 (WEA VB7)	05:54		20:04 (WEA VB6)	06:48	07:41	07:39	08:30	
	21:57	33	21:21 (WEA VB7)	21:13	27	20:31 (WEA VB5)	20:04	18:50	16:44	16:09	
9	05:09		20:48 (WEA VB7)	05:55		20:04 (WEA VB6)	06:50	07:43	07:41	08:32	
	21:57	33	21:21 (WEA VB7)	21:11	28	20:32 (WEA VB5)	20:01	18:48	16:42	16:09	
10	05:11		20:49 (WEA VB7)	05:57		20:03 (WEA VB6)	06:51	07:45	07:43	08:33	
	21:56	32	21:21 (WEA VB7)	21:09	29	20:32 (WEA VB5)	19:59	18:46	16:40	16:09	
11	05:12		20:49 (WEA VB7)	05:59		20:03 (WEA VB6)	06:53	07:46	07:45	08:34	
	21:55	32	21:21 (WEA VB7)	21:07	30	20:33 (WEA VB5)	19:56	18:43	16:39	16:08	
12	05:13		20:50 (WEA VB7)	06:01		20:04 (WEA VB6)	06:55	07:48	07:47	08:35	
	21:54	30	21:20 (WEA VB7)	21:05	29	20:33 (WEA VB5)	19:54	18:41	16:37	16:08	
13	05:14		20:50 (WEA VB7)	06:02		20:03 (WEA VB6)	06:57	07:50	07:49	08:36	
	21:53	29	21:19 (WEA VB7)	21:03	29	20:32 (WEA VB5)	19:51	18:39	16:35	16:08	
14	05:15		20:50 (WEA VB7)	06:04		20:04 (WEA VB6)	06:58	07:52	07:51	08:37	
	21:52	28	21:18 (WEA VB7)	21:01	27	20:31 (WEA VB5)	19:49	18:36	16:34	16:08	
15	05:16		20:52 (WEA VB7)	06:06		20:04 (WEA VB6)	07:00	07:54	07:53	08:38	
	21:51	26	21:18 (WEA VB7)	20:59	26	20:30 (WEA VB5)	19:46	18:34	16:32	16:08	
16	05:18		20:52 (WEA VB7)	06:07		20:04 (WEA VB6)	07:02	07:56	07:55	08:39	
	21:50	24	21:16 (WEA VB7)	20:57	23	20:27 (WEA VB5)	19:44	18:32	16:31	16:08	
17	05:19		20:53 (WEA VB7)	06:09		20:05 (WEA VB6)	07:04	07:57	07:56	08:40	
	21:49	22	21:15 (WEA VB7)	20:55	20	20:25 (WEA VB5)	19:42	18:29	16:29	16:08	
18	05:20		20:53 (WEA VB7)	06:11		20:06 (WEA VB6)	07:05	07:59	07:58	08:41	
	21:48	21	21:14 (WEA VB7)	20:52	17	20:23 (WEA VB5)	19:39	18:27	16:28	16:08	
19	05:22		20:55 (WEA VB7)	06:13		20:08 (WEA VB6)	07:07	08:01	08:00	08:41	
	21:46	18	21:13 (WEA VB7)	20:50	13	20:21 (WEA VB5)	19:37	18:25	16:26	16:09	
20	05:23		20:56 (WEA VB7)	06:14		20:11 (WEA VB6)	07:09	08:03	08:02	08:42	
	21:45	16	21:12 (WEA VB7)	20:48	6	20:17 (WEA VB6)	19:34	18:23	16:25	16:09	
21	05:25		20:57 (WEA VB7)	06:16			07:11	08:05	08:04	08:43	
	21:44	13	21:10 (WEA VB7)	20:46			19:32	18:20	16:24	16:10	
22	05:26		20:59 (WEA VB7)	06:18			07:12	08:07	08:06	08:43	
	21:42	11	21:10 (WEA VB7)	20:44			19:29	18:18	16:22	16:10	
23	05:28		21:00 (WEA VB7)	06:20			07:14	08:09	08:07	08:44	
	21:41	8	21:08 (WEA VB7)	20:41			19:27	18:16	16:21	16:10	
24	05:29		21:04 (WEA VB7)	06:21			07:16	08:11	08:09	08:44	
	21:39	2	21:06 (WEA VB7)	20:39			19:24	18:14	16:20	16:11	
25	05:31			06:23			07:18	07:13	08:11	08:44	
	21:38			20:37			19:22	17:12	16:19	16:12	
26	05:32			06:25			07:19	07:14	08:12	08:45	
	21:36			20:34			19:19	17:09	16:18	16:12	
27	05:34			06:27			07:21	07:16	08:14	08:45	
	21:35			20:32			19:17	17:07	16:17	16:13	
28	05:35			06:29			07:23	07:18	08:16	08:45	
	21:33			20:30			19:14	17:05	16:16	16:14	
29	05:37			06:30			07:25	07:20	08:17	08:45	
	21:32			20:27			19:12	17:03	16:15	16:15	
30	05:39			06:32			07:27	07:22	08:19	08:45	
	21:30			20:25			19:10	17:01	16:14	16:16	
31	05:40		20:14 (WEA VB6)	06:34				07:24		08:45	
	21:28	7	20:21 (WEA VB6)	20:23				16:59		16:17	
Sonnenscheinstunden	511			459			382	329	260	234	
astr.max.mögl.Beschattung		625		442							

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)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung **Schattenrezeptor:** IO9 - Idschenhausen 2

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April		Mai		Juni	
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02		05:55 20:57		05:06 21:47	20:23 (WEA VB7)
2	08:45 16:19	08:14 17:11	07:16 18:06	07:01 20:04		05:53 20:59	22	05:05 21:48	20:53 (WEA VB7) 20:24 (WEA VB7)
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06		05:51 21:01	14	05:04 21:49	20:52 (WEA VB7) 20:24 (WEA VB7)
4	08:45 16:22	08:10 17:15	07:11 18:10	06:57 20:08		05:49 21:02	9	05:04 21:50	20:52 (WEA VB7) 20:24 (WEA VB7)
5	08:44 16:23	08:08 17:17	07:09 18:12	06:54 20:10		05:47 21:04		05:03 21:51	20:25 (WEA VB7) 20:52 (WEA VB7)
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11		05:45 21:06		05:02 21:52	20:51 (WEA VB7) 20:51 (WEA VB7)
7	08:43 16:26	08:05 17:21	07:04 18:16	06:49 20:13		05:43 21:08		05:01 21:53	20:26 (WEA VB7) 20:52 (WEA VB7)
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15		05:41 21:10	7	05:01 21:54	20:26 (WEA VB7) 20:51 (WEA VB7)
9	08:42 16:28	08:01 17:25	07:00 18:20	06:45 20:17		05:40 21:11	11	05:00 21:55	20:27 (WEA VB7) 20:51 (WEA VB7)
10	08:42 16:30	07:59 17:27	06:57 18:21	06:42 20:19		05:38 21:13	14	05:00 21:56	20:27 (WEA VB7) 20:50 (WEA VB7)
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21		05:36 21:15	17	04:59 21:57	20:28 (WEA VB7) 20:51 (WEA VB7)
12	08:40 16:33	07:55 17:31	06:52 18:25	06:38 20:22		05:34 21:16	20	04:59 21:57	20:29 (WEA VB7) 20:51 (WEA VB7)
13	08:40 16:34	07:53 17:33	06:50 18:27	06:35 20:24		05:32 21:18	22	04:59 21:58	20:30 (WEA VB7) 20:51 (WEA VB7)
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26		05:31 21:20	24	04:58 21:59	20:29 (WEA VB7) 20:50 (WEA VB7)
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28		05:29 21:22	26	04:58 21:59	20:30 (WEA VB7) 20:50 (WEA VB7)
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30		05:27 21:23	28	04:58 22:00	20:30 (WEA VB7) 20:50 (WEA VB7)
17	08:36 16:41	07:45 17:41	06:40 18:35	06:26 20:32	19:55 (WEA VB6)	05:26 21:25	30	04:58 22:00	20:31 (WEA VB7) 20:50 (WEA VB7)
18	08:35 16:43	07:43 17:43	06:38 18:36	06:24 20:33	9 19:53 (WEA VB6)	05:24 21:26	31	04:58 22:01	20:31 (WEA VB7) 20:50 (WEA VB7)
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	12 20:05 (WEA VB6)	05:22 21:28	32	04:58 22:01	20:31 (WEA VB7) 20:50 (WEA VB7)
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	16 20:07 (WEA VB5)	05:21 21:30	32	04:58 22:01	20:32 (WEA VB7) 20:51 (WEA VB7)
21	08:31 16:48	07:36 17:49	06:31 18:42	06:17 20:39	19 20:08 (WEA VB5)	05:20 21:31	32	04:58 22:02	20:32 (WEA VB7) 20:51 (WEA VB7)
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	22 20:10 (WEA VB5)	05:18 21:33	33	04:58 22:02	20:32 (WEA VB7) 20:51 (WEA VB7)
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:42	25 20:12 (WEA VB5)	05:17 21:34	33	04:58 22:02	20:32 (WEA VB7) 20:51 (WEA VB7)
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	27 20:14 (WEA VB5)	05:15 21:36	32	04:59 22:02	20:33 (WEA VB7) 20:52 (WEA VB7)
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	29 20:16 (WEA VB5)	05:14 21:37	32	04:59 22:02	20:33 (WEA VB7) 20:52 (WEA VB7)
26	08:25 16:57	07:25 17:58	06:18 18:51	06:06 20:48	31 20:17 (WEA VB5)	05:13 21:39	32	05:00 22:02	20:32 (WEA VB7) 20:52 (WEA VB7)
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	30 20:16 (WEA VB5)	05:12 21:40	32	05:00 22:02	20:33 (WEA VB7) 20:53 (WEA VB7)
28	08:22 17:01	07:21 18:02	06:14 18:55	06:01 20:52	29 20:16 (WEA VB5)	05:10 21:41	32	05:01 22:02	20:32 (WEA VB7) 20:53 (WEA VB7)
29	08:20 17:03		07:11 19:57	05:59 20:53	28 20:15 (WEA VB5)	05:09 21:43	31	05:01 22:02	20:33 (WEA VB7) 20:54 (WEA VB7)
30	08:19 17:05		07:09 19:59	05:57 20:55	27 20:14 (WEA VB5)	05:08 21:44	30	05:02 22:02	20:33 (WEA VB7) 20:55 (WEA VB7)
31	08:17 17:07		07:06 20:00		25 20:13 (WEA VB5)	05:07 21:45	30	20:22 (WEA VB7) 20:52 (WEA VB7)	
Sonnenscheinstunden	251	274	367	419		493		509	
astr.max.mögl.Beschattung				329		718		666	

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	(WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO9 - Idschenhausen 2

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli			August			September			Oktober	November	Dezember	
1	05:02	20:32 (WEA VB7)	05:42		20:34 (WEA VB7)	06:36		07:28		07:26	08:21	
	22:01	23 20:55 (WEA VB7)	21:26	21	20:55 (WEA VB7)	20:20		19:07		16:57	16:13	
2	05:03	20:33 (WEA VB7)	05:43		20:35 (WEA VB7)	06:37		07:30		07:28	08:22	
	22:01	23 20:56 (WEA VB7)	21:25	19	20:54 (WEA VB7)	20:18		19:05		16:55	16:13	
3	05:04	20:33 (WEA VB7)	05:45		20:36 (WEA VB7)	06:39		07:32		07:30	08:24	
	22:00	23 20:56 (WEA VB7)	21:23	15	20:51 (WEA VB7)	20:16		19:02		16:53	16:12	
4	05:05	20:32 (WEA VB7)	05:47		20:37 (WEA VB7)	06:41		07:34		07:32	08:25	
	22:00	24 20:56 (WEA VB7)	21:21	13	20:50 (WEA VB7)	20:13		19:00		16:51	16:11	
5	05:06	20:32 (WEA VB7)	05:48		20:39 (WEA VB7)	06:43		07:35		07:34	08:26	
	21:59	25 20:57 (WEA VB7)	21:19	9	20:48 (WEA VB7)	20:11		18:57		16:49	16:11	
6	05:06	20:32 (WEA VB7)	05:50		20:42 (WEA VB7)	06:44		07:37		07:36	08:28	
	21:59	25 20:57 (WEA VB7)	21:17	4	20:46 (WEA VB7)	20:08		18:55		16:48	16:10	
7	05:07	20:32 (WEA VB7)	05:52			06:46		07:39		07:38	08:29	
	21:58	26 20:58 (WEA VB7)	21:15			20:06		18:53		16:46	16:10	
8	05:08	20:32 (WEA VB7)	05:54			06:48		07:41		07:39	08:30	
	21:57	26 20:58 (WEA VB7)	21:13			20:04		18:50		16:44	16:09	
9	05:09	20:31 (WEA VB7)	05:55		20:05 (WEA VB6)	06:50		07:43		07:41	08:32	
	21:57	28 20:59 (WEA VB7)	21:11	2	20:07 (WEA VB6)	20:01		18:48		16:42	16:09	
10	05:11	20:31 (WEA VB7)	05:57		20:00 (WEA VB6)	06:51		07:45		07:43	08:33	
	21:56	28 20:59 (WEA VB7)	21:09	10	20:10 (WEA VB6)	19:59		18:46		16:40	16:09	
11	05:12	20:31 (WEA VB7)	05:59		19:58 (WEA VB6)	06:53		07:46		07:45	08:34	
	21:55	29 21:00 (WEA VB7)	21:07	15	20:13 (WEA VB6)	19:56		18:43		16:39	16:08	
12	05:13	20:31 (WEA VB7)	06:01		19:57 (WEA VB6)	06:55		07:48		07:47	08:35	
	21:54	29 21:00 (WEA VB7)	21:05	23	20:20 (WEA VB5)	19:54		18:41		16:37	16:08	
13	05:14	20:30 (WEA VB7)	06:02		19:55 (WEA VB6)	06:57		07:50		07:49	08:36	
	21:53	30 21:00 (WEA VB7)	21:03	26	20:21 (WEA VB5)	19:51		18:39		16:35	16:08	
14	05:15	20:30 (WEA VB7)	06:04		19:55 (WEA VB6)	06:58		07:52		07:51	08:37	
	21:52	31 21:01 (WEA VB7)	21:01	27	20:22 (WEA VB5)	19:49		18:36		16:34	16:08	
15	05:16	20:31 (WEA VB7)	06:06		19:54 (WEA VB6)	07:00		07:54		07:53	08:38	
	21:51	31 21:02 (WEA VB7)	20:59	29	20:23 (WEA VB5)	19:46		18:34		16:32	16:08	
16	05:18	20:31 (WEA VB7)	06:07		19:53 (WEA VB6)	07:02		07:56		07:55	08:39	
	21:50	31 21:02 (WEA VB7)	20:57	29	20:22 (WEA VB5)	19:44		18:32		16:31	16:08	
17	05:19	20:30 (WEA VB7)	06:09		19:53 (WEA VB6)	07:04		07:57		07:56	08:40	
	21:49	32 21:02 (WEA VB7)	20:55	30	20:23 (WEA VB5)	19:42		18:29		16:29	16:08	
18	05:20	20:30 (WEA VB7)	06:11		19:52 (WEA VB6)	07:05		07:59		07:58	08:41	
	21:48	32 21:02 (WEA VB7)	20:52	30	20:22 (WEA VB5)	19:39		18:27		16:28	16:08	
19	05:22	20:31 (WEA VB7)	06:13		19:52 (WEA VB6)	07:07		08:01		08:00	08:41	
	21:46	32 21:03 (WEA VB7)	20:50	29	20:21 (WEA VB5)	19:37		18:25		16:26	16:09	
20	05:23	20:30 (WEA VB7)	06:14		19:53 (WEA VB6)	07:09		08:03		08:02	08:42	
	21:45	33 21:03 (WEA VB7)	20:48	26	20:19 (WEA VB5)	19:34		18:23		16:25	16:09	
21	05:25	20:30 (WEA VB7)	06:16		19:52 (WEA VB6)	07:11		08:05		08:04	08:43	
	21:44	33 21:03 (WEA VB7)	20:46	24	20:16 (WEA VB5)	19:32		18:20		16:24	16:10	
22	05:26	20:31 (WEA VB7)	06:18		19:53 (WEA VB6)	07:12		08:07		08:06	08:43	
	21:42	32 21:03 (WEA VB7)	20:44	22	20:15 (WEA VB5)	19:29		18:18		16:22	16:10	
23	05:28	20:30 (WEA VB7)	06:20		19:54 (WEA VB6)	07:14		08:09		08:07	08:44	
	21:41	33 21:03 (WEA VB7)	20:41	19	20:13 (WEA VB5)	19:27		18:16		16:21	16:10	
24	05:29	20:30 (WEA VB7)	06:21		19:54 (WEA VB6)	07:16		08:11		08:09	08:44	
	21:39	32 21:02 (WEA VB7)	20:39	16	20:10 (WEA VB5)	19:24		18:14		16:20	16:11	
25	05:31	20:31 (WEA VB7)	06:23		19:56 (WEA VB6)	07:18		07:13		08:11	08:44	
	21:38	32 21:03 (WEA VB7)	20:37	12	20:08 (WEA VB6)	19:22		17:12		16:19	16:12	
26	05:32	20:31 (WEA VB7)	06:25		19:58 (WEA VB6)	07:19		07:14		08:12	08:45	
	21:36	31 21:02 (WEA VB7)	20:34	8	20:06 (WEA VB6)	19:19		17:09		16:18	16:12	
27	05:34	20:32 (WEA VB7)	06:27			07:21		07:16		08:14	08:45	
	21:35	31 21:03 (WEA VB7)	20:32			19:17		17:07		16:17	16:13	
28	05:35	20:32 (WEA VB7)	06:29			07:23		07:18		08:16	08:45	
	21:33	29 21:01 (WEA VB7)	20:30			19:14		17:05		16:16	16:14	
29	05:37	20:32 (WEA VB7)	06:30			07:25		07:20		08:17	08:45	
	21:32	28 21:00 (WEA VB7)	20:27			19:12		17:03		16:15	16:15	
30	05:39	20:32 (WEA VB7)	06:32			07:26		07:22		08:19	08:45	
	21:30	26 20:58 (WEA VB7)	20:25			19:10		17:01		16:14	16:16	
31	05:40	20:34 (WEA VB7)	06:34					07:24			08:45	
	21:28	23 20:57 (WEA VB7)	20:23					16:59			16:17	
Sonnenscheinstunden			511		459		382		329		260	234
astr.max.mögl.Beschattung			891		458							

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)
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