

WINDPARK GROßENHOLZ

# Schattenwurfberechnung

Gosdorfer Windenergie GmbH & Co. KG

**Berichtsnummer:** 10330604-A-2-A

**Datum:** 2022-06-24



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**Auftrag:**

Schattenwurfberechnung für die Umgebung des geplanten Windenergieparks Großenholz

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## 1 EINLEITUNG

Von der Gosdorfer Windenergie GmbH & Co. KG wurde der GL Garrad Hassan Deutschland GmbH (GH-D) am 2021-01-03 der Auftrag erteilt, für das geplante Repoweringprojekt im Windenergiepark Großenholz die Schattenwurfbelastung an den umliegenden Immissionsorten (IO) unter Berücksichtigung aller immissionsrelevanten Windenergieanlagen (WEA) zu berechnen.

Die Arbeiten werden auf Grundlage der ISI-RA-MEA-4620 /4/ des Management Systems der GL Garrad Hassan Deutschland GmbH durchgeführt.

## 2 IMMISSIONSRELEVANTE WINDENERGIEANLAGEN

Auf der beplanten Fläche sind von der Gosdorfer Windenergie GmbH & Co. KG drei neue Windenergieanlagen (WEA) des Typs Vestas V150-6.0 MW mit einer Nabenhöhe von 105 m und einem Rotordurchmesser von 150 m geplant (WEA G1 bis WEA G3). Im Gegenzug sind sechs momentan an diesem Standort vorhandene WEA des Typs Vestas V47 (WEA R07 bis WEA R 12) mit einer Nabenhöhe von 65 m für den Rückbau vorgesehen.

Als verbleibende Vorbelastung werden die in Tabelle 2.1 aufgelisteten, insgesamt 47 WEA berücksichtigt.

**Tabelle 2.1: WEA der verbleibenden Vorbelastung nach Rückbau**

Bezeichnung	ID	Nabenhöhe	Rotordurchmesser
Easywind 6	WEA 51	19,0	6,0
Enercon E-115 EP3 E3/2,9 MW (TES)	WEA K01 bis WEA K04	92,0	115,7
Enercon E-40/5.40	WEA 36	65,0	40,3
Enercon E-66 18.70	WEA 06 bis WEA 08 und WEA 32	65,0	70,0
Enercon E-66/15.66	WEA 35	85,0	66,0
Enercon E-70 E4	WEA 37 bis WEA 39	64,0	71,0
Enercon E-82	WEA 49 und WEA 50	108,4	82,0
Jacobs MD70	WEA 01 bis WEA 10, WEA 11 bis WEA 21, WEA 33, WEA 40 bis WEA 43	65,0	70,0
NEG Micon NM 1500 C	WEA 22 bis WEA 25	68,0	64,0
Südwind S70	WEA 46 bis WEA 48	65,0	70,0
Vestas V47	WEA 44 und WEA 48	65,0	47,0

Die Reichweite der Schatten der Windenergieanlagen wird gemäß /1/ errechnet. Es wird ein Linke-Trübungsfaktor von 3,5 berücksichtigt. Dies entspricht dem Wert der größten zu erwartenden Schattenwurfreichweite, wie er an klaren Wintertagen vorkommt.

Die Koordinaten der Standorte der WEA wurden vom Auftraggeber angegeben und mit den Daten des LLUR Flintbek abgeglichen. Die Aufstellungsgeometrie ist mit genauen Koordinaten im Hauptresultat im Anhang dargestellt. Über die im Anhang dargestellten WEA hinaus sind dem Gutachter keine vorhandenen, genehmigten oder geplanten Anlagen in immissionsrelevanter Entfernung bekannt.

## 3 IMMISSIONSORTE

Als Immissionsorte (IO) wurden die nächstgelegenen Wohnbebauungen ausgewählt, für die von erhöhter potenzieller Schattenwurfimmission ausgegangen werden kann. Die ausgewählten IO sind unterschiedlich bewachsen und werden als den zu beurteilenden WEA zugewandt betrachtet. Es wird davon ausgegangen, dass Bewuchs den Schattenwurf nicht wesentlich abschwächt.

Die Koordinaten der IO wurden anhand von Karten im Maßstab 1:5.000 ermittelt. Erhebliche Abweichungen, die einen Einfluss auf das Endergebnis haben könnten, sind nicht zu erwarten.

## 4 BEURTEILUNGSVERFAHREN

Einen Einfluss auf die Schattenwurfbelastung haben die geographische Lage der WEA, der Immissionsorte (IO) und deren Lage zueinander sowie die örtlichen Gegebenheiten. Diese Daten werden als Eingabeparameter für die verwendete Software "WindPRO" der Fa. Energi- og Miljødata, Aalborg, Dänemark, in der Version 3.5.584 /2/ benutzt, mit der über Sonnenstandsdiagramme und die sich dann ergebende Geometrie möglicher Schattenwurf berechnet wird. Die Standortkoordinaten (UTM ETRS89) und die Höhe über N.N. der zu berücksichtigenden WEA sowie deren Nabenhöhe und der Rotordurchmesser werden ermittelt und stellen den ersten Teil der Eingangsgrößen für die Schattenwurfberechnung dar. Der zweite Teil ist die Festlegung der Immissionsorte. Sie werden durch die vor Ort gewonnenen Kenntnisse über Wohnbebauungen anhand der Standortkoordinaten, der Höhe über N.N., der Größe, der Platzierung und der Ausrichtung beschrieben. Die Größe wird hier gemäß den Empfehlungen des Arbeitskreises Schattenwurf unter Federführung des Staatlichen Umweltamtes Schleswig /3/ als annähernd punktförmig festgelegt und durch ein horizontales Quadrat von 1 x 1 m abgebildet, das sich auf einer Höhe von 2 m über dem Boden befindet.

Anhand der oben genannten Eingangsdaten erfolgt die Berechnung der maximal möglichen Schattenwurfbelastung an den IO. Die Berechnung der maximalen Schattenwurfbelastung an den IO entspricht dem ungünstigsten Fall („worst case“), wobei folgende Annahmen getroffen werden:

- die Sonne scheint durchgehend während der gesamten Zeit zwischen Sonnenauf- und Sonnenuntergang, es wird also stets von einem wolkenlosen Himmel ausgegangen. Eine Ausnahme hiervon sind die Zeiten, in denen die Sonne weniger als 3° über dem Horizont steht. Diese werden wegen zu geringer Strahlungsintensität nicht berücksichtigt.
- die Windrichtung wird stets so angenommen, dass die Rotorfläche senkrecht zur Sonneneinstrahlung steht, also den maximal möglichen Schatten verursacht.
- die WEA sind immer in Betrieb, haben also keine technisch bedingten Stillstandszeiten und immer ausreichend starken Wind.
- der Einwirkungsbereich des Schattens einer WEA beträgt bis zu 3.000 m. Liegen Daten zur Rotorblattgeometrie der WEA vor, wird der Beschattungsbereich anhand der Geometriedaten ermittelt.
- die angenommenen Schattenwurfrezeptoren bzw. Fenster an den IO sind nicht durch Gebäude, Bewuchs oder ähnliches teilweise oder ganz verdeckt.

## 5 BERECHNUNG DER ERGEBNISSE

Die detaillierten Gesamtergebnisse sind dem Anhang zu entnehmen.

Nach Eingabe der Eingangsdaten wurde die maximal mögliche Schattenwurfbelastung an den ausgewählten Immissionsorten bestimmt. Dabei werden zum einen die Vorbelastung durch vorhandene und ggf. weitere geplante WEA und zum anderen die resultierenden Gesamtimmisionen bestimmt. Dabei ergibt sich folgendes Ergebnis für den ungünstigsten Fall:

### 5.1 Vorbelastung momentane Bestandssituation

Am Immissionsort IO 32 (Rüting Söhlen 5) beträgt die momentane Vorbelastung 94 Stunden und 16 Minuten pro Jahr, verteilt auf 239 Tage. Die maximale Tagesbelastung beträgt dort 45 Minuten. Am zweitstärksten belastet ist mit bis zu 66 Stunden und 42 Minuten pro Jahr, verteilt auf 196 Tage, und einer maximalen Tagesbelastung von 33 Minuten der IO 33 (Rüting Söhlen 7). Am IO 03 (Hauptstraße 4, Riepsdorf) tritt ebenfalls erheblicher Schattenwurf durch die

vorhandenen WEA auf. Dieser beträgt dort bis zu 66 Stunden und neun Minuten pro Jahr, verteilt auf 293 Tage. Die maximale Tagesbelastung beträgt dort 32 Minuten.

## 5.2 Bestandssituation nach Rückbau

Nach dem Rückbau der sechs Vestas V47 beträgt am Immissionsort IO 32 (Rüting Söhlen 5) die verbleibende Vorbelastung unverändert 94 Stunden und 16 Minuten pro Jahr, verteilt auf 239 Tage. Die maximale Tagesbelastung beträgt dort weiterhin 45 Minuten. Am zweitstärksten und ebenfalls unverändert belastet ist mit bis zu 66 Stunden und 42 Minuten pro Jahr, verteilt auf 196 Tage, und einer maximalen Tagesbelastung von 33 Minuten der IO 33 (Rüting Söhlen 7). Erheblicher Schattenwurf durch die verbleibenden WEA tritt weiterhin am IO 03 (Hauptstraße 4, Riepsdorf) auf. Auch hier ist unverändert eine Belastung von bis zu 66 Stunden und neun Minuten pro Jahr, verteilt auf 293 Tage festzustellen. Die maximale Tagesbelastung beträgt dort 32 Minuten.

## 5.3 Zusatzbelastung Windenergiepark Großenholz

Durch die drei geplante Anlage entsteht am Immissionsort IO 15 (Poggenpohler Weg 30, Gosdorf) eine Erhöhung der Schattenwurfbelastung um 64 Stunden und sieben Minuten auf dann 89 Stunden und 34 Minuten. Die maximale Tagesbelastung erhöht sich um 43 Minuten auf eine Stunde und 10 Minuten. Am Immissionsort IO 35 (Rüting Chaussee 1) erhöht sich die Jahresbelastung um 54 Stunden und acht Minuten auf 105 Stunden und 42 Minuten pro Jahr, die maximale Tagesbelastung erhöht sich um 36 Minuten auf eine Stunde und drei Minuten. Am Immissionsort IO 31 (Rüting Söhlen 2) erhöht sich die Jahresbelastung um 51 Stunden und 57 Minuten auf 70 Stunden und 20 Minuten pro Jahr. Die maximale Tagesbelastung erhöht sich um sechs Minuten auf dann 38 Minuten.

## 5.4 Gesamtbelastung nach Abschluss des Repowering Vorhabens

Am Immissionsort IO 32 (Rüting Söhlen 5) tritt die höchste Belastung durch Schattenwurf auf. Sie beträgt 119 Stunden und 46 Minuten pro Jahr, verteilt auf 253 Tage. Die maximale Tagesbelastung beträgt hier 45 Minuten. Am zweitstärksten belastet ist mit bis zu 105 Stunden und 42 Minuten pro Jahr, verteilt auf 283 Tage, und einer maximalen Tagesbelastung von einer Stunde und drei Minuten der IO35 (Rüting Chaussee 1). Die dritthöchste Belastung ergibt sich mit 89 Stunden und 34 Minuten pro Jahr, verteilt auf 180 Tage, am IO 15 (Poggenpohler Weg 30, Gosdorf). Die maximale Tagesbelastung beträgt dort eine Stunde und 10 Minuten.

# 6 PROGNOSEGENAUIGKEIT

Zur Genauigkeit der Ergebnisse der Schattenwurfberechnung kann keine Aussage getroffen werden, da noch keine auf Langzeitstudien basierenden Ergebnisse zu den Unsicherheiten der Berechnung vorliegen. Aufgrund des angewendeten Verfahrens kann die Berechnung jedoch als konservativ im Sinne des Immissionsschutzes betrachtet werden.

# 7 ABSCHLIEßENDE BEURTEILUNG

Gemäß den Hinweisen zur Ermittlung und Beurteilung der optischen Immissionen von Windenergieanlagen des Länderausschusses für Immissionsschutz /3/ soll eine Belastung von 30 h im Jahr oder 30 min pro Tag nicht überschritten werden.

Unter den oben beschriebenen Vorbedingungen ergibt die Berechnung, dass im Bereich der Ortschaft Gosdorf, an der Bebauung entlang der Bäderstraße bis zur Einmündung Poggenpohler Weg, sowie an den Häusern im Bereich Achterhof und im Verlauf des Poggenpohler Weges bis zum Ortsausgang eine Überschreitung der genannten Richtwerte nicht ausgeschlossen werden kann. Auch an der östlich bzw. südöstlich der geplanten WEA gelegenen Wohnbebauung Rathjensdorfer Felde 2 und Morest (IO 21, Grömitz) ergibt sich durch die geplanten WEA eine rechnerische Überschreitung der Richtwerte. Die Immissionsorte entlang der Straße Rüting Söhlen sind ebenfalls von einer Erhöhung der bereits durch die Vorbelastung verursachten Überschreitung der Richtwerte betroffen. Auch in der gesamten Ortslage Rüting ergibt sich durch das geplante Vorhaben eine Erhöhung der bereits durch den momentanen



Bestand verursachten Richtwertüberschreitungen. An der Wohnbebauung Rüttinger Kornenhof 10 und am Kathenkamp 11 werden durch die geplanten WEA die Richtwerte erstmalig überschritten.

Die Belastung der Immissionsorte durch die geplanten Anlagen ist somit als beeinträchtigend zu werten.

Daher sollte durch eine Einrichtung, die den Schattenwurf auf das zulässige Maß begrenzt, der Schutz der Anwohner vor diesen Beeinträchtigungen sichergestellt werden. Gemäß /3/ können hierfür technische Maßnahmen zur zeitlichen Beschränkung angewandt werden. Diese sollte mindestens alle Wohngebäude in oben genannten Bereichen berücksichtigen.

Da der Richtwert von 30 Stunden pro Kalenderjahr auf Grundlage der astronomisch möglichen Beschattung entwickelt wurde, ist für Abschaltautomatiken der Wert für die tatsächliche, meteorologische Schattendauer auf 8 Stunden pro Kalenderjahr zu berücksichtigen.

Es ist zu beachten, dass sich die Zeitpunkte für Schattenwurf durch die Tatsache, dass das Kalenderjahr nicht exakt 365 Tage hat, jedes Jahr leicht verschieben. Daher muss für eine zeitgesteuerte Abschaltung ein Kalender basierend auf dem realen Sonnenstand zugrunde gelegt werden.

## **8 ZUSAMMENFASSUNG**

Zur Ermittlung der Schattenwurfbelastung in der Umgebung der geplanten Windenergieanlagen des Windparks Großenholz wurden Berechnungen durchgeführt. Die örtlichen Parameter wurden bei einer Ortsbesichtigung ermittelt bzw. durch Standardvorgaben für die Ermittlung des ungünstigsten Falles festgelegt.

Die Belastung der Immissionsorte durch Schattenwurf beträgt bei einer Berechnung des ungünstigsten Falles unter Berücksichtigung der nach dem Rückbau verbleibenden und als Vorbelastung zu wertenden WEA maximal 119 Stunden und 46 Minuten im Jahr am IO 32 (Rütting Söhlen 5) bzw. 1 Stunde und 10 Minuten pro Tag am IO 15 (Poggenpohler Weg 30, Gosdorf). An 12 bereits durch die Vorbelastung von einer Richtwertüberschreitung betroffenen IO verursachen die geplanten WEA eine zusätzliche Erhöhung der Überschreitung. Zudem kommt es an 12 weiteren IO durch die geplanten WEA erstmalig zu einer Überschreitung der Richtwerte.

## 9 LITERATURVERZEICHNIS

- /1/ Hans D. Freund, Institut für Physik und Allgemeine Elektronik, FH Kiel, "Die Reichweite des Schattenwurfs von Windkraftanlagen", 1999-06.
- /2/ Energi- og Miljødata, Aalborg, Dänemark, " WindPro ", Vers. 3.5.584.
- /3/ Länderausschuss für Immissionsschutz, "Hinweise zur Ermittlung und Beurteilung der optischen Immissionen von Windenergieanlagen Aktualisierung 2019", 2020-01-23.
- /4/ DNV GL Management System, "ISI-RA-MEA-4620 Shadow Flicker Impact Assessment", Revision A, 2017-03-01. (Dieses Dokument ist Teil des DNV GL Management Systems und kann bei Bedarf eingesehen werden.)

## 10 TABELLENVERZEICHNIS

Tabelle 2.1: WEA der verbleibenden Vorbelastung nach Rückbau

5

## 11 ANHANG

Auf den folgenden Seiten sind die Berechnungsergebnisse dargestellt.

# 11.1 Hauptergebnis Vorbelastung Bestandssituation (vor Rückbau)

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## SHADOW - Hauptergebnis

**Berechnung:** Vorbelastung Bestandssituation vor dem Rückbau WP Großenholz

### 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 Sonneneinfallrichtung  
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: Höhenlinien: oro\_2019-07-25.map (1)  
Hindernisse in Berechnung nicht verwendet  
Rasterauflösung: 10,0 m

Alle Koordinatenangaben in:  
UTM (north)-ETRS89 Zone: 32

### WEA

WEA	Ost	Nord	Z	Beschreibung	WEA-Typ			Nennleistung	Rotor-durchmesser	Nabenhöhe	Schattendaten	
					Aktuell	Hersteller	Typ				Beschatt.-Bereich	U/min
			[m]				[kW]	[m]	[m]	[m]	[U/min]	
WEA 01 (GRN)	626.955	6.009.774	20,8	WEA 01 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 02 (GRN)	627.240	6.009.666	25,0	WEA 02 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 03 (GRN)	627.525	6.009.556	25,0	WEA 03 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 04 (GRN)	626.826	6.009.569	20,0	WEA 04 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 05 (GRN)	627.037	6.009.390	23,9	WEA 05 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 06 (GRN)	627.377	6.009.189	25,0	WEA 06 Ener...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
WEA 07 (GRN)	627.835	6.009.437	25,0	WEA 07 Ener...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
WEA 08 (GRN)	627.591	6.009.028	20,6	WEA 08 Ener...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
WEA 10 (GRS)	625.825	6.008.222	16,4	WEA 10 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 11 (GRS)	626.145	6.008.219	21,9	WEA 11 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 12 (GRS)	626.491	6.008.169	25,0	WEA 12 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 13 (GRS)	626.067	6.008.014	16,5	WEA 13 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 14 (GRS)	626.378	6.007.889	16,8	WEA 14 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 15 (GCN)	628.439	6.008.420	25,0	WEA 15 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 16 (GCN)	628.861	6.008.454	20,7	WEA 16 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 17 (GCN)	628.721	6.008.093	21,8	WEA 17 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 18 (GCN)	629.006	6.008.251	20,0	WEA 18 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 19 (GCS)	627.286	6.007.351	20,0	WEA 19 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 20 (GCS)	627.481	6.007.592	20,0	WEA 20 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 21 (GCS)	627.404	6.007.112	17,5	WEA 21 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 22 (Kab)	626.313	6.011.135	16,1	WEA 22 NEG...	Nein	NEG MICON	NM1500/64-1.500/750	1.500	64,0	68,0	3.000	17,1
WEA 23 (Kab)	626.606	6.010.014	18,8	WEA 23 NEG...	Nein	NEG MICON	NM1500/64-1.500/750	1.500	64,0	68,0	3.000	17,1
WEA 24 (Kab)	626.513	6.010.960	17,0	WEA 24 NEG...	Nein	NEG MICON	NM1500/64-1.500/750	1.500	64,0	68,0	3.000	17,1
WEA 25 (Kab)	626.649	6.010.300	18,9	WEA 25 NEG...	Nein	NEG MICON	NM1500/64-1.500/750	1.500	64,0	68,0	3.000	17,1
WEA 32 (LR)	624.599	6.009.726	25,0	WEA 32 Ener...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
WEA 33 (LR)	624.912	6.009.921	15,0	WEA 33 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 35 (L)	624.386	6.010.378	20,0	WEA 35 Ener...	Nein	ENERCON	E-66/15.66-1.500	1.500	66,0	85,0	1.462	22,0
WEA 36 (L)	623.918	6.010.628	15,0	WEA 36 Ener...	Nein	ENERCON	E-40/5.40-500	500	40,3	65,0	897	38,0
WEA 37 (L)	624.118	6.010.054	24,0	WEA 37 Ener...	Ja	ENERCON	E-70 E4 2,3 MW-2.300	2.300	71,0	64,0	1.644	20,0
WEA 38 (L)	624.081	6.010.287	20,0	WEA 38 Ener...	Ja	ENERCON	E-70 E4 2,3 MW-2.300	2.300	71,0	64,0	1.644	20,0
WEA 39 (L)	624.003	6.010.476	24,7	WEA 39 Ener...	Ja	ENERCON	E-70 E4 2,3 MW-2.300	2.300	71,0	64,0	1.644	20,0
WEA 40 (RW)	626.898	6.010.632	20,0	WEA 40 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 41 (RW)	626.988	6.010.354	23,9	WEA 41 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 42 (RW)	627.526	6.010.398	24,2	WEA 42 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 43 (RW)	627.165	6.009.938	25,0	WEA 43 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 44 (RW)	627.353	6.010.254	25,0	WEA 44 Vest...	Nein	VESTAS	V47-660	660	47,0	65,0	880	28,5
WEA 45 (RW)	627.569	6.009.788	25,0	WEA 45 Vest...	Nein	VESTAS	V47-660	660	47,0	65,0	880	28,5
WEA 46 (Dam)	624.033	6.011.232	25,0	WEA 46 Süd...	Nein	SÜDWIND	S70-1.500	1.500	70,0	65,0	1.467	19,0
WEA 47 (Dam)	624.290	6.011.385	20,0	WEA 47 Süd...	Nein	SÜDWIND	S70-1.500	1.500	70,0	65,0	1.467	19,0

(Fortsetzung nächste Seite)...

**SHADOW - Hauptergebnis**

**Berechnung: Vorbelastung Bestandssituation vor dem Rückbau WP Großenholz**

...(Fortsetzung von vorheriger Seite)

	Ost	Nord	Z	Beschreibung	WEA-Typ		Typ	Nennleistung	Rotor-durchmesser	Nabenhöhe	Schattendaten	
					Aktuell	Hersteller					Beschatt.-Bereich	U/min
			[m]					[kW]	[m]	[m]	[m]	[U/min]
WEA 48 (Dam)	623.712	6.011.262	15,0	WEA 48 Süd...	Nein	SÜDWIND	S70-1.500	1.500	70,0	65,0	1.467	19,0
WEA 49 (Dam)	623.845	6.011.006	18,8	WEA 49 Ener...	Ja	ENERCON	E-82 E2-2.300	2.300	82,0	108,4	1.601	18,0
WEA 50 (Dam)	624.437	6.011.234	20,0	WEA 50 Ener...	Ja	ENERCON	E-82 E2-2.300	2.300	82,0	108,4	1.601	18,0
WEA 51	627.701	6.011.676	7,8	WEA 51 Easy...	Nein	EasyWind	EasyWind 6-6	6	6,0	19,0	3.000	124,0
WEA K01	626.666	6.011.752	12,9	WEA K01 En...	Ja	ENERCON	E-115 EP3 E3 TES-2.900	2.900	115,7	92,0	2.069	0,0
WEA K02	626.813	6.011.347	20,0	WEA K02 En...	Ja	ENERCON	E-115 EP3 E3 TES-2.900	2.900	115,7	92,0	2.069	0,0
WEA K03	626.913	6.011.037	20,0	WEA K03 En...	Ja	ENERCON	E-115 EP3 E3 TES-2.900	2.900	115,7	92,0	2.069	0,0
WEA K04	627.292	6.010.722	21,5	WEA K04 En...	Ja	ENERCON	E-115 EP3 E3 TES-2.900	2.900	115,7	92,0	2.069	0,0
WEA R07 (Gro)	628.186	6.009.230	20,0	WEA R07 Ve...	Nein	VESTAS	V47-660	660	47,0	65,0	880	28,5
WEA R08 (Gro)	628.491	6.008.984	20,0	WEA R08 Ve...	Nein	VESTAS	V47-660	660	47,0	65,0	880	28,5
WEA R09 (Gro)	628.841	6.008.778	20,0	WEA R09 Ve...	Nein	VESTAS	V47-660	660	47,0	65,0	880	28,5
WEA R10 (Gro)	627.802	6.008.856	20,0	WEA R10 Ve...	Nein	VESTAS	V47-660	660	47,0	65,0	880	28,5
WEA R11 (Gro)	627.996	6.008.658	20,0	WEA R11 Ve...	Nein	VESTAS	V47-660	660	47,0	65,0	880	28,5
WEA R12 (Gro)	628.332	6.008.623	20,0	WEA R12 Ve...	Nein	VESTAS	V47-660	660	47,0	65,0	880	28,5

**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]
IO 01	IO 01 Hohe Weide 6 (Riepsdorf)	628.558	6.010.372	16,5	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 02	IO 02 Am Teich 4 (Riepsdorf)	628.337	6.010.091	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 03	IO 03 Hauptstraße 4 (Riepsdorf)	628.192	6.009.924	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 04	IO 04 Bäderstraße 2 (Gosdorf)	628.468	6.009.804	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 05	IO 05 Bäderstraße 8 (Gosdorf)	628.577	6.009.796	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 06	IO 06 Bäderstraße 17 (Gosdorf)	628.683	6.009.834	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 07	IO 07 Bäderstraße 25 (Gosdorf)	628.786	6.009.934	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 08	IO 08 Bäderstraße 34 (Gosdorf)	628.870	6.009.884	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 09	IO 09 Bäderstraße 35 (Gosdorf)	628.968	6.009.911	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 10	IO 10 Poggenpohler Weg 2 (Gosdorf)	628.801	6.009.822	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 11	IO 11 Poggenpohler Weg 8 (Gosdorf)	628.788	6.009.756	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 12	IO 12 Poggenpohler Weg 14 (Gosdorf)	628.820	6.009.685	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 13	IO 13 Poggenpohler Weg 20 (Gosdorf)	628.856	6.009.598	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 14	IO 14 Poggenpohler Weg 28 (Gosdorf)	628.894	6.009.522	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 15	IO 15 Poggenpohler Weg 30 (Gosdorf)	628.752	6.009.469	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 16	IO 16 Achterhof (Gosdorf)	628.608	6.009.649	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 17	IO 17 Bäderstraße 24a (Gosdorf)	628.706	6.009.684	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 18	IO 18 Ratjensdorfer Felde 1	629.789	6.009.880	15,1	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 19	IO 19 Ratjensdorfer Felde 3	629.701	6.009.765	15,1	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 20	IO 20 Ratjensdorfer Felde 2	629.474	6.009.621	15,1	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 21	IO 21 Morest, Grömitz	629.723	6.008.400	16,7	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 22	IO 22 Poggenpohl 4 (Cismarfelde)	629.157	6.007.735	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 23	IO 23 Poggenpohl 1 (Cismarfelde)	629.211	6.007.586	19,5	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 24	IO 24 Wintersberg	630.455	6.007.797	8,2	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 28	IO 28 Cismarfelde 15	627.807	6.008.129	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 31	IO 31 Rütting Söhlen 2	627.197	6.008.174	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 32	IO 32 Rütting Söhlen 5	626.892	6.007.779	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 33	IO 33 Rütting Söhlen 7	626.798	6.007.622	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 34	IO 34 Rütting Söhlen 11	626.671	6.007.415	15,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 35	IO 35 Rütting Chaussee 1	627.056	6.008.668	25,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 36	IO 36 Kathenkamp 1 (Rüttinger Hof)	626.737	6.008.865	24,6	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 37	IO 37 Rüttinger Klosterkamp 5	626.737	6.008.797	23,6	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 38	IO 38 Rüttinger Klosterkamp 9	626.626	6.008.796	23,6	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 39	IO 39 Rüttinger Kornhof 1 (Rütting)	626.632	6.008.936	23,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 40	IO 40 Rüttinger Kornhof 10 (Rütting)	626.542	6.008.948	21,9	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 41	IO 41 Kathenkamp 11 (Rütting)	626.629	6.008.999	22,7	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 42	IO 42 Kathenkamp 19 (Rütting)	626.484	6.009.093	20,4	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 43	IO 43 Kathenkamp 2 (Rütting)	626.309	6.009.066	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 44	IO 44 Kälberhof 5 (Rütting)	626.450	6.009.007	20,4	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 45	IO 45 Bäderstraße 20-22 (Kabelhorst)	625.876	6.008.779	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 46	IO 46 Bäderstraße 15 (Kabelhorst)	625.824	6.008.830	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 47	IO 47 Bäderstraße 18 (Kabelhorst)	625.689	6.008.831	22,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0

(Fortsetzung nächste Seite)...

Projekt:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:

22.06.2022 16:34/3.5.584

## SHADOW - Hauptergebnis

**Berechnung:** Vorbelastung Bestandssituation vor dem Rückbau WP Großenholz

...(Fortsetzung von vorheriger Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe	Neigung des	Ausrichtungsmodus	Augenhöhe
					[m]	[m]	ü.Gr.	Fensters		(ZVI)
								[°]		ü.Gr.
										[m]
IO 48	IO 48 Bäderstraße 13 (Kabelhorst)	625.700	6.008.897	22,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 49	IO 49 Bäderstraße 10 (Kabelhorst)	625.563	6.008.931	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 50	IO 50 Schmiedeberg 26 (Kabelhorst)	625.655	6.009.307	16,9	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 51	IO 51 Grünbeck 2	625.972	6.009.891	14,9	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 52	IO 52 Grünbeck 16	626.050	6.010.124	15,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0

## Berechnungsergebnisse

Schattenrezeptor

### astron. max. mögl. Beschattungsdauer

Nr.	Name	Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag
		[h/a]	[d/a]	[h/d]
IO 01	IO 01 Hohe Weide 6 (Riepsdorf)	26:57	182	0:21
IO 02	IO 02 Am Teich 4 (Riepsdorf)	64:05	257	0:30
IO 03	IO 03 Hauptstraße 4 (Riepsdorf)	66:09	239	0:32
IO 04	IO 04 Bäderstraße 2 (Gosdorf)	28:47	178	0:24
IO 05	IO 05 Bäderstraße 8 (Gosdorf)	32:51	211	0:20
IO 06	IO 06 Bäderstraße 17 (Gosdorf)	32:09	209	0:18
IO 07	IO 07 Bäderstraße 25 (Gosdorf)	10:27	88	0:15
IO 08	IO 08 Bäderstraße 34 (Gosdorf)	8:08	76	0:13
IO 09	IO 09 Bäderstraße 35 (Gosdorf)	5:31	62	0:11
IO 10	IO 10 Poggenpohler Weg 2 (Gosdorf)	16:25	134	0:15
IO 11	IO 11 Poggenpohler Weg 8 (Gosdorf)	20:25	153	0:16
IO 12	IO 12 Poggenpohler Weg 14 (Gosdorf)	17:32	138	0:16
IO 13	IO 13 Poggenpohler Weg 20 (Gosdorf)	15:38	129	0:17
IO 14	IO 14 Poggenpohler Weg 28 (Gosdorf)	23:49	146	0:21
IO 15	IO 15 Poggenpohler Weg 30 (Gosdorf)	25:27	119	0:27
IO 16	IO 16 Achterhof (Gosdorf)	27:29	175	0:20
IO 17	IO 17 Bäderstraße 24a (Gosdorf)	20:07	164	0:18
IO 18	IO 18 Ratjensdorfer Felde 1	0:02	2	0:01
IO 19	IO 19 Ratjensdorfer Felde 3	0:19	8	0:03
IO 20	IO 20 Ratjensdorfer Felde 2	1:56	31	0:08
IO 21	IO 21 Morest, Grömitz	16:44	74	0:23
IO 22	IO 22 Poggenpohl 4 (Cismarfelde)	0:04	4	0:01
IO 23	IO 23 Poggenpohl 1 (Cismarfelde)	0:03	3	0:01
IO 24	IO 24 Wintersberg	1:35	27	0:08
IO 28	IO 28 Cismarfelde 15	46:49	161	0:34
IO 31	IO 31 Rütting Söhlen 2	18:23	74	0:32
IO 32	IO 32 Rütting Söhlen 5	94:16	239	0:45
IO 33	IO 33 Rütting Söhlen 7	66:42	196	0:33
IO 34	IO 34 Rütting Söhlen 11	24:33	87	0:26
IO 35	IO 35 Rütting Chaussee 1	51:34	221	0:27
IO 36	IO 36 Kathenkamp 1 (Rüttinger Hof)	37:26	161	0:25
IO 37	IO 37 Rüttinger Klosterkamp 5	45:42	209	0:24
IO 38	IO 38 Rüttinger Klosterkamp 9	40:37	165	0:26
IO 39	IO 39 Rüttinger Kornhof 1 (Rütting)	33:36	170	0:27
IO 40	IO 40 Rüttinger Kornhof 10 (Rütting)	18:29	106	0:20
IO 41	IO 41 Kathenkamp 11 (Rütting)	21:49	118	0:22
IO 42	IO 42 Kathenkamp 19 (Rütting)	54:58	188	0:31
IO 43	IO 43 Kathenkamp 2 (Rütting)	20:25	110	0:21
IO 44	IO 44 Kälberhof 5 (Rütting)	46:29	179	0:30
IO 45	IO 45 Bäderstraße 20-22 (Kabelhorst)	16:39	121	0:20
IO 46	IO 46 Bäderstraße 15 (Kabelhorst)	18:51	127	0:19
IO 47	IO 47 Bäderstraße 18 (Kabelhorst)	21:52	125	0:22
IO 48	IO 48 Bäderstraße 13 (Kabelhorst)	11:10	110	0:16
IO 49	IO 49 Bäderstraße 10 (Kabelhorst)	16:24	101	0:19
IO 50	IO 50 Schmiedeberg 26 (Kabelhorst)	16:47	115	0:15
IO 51	IO 51 Grünbeck 2	54:15	228	0:26
IO 52	IO 52 Grünbeck 16	55:16	196	0:41

Projekt:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:

22.06.2022 16:34/3.5.584

## SHADOW - Hauptergebnis

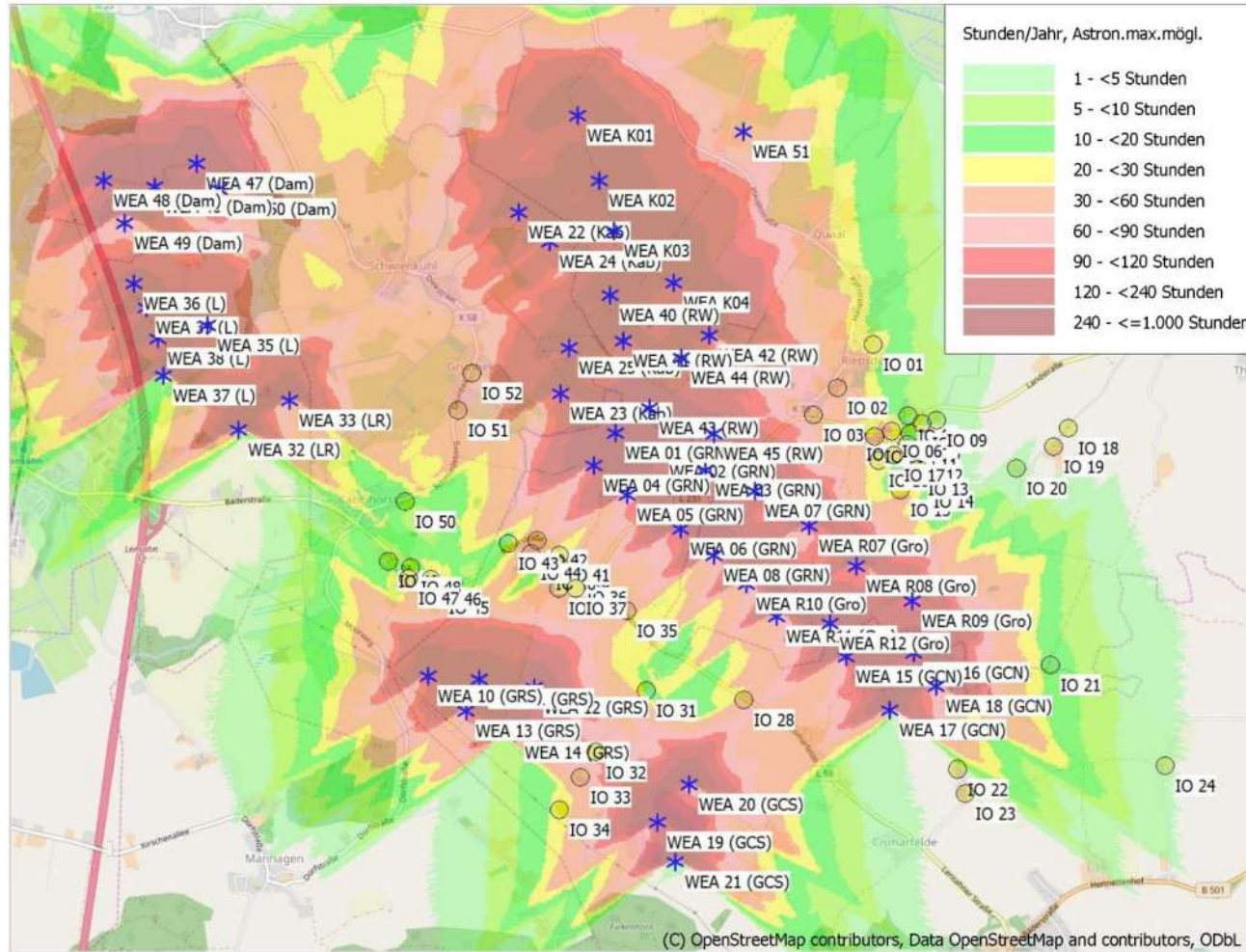
**Berechnung:** Vorbelastung Bestandssituation vor dem Rückbau WP Großenholz

Gesamtdauer Beschattung an Rezeptoren pro WEA

Nr.	Name	Maximal [h/a]
WEA 01 (GRN)	WEA 01 Jacobs MD70	13:58
WEA 02 (GRN)	WEA 02 Jacobs MD70	32:33
WEA 03 (GRN)	WEA 03 Jacobs MD70	50:13
WEA 04 (GRN)	WEA 04 Jacobs MD70	24:59
WEA 05 (GRN)	WEA 05 Jacobs MD70	68:30
WEA 06 (GRN)	WEA 06 Enercon E-66 18.70	67:31
WEA 07 (GRN)	WEA 07 Enercon E-66 18.70	79:53
WEA 08 (GRN)	WEA 08 Enercon E-66 18.70	54:49
WEA 10 (GRS)	WEA 10 Jacobs MD70	33:11
WEA 11 (GRS)	WEA 11 Jacobs MD70	84:48
WEA 12 (GRS)	WEA 12 Jacobs MD70	37:41
WEA 13 (GRS)	WEA 13 Jacobs MD70	36:25
WEA 14 (GRS)	WEA 14 Jacobs MD70	55:11
WEA 15 (GCN)	WEA 15 Jacobs MD70	20:59
WEA 16 (GCN)	WEA 16 Jacobs MD70	8:26
WEA 17 (GCN)	WEA 17 Jacobs MD70	7:22
WEA 18 (GCN)	WEA 18 Jacobs MD70	10:03
WEA 19 (GCS)	WEA 19 Jacobs MD70	63:40
WEA 20 (GCS)	WEA 20 Jacobs MD70	46:36
WEA 21 (GCS)	WEA 21 Jacobs MD70	26:01
WEA 22 (Kab)	WEA 22 NEG Micon NM 1500 C	0:00
WEA 23 (Kab)	WEA 23 NEG Micon NM 1500 C	29:07
WEA 24 (Kab)	WEA 24 NEG Micon NM 1500 C	0:00
WEA 25 (Kab)	WEA 25 NEG Micon NM 1500 C	28:02
WEA 32 (LR)	WEA 32 Enercon E-66/18.70	4:44
WEA 33 (LR)	WEA 33 Jacobs MD70	4:22
WEA 35 (L)	WEA 35 Enercon E-66/15.66	0:00
WEA 36 (L)	WEA 36 Enercon E-40/5.40	0:00
WEA 37 (L)	WEA 37 Enercon E-70 E4	0:00
WEA 38 (L)	WEA 38 Enercon E-70 E4	0:00
WEA 39 (L)	WEA 39 Enercon E-70 E4	0:00
WEA 40 (RW)	WEA 40 Jacobs MD70	12:51
WEA 41 (RW)	WEA 41 Jacobs MD70	13:50
WEA 42 (RW)	WEA 42 Jacobs MD70	31:35
WEA 43 (RW)	WEA 43 Jacobs MD70	14:30
WEA 44 (RW)	WEA 44 Vestas V47	0:00
WEA 45 (RW)	WEA 45 Vestas V47	7:54
WEA 46 (Dam)	WEA 46 Südwind S70	0:00
WEA 47 (Dam)	WEA 47 Südwind S70	0:00
WEA 48 (Dam)	WEA 48 Südwind S70	0:00
WEA 49 (Dam)	WEA 49 Enercon E-82	0:00
WEA 50 (Dam)	WEA 50 Enercon E-82	0:00
WEA 51	WEA 51 Easywind 6	0:00
WEA K01	WEA K01 Enercon E-115 EP3 E3/2,9 MW (TES)	0:00
WEA K02	WEA K02 Enercon E-115 EP3 E3/2,9 MW (TES)	2:17
WEA K03	WEA K03 Enercon E-115 EP3 E3/2,9 MW (TES)	11:21
WEA K04	WEA K04 Enercon E-115 EP3 E3/2,9 MW (TES)	50:12
WEA R07 (Gro)	WEA R07 Vestas V47	53:59
WEA R08 (Gro)	WEA R08 Vestas V47	28:03
WEA R09 (Gro)	WEA R09 Vestas V47	0:00
WEA R10 (Gro)	WEA R10 Vestas V47	3:37
WEA R11 (Gro)	WEA R11 Vestas V47	0:00
WEA R12 (Gro)	WEA R12 Vestas V47	0:00

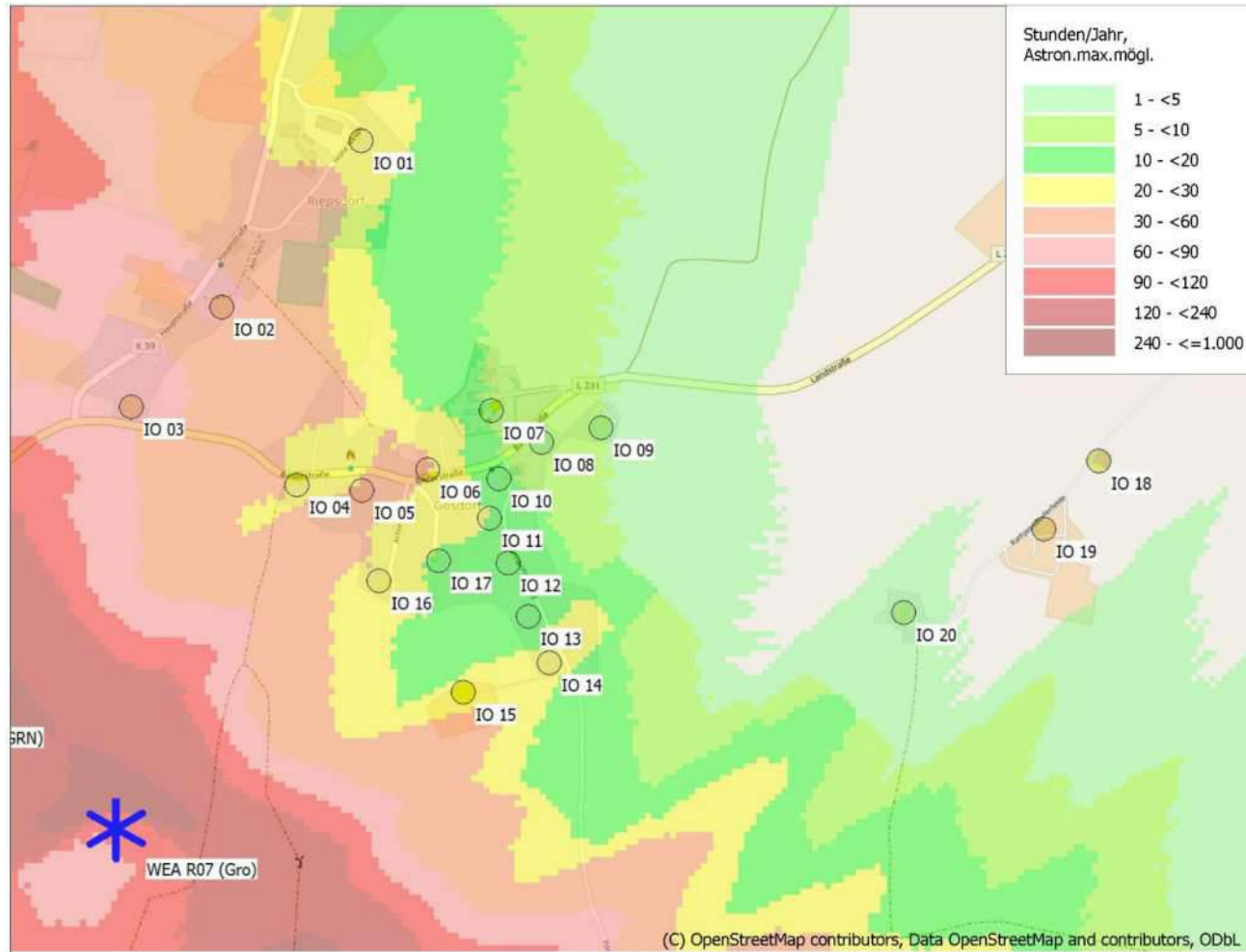
Summen in Rezeptortabelle und WEA-Tabelle können sich unterscheiden, da eine WEA gleichzeitig an zwei oder mehr Rezeptoren Beschattung verursachen kann und/oder ein Rezeptor gleichzeitig von zwei oder mehr WEA beschattet werden kann.

## 11.2 Schattenwurfkarte Vorbelastung Bestandssituation (vor Rückbau), Stunden pro Jahr



0 500 1000 1500 2000 m  
 Karte: EMD OpenStreetMap, Maßstab 1:38.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 626.999 Nord: 6.009.387  
 \* Existierende WEA    ● Schattenrezeptor  
 Höhe der Schattenkarte: Höhenlinien: oro\_2019-07-25.map (1)

### 11.3 Schattenwurfkarte Vorbelastung Bestandssituation (vor Rückbau) Detail Gosdorf, Stunden pro Jahr



0 100 200 300 400 m

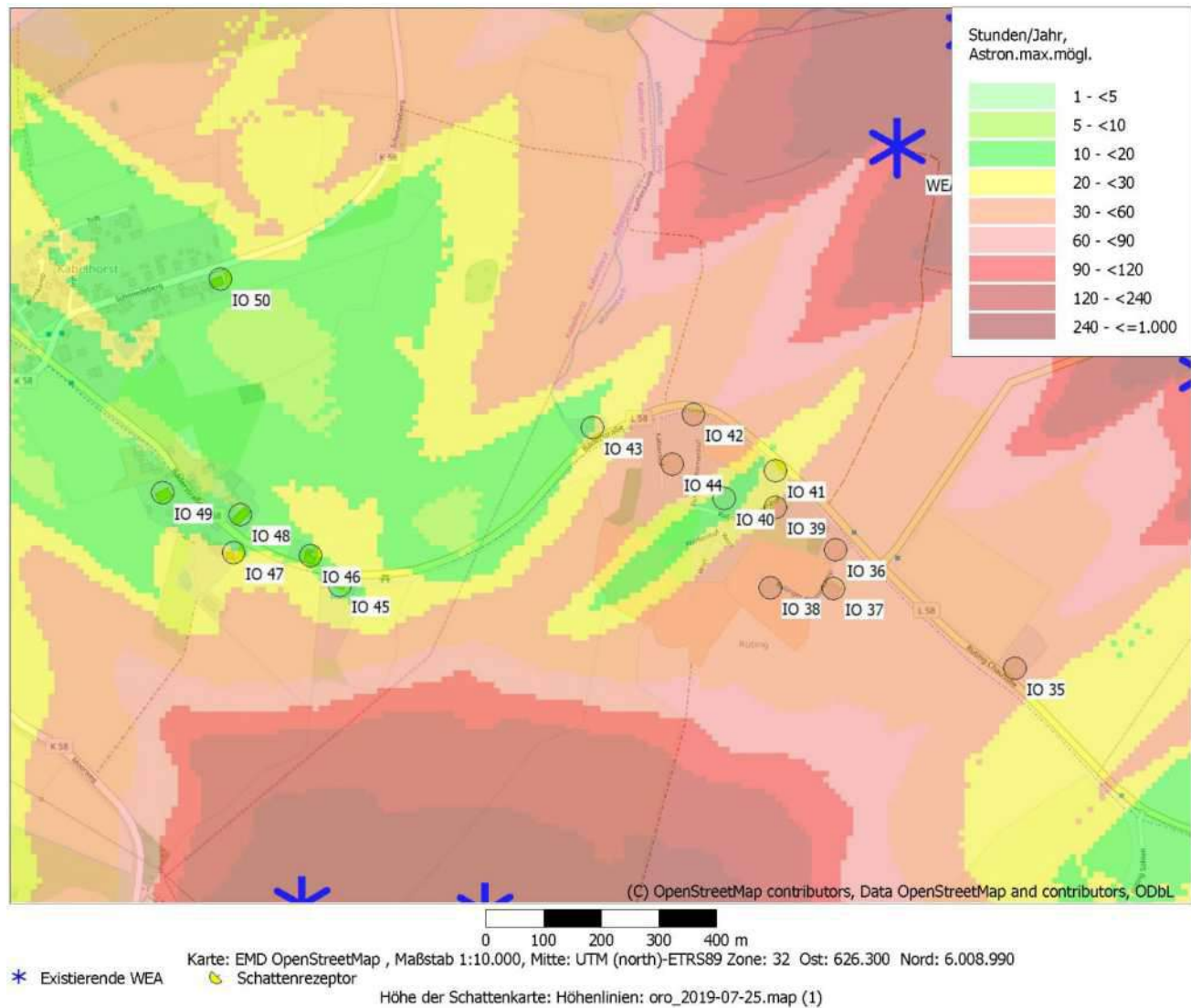
Karte: EMD OpenStreetMap , Maßstab 1:10.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 629.000 Nord: 6.009.800

\* Existierende WEA    ● Schattenrezeptor

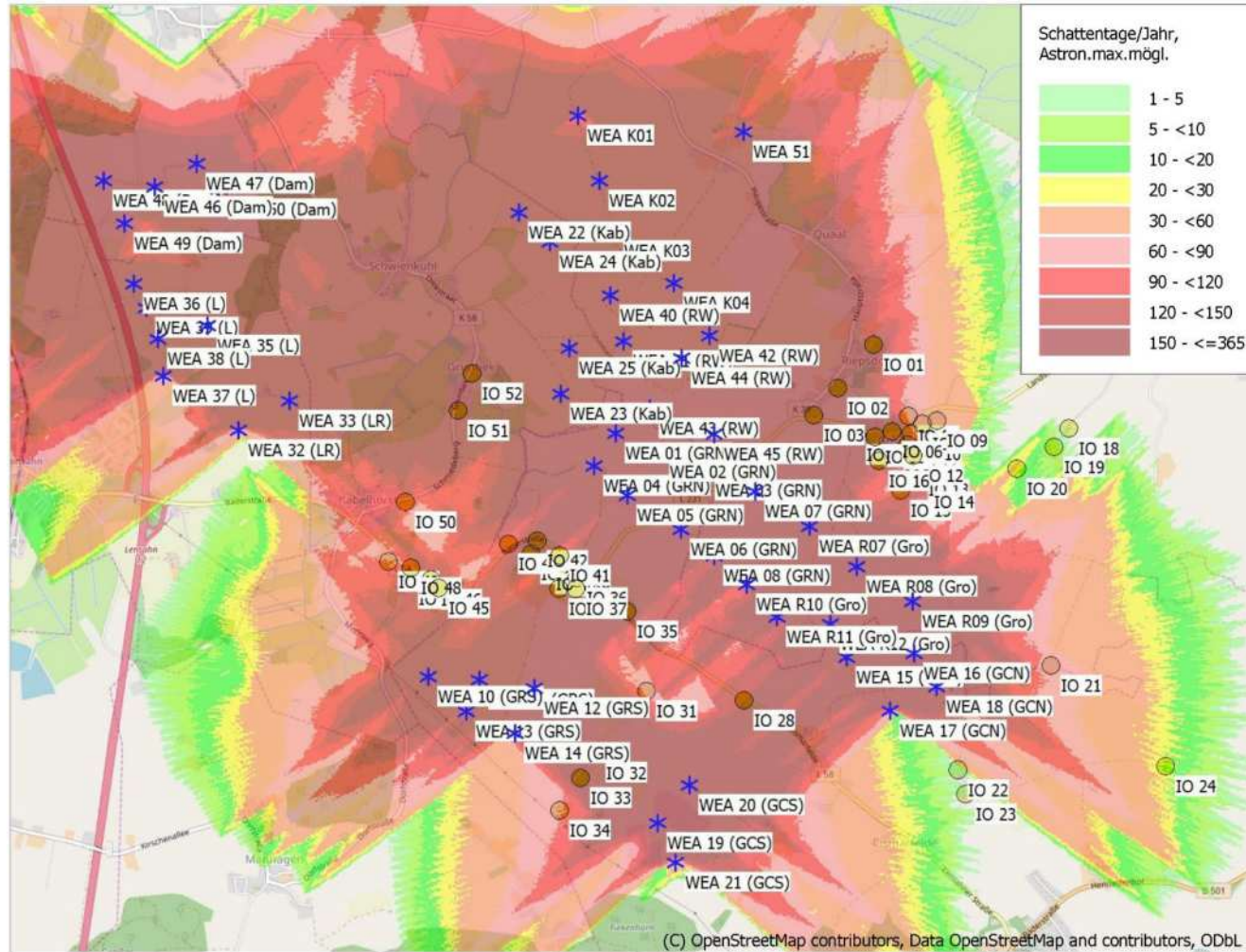
Höhe der Schattenkarte: Höhenlinien: oro\_2019-07-25.map (1)



## 11.4 Schattenwurfkarte Vorbelastung Bestandssituation (vor Rückbau) Detail Rütting, Stunden pro Jahr



## 11.5 Schattenwurfkarte Vorbelastung Bestandssituation (vor Rückbau), Tage pro Jahr



0 500 1000 1500 2000 m

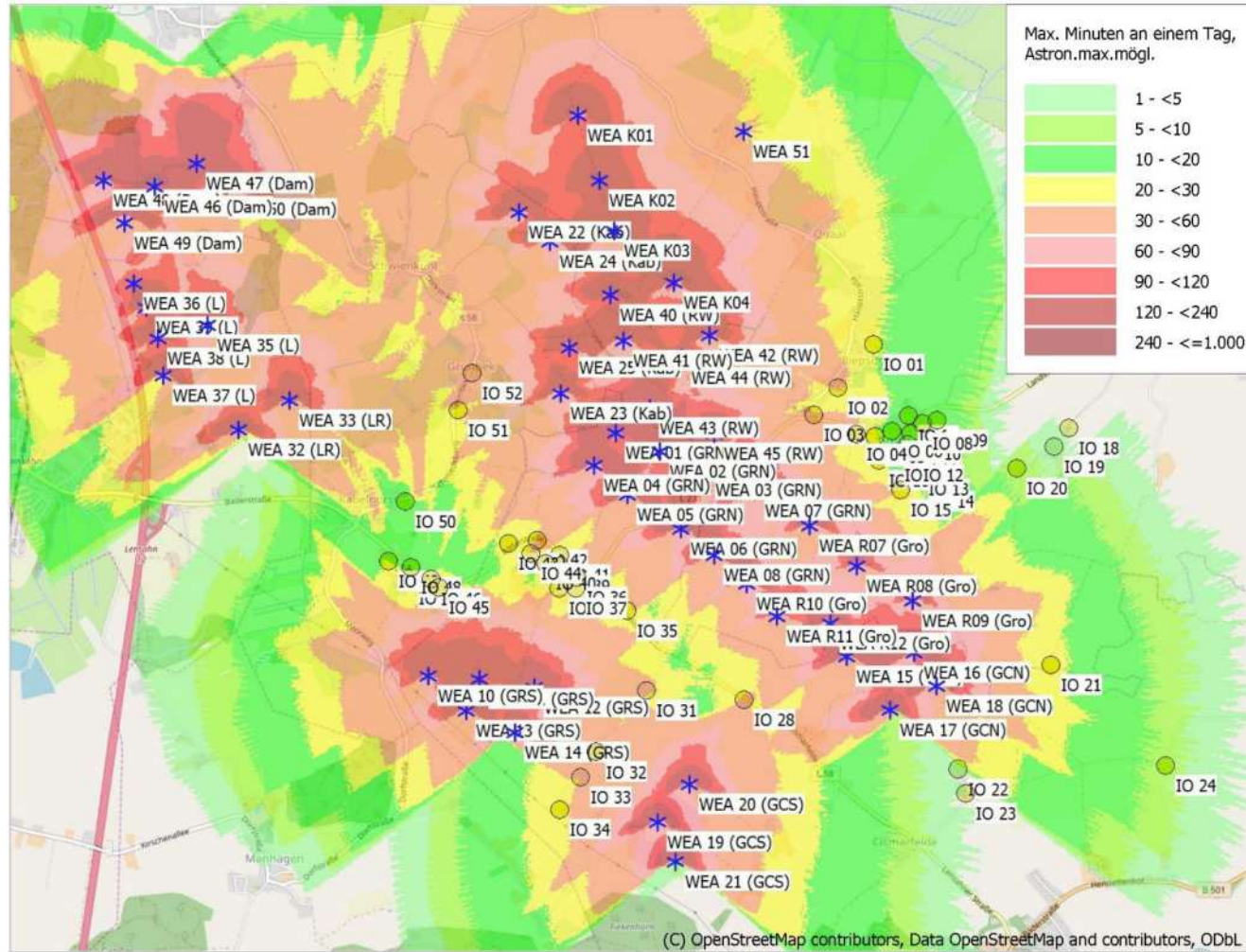
Karte: EMD OpenStreetMap, Maßstab 1:38.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 626.999 Nord: 6.009.387

\* Existierende WEA

● Schattenrezeptor

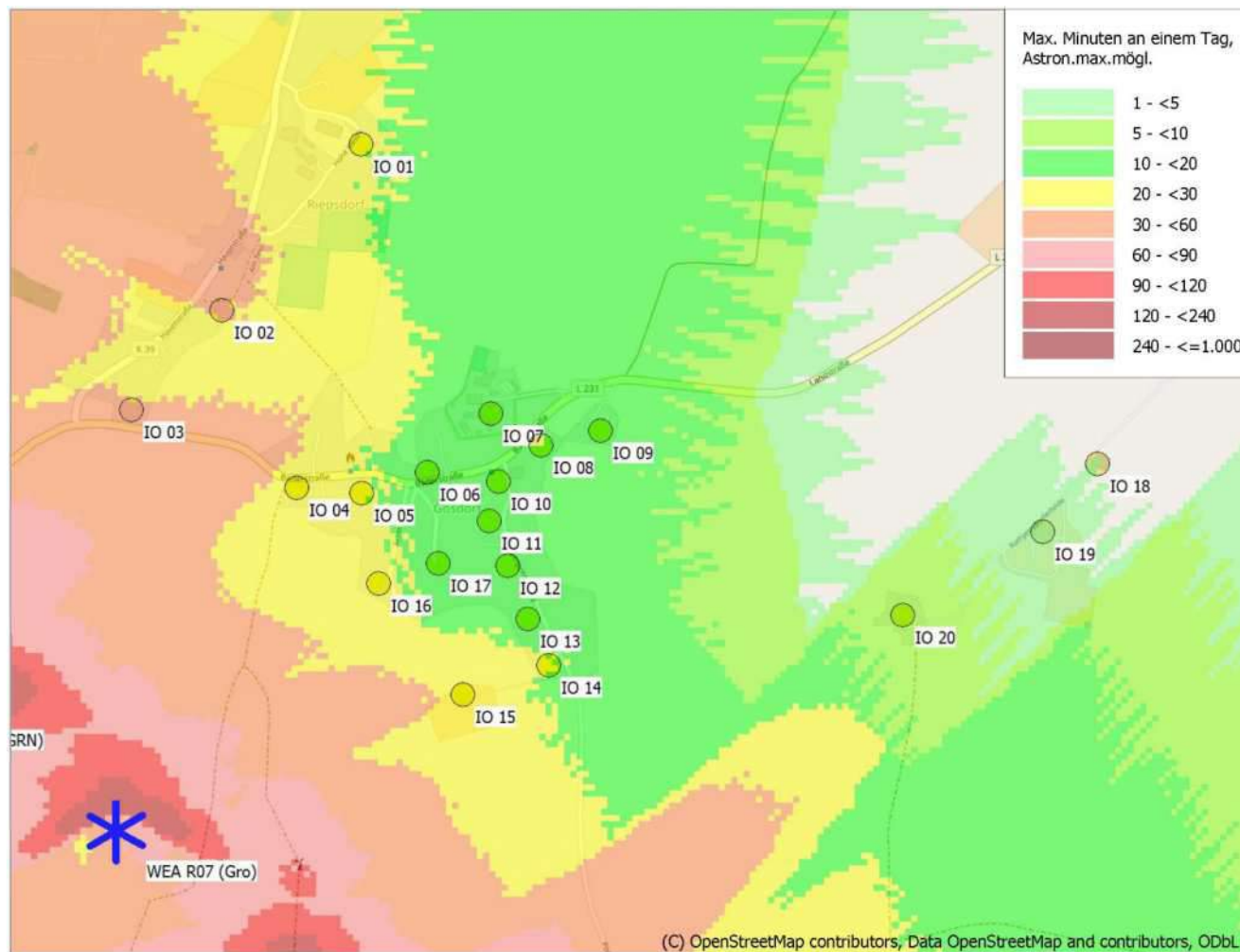
Höhe der Schattenkarte: Höhenlinien: oro\_2019-07-25.map (1)

## 11.6 Schattenwurfkarte Vorbelastung Bestandssituation (vor Rückbau), Minuten pro Tag



0 500 1000 1500 2000 m  
 Karte: EMD OpenStreetMap , Maßstab 1:38.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 626.999 Nord: 6.009.387  
 \* Existierende WEA    ● Schattenrezeptor  
 Höhe der Schattenkarte: Höhenlinien: oro\_2019-07-25.map (1)

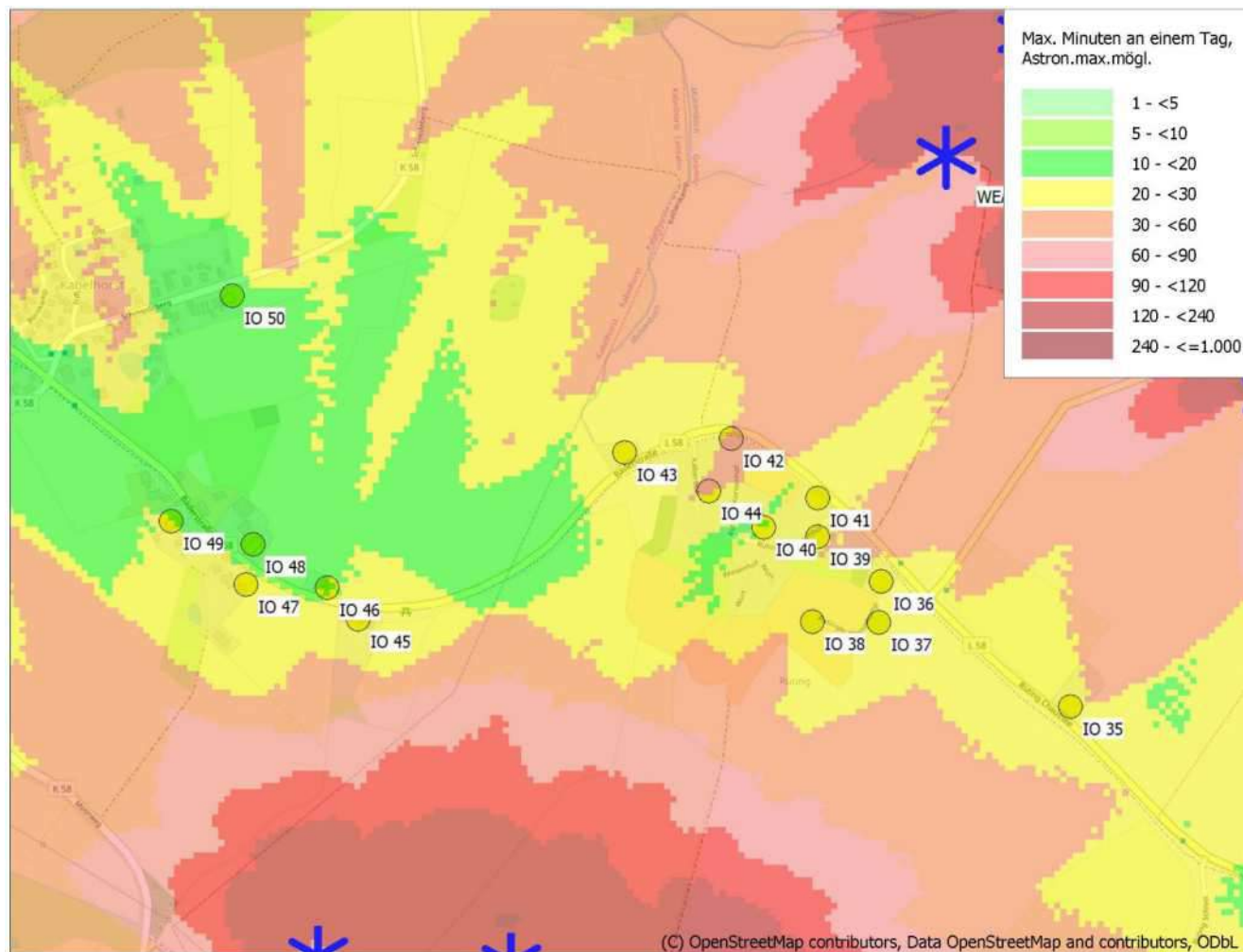
### 11.7 Schattenwurfkarte Vorbelastung Bestandssituation (vor Rückbau) Detail Gosdorf, Minuten pro Tag



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

0 100 200 300 400 m  
 Karte: EMD OpenStreetMap , Maßstab 1:10.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 629.000 Nord: 6.009.800  
 \* Existierende WEA    Schattenrezeptor  
 Höhe der Schattenkarte: Höhenlinien: oro\_2019-07-25.map (1)

## 11.8 Schattenwurfkarte Vorbelastung Bestandssituation (vor Rückbau) Detail Rütting, Minuten pro Tag



0 100 200 300 400 m

Karte: EMD OpenStreetMap , Maßstab 1:10.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 626.300 Nord: 6.008.990

\* Existierende WEA    ● Schattenrezeptor

Höhe der Schattenkarte: Höhenlinien: oro\_2019-07-25.map (1)

## 11.9 Hauptergebnis verbleibende Vorbelastung nach Rückbau

Projekt:  
SWP Windpark Großenholz

Lizenzierter Anwender:  
GL Garrad Hassan Deutschland GmbH  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0

DNV

Berechnet:  
22.06.2022 18:22/3.5.584

### SHADOW - Hauptergebnis

**Berechnung:** Vorbelastung verbleibender Bestand nach Rückbau Großenholz  
**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: Höhenlinien: oro\_2019-07-25.map (1)  
Hindernisse in Berechnung nicht verwendet  
Rasterauflösung: 10,0 m

Alle Koordinatenangaben in:  
UTM (north)-ETRS89 Zone: 32

### WEA

	Ost	Nord	Z	Beschreibung	WEA-Typ			Schattendaten				
					Ak- tu- ell	Hersteller	Typ	Nenn- leistung	Rotor- durch- messer	Naben- höhe	Beschatt.- Bereich	U/min
			[m]				[kW]	[m]	[m]	[m]	[U/min]	
WEA 01 (GRN)	626.955	6.009.774	20,8	WEA 01 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 02 (GRN)	627.240	6.009.666	25,0	WEA 02 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 03 (GRN)	627.525	6.009.556	25,0	WEA 03 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 04 (GRN)	626.826	6.009.569	20,0	WEA 04 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 05 (GRN)	627.037	6.009.390	23,9	WEA 05 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 06 (GRN)	627.377	6.009.189	25,0	WEA 06 Ener...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
WEA 07 (GRN)	627.835	6.009.437	25,0	WEA 07 Ener...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
WEA 08 (GRN)	627.591	6.009.028	20,6	WEA 08 Ener...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
WEA 10 (GRS)	625.825	6.008.222	16,4	WEA 10 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 11 (GRS)	626.145	6.008.219	21,9	WEA 11 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 12 (GRS)	626.491	6.008.169	25,0	WEA 12 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 13 (GRS)	626.067	6.008.014	16,5	WEA 13 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 14 (GRS)	626.378	6.007.889	16,8	WEA 14 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 15 (GCN)	628.439	6.008.420	25,0	WEA 15 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 16 (GCN)	628.861	6.008.454	20,7	WEA 16 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 17 (GCN)	628.721	6.008.093	21,8	WEA 17 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 18 (GCN)	629.006	6.008.251	20,0	WEA 18 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 19 (GCS)	627.286	6.007.351	20,0	WEA 19 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 20 (GCS)	627.481	6.007.592	20,0	WEA 20 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 21 (GCS)	627.404	6.007.112	17,5	WEA 21 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 22 (Kab)	626.313	6.011.135	16,1	WEA 22 NEG...	Nein	NEG MICON	NM1500/64-1.500/750	1.500	64,0	68,0	3.000	17,1
WEA 23 (Kab)	626.606	6.010.014	18,8	WEA 23 NEG...	Nein	NEG MICON	NM1500/64-1.500/750	1.500	64,0	68,0	3.000	17,1
WEA 24 (Kab)	626.513	6.010.960	17,0	WEA 24 NEG...	Nein	NEG MICON	NM1500/64-1.500/750	1.500	64,0	68,0	3.000	17,1
WEA 25 (Kab)	626.649	6.010.300	18,9	WEA 25 NEG...	Nein	NEG MICON	NM1500/64-1.500/750	1.500	64,0	68,0	3.000	17,1
WEA 32 (LR)	624.599	6.009.726	25,0	WEA 32 Ener...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
WEA 33 (LR)	624.912	6.009.921	15,0	WEA 33 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 35 (L)	624.386	6.010.378	20,0	WEA 35 Ener...	Nein	ENERCON	E-66/15.66-1.500	1.500	66,0	85,0	1.462	22,0
WEA 36 (L)	623.918	6.010.628	15,0	WEA 36 Ener...	Nein	ENERCON	E-40/5.40-500	500	40,3	65,0	897	38,0
WEA 37 (L)	624.118	6.010.054	24,0	WEA 37 Ener...	Ja	ENERCON	E-70 E4 2,3 MW-2.300	2.300	71,0	64,0	1.644	20,0
WEA 38 (L)	624.081	6.010.287	20,0	WEA 38 Ener...	Ja	ENERCON	E-70 E4 2,3 MW-2.300	2.300	71,0	64,0	1.644	20,0
WEA 39 (L)	624.003	6.010.476	24,7	WEA 39 Ener...	Ja	ENERCON	E-70 E4 2,3 MW-2.300	2.300	71,0	64,0	1.644	20,0
WEA 40 (RW)	626.898	6.010.632	20,0	WEA 40 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 41 (RW)	626.988	6.010.354	23,9	WEA 41 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 42 (RW)	627.526	6.010.398	24,2	WEA 42 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 43 (RW)	627.165	6.009.938	25,0	WEA 43 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 44 (RW)	627.353	6.010.254	25,0	WEA 44 Vest...	Nein	VESTAS	V47-660	660	47,0	65,0	880	28,5
WEA 45 (RW)	627.569	6.009.788	25,0	WEA 45 Vest...	Nein	VESTAS	V47-660	660	47,0	65,0	880	28,5
WEA 46 (Dam)	624.033	6.011.232	25,0	WEA 46 Süd...	Nein	SÜDWIND	S70-1.500	1.500	70,0	65,0	1.467	19,0

(Fortsetzung nächste Seite)...

## SHADOW - Hauptergebnis

### Berechnung: Vorbelastung verbleibender Bestand nach Rückbau Großenholz

...(Fortsetzung von vorheriger Seite)

	Ost	Nord	Z	Beschreibung	WEA-Typ			Nennleistung	Rotor-durchmesser	Nabenhöhe	Schattendaten	
					Aktuell	Hersteller	Typ				Beschatt.-Bereich	U/min
			[m]					[kW]	[m]	[m]	[m]	[U/min]
WEA 47 (Dam)	624.290	6.011.385	20,0	WEA 47 Süd...	Nein	SÜDWIND	S70-1.500	1.500	70,0	65,0	1.467	19,0
WEA 48 (Dam)	623.712	6.011.262	15,0	WEA 48 Süd...	Nein	SÜDWIND	S70-1.500	1.500	70,0	65,0	1.467	19,0
WEA 49 (Dam)	623.845	6.011.006	18,8	WEA 49 Ener...	Ja	ENERCON	E-82 E2-2.300	2.300	82,0	108,4	1.601	18,0
WEA 50 (Dam)	624.437	6.011.234	20,0	WEA 50 Ener...	Ja	ENERCON	E-82 E2-2.300	2.300	82,0	108,4	1.601	18,0
WEA 51	627.701	6.011.676	7,8	WEA 51 Easy...	Nein	EasyWind	EasyWind 6-6	6	6,0	19,0	3.000	124,0
WEA K01	626.666	6.011.752	12,9	WEA K01 En...	Ja	ENERCON	E-115 EP3 E3 TES-2.900	2.900	115,7	92,0	2.069	0,0
WEA K02	626.813	6.011.347	20,0	WEA K02 En...	Ja	ENERCON	E-115 EP3 E3 TES-2.900	2.900	115,7	92,0	2.069	0,0
WEA K03	626.913	6.011.037	20,0	WEA K03 En...	Ja	ENERCON	E-115 EP3 E3 TES-2.900	2.900	115,7	92,0	2.069	0,0
WEA K04	627.292	6.010.722	21,5	WEA K04 En...	Ja	ENERCON	E-115 EP3 E3 TES-2.900	2.900	115,7	92,0	2.069	0,0

### 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]
IO 01	IO 01 Hohe Weide 6 (Riepsdorf)	628.558	6.010.372	16,5	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 02	IO 02 Am Teich 4 (Riepsdorf)	628.337	6.010.091	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 03	IO 03 Hauptstraße 4 (Riepsdorf)	628.192	6.009.924	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 04	IO 04 Bäderstraße 2 (Gosdorf)	628.468	6.009.804	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 05	IO 05 Bäderstraße 8 (Gosdorf)	628.577	6.009.796	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 06	IO 06 Bäderstraße 17 (Gosdorf)	628.683	6.009.834	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 07	IO 07 Bäderstraße 25 (Gosdorf)	628.786	6.009.934	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 08	IO 08 Bäderstraße 34 (Gosdorf)	628.870	6.009.884	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 09	IO 09 Bäderstraße 35 (Gosdorf)	628.968	6.009.911	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 10	IO 10 Poggenpohler Weg 2 (Gosdorf)	628.801	6.009.822	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 11	IO 11 Poggenpohler Weg 8 (Gosdorf)	628.788	6.009.756	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 12	IO 12 Poggenpohler Weg 14 (Gosdorf)	628.820	6.009.685	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 13	IO 13 Poggenpohler Weg 20 (Gosdorf)	628.856	6.009.598	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 14	IO 14 Poggenpohler Weg 28 (Gosdorf)	628.894	6.009.522	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 15	IO 15 Poggenpohler Weg 30 (Gosdorf)	628.752	6.009.469	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 16	IO 16 Achterhof (Gosdorf)	628.608	6.009.649	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 17	IO 17 Bäderstraße 24a (Gosdorf)	628.706	6.009.684	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 18	IO 18 Ratjensdorfer Felde 1	629.789	6.009.880	15,1	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 19	IO 19 Ratjensdorfer Felde 3	629.701	6.009.765	15,1	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 20	IO 20 Ratjensdorfer Felde 2	629.474	6.009.621	15,1	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 21	IO 21 Morest, Grömitz	629.723	6.008.400	16,7	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 22	IO 22 Poggenpohl 4 (Cismarfelde)	629.157	6.007.735	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 23	IO 23 Poggenpohl 1 (Cismarfelde)	629.211	6.007.586	19,5	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 24	IO 24 Wintersberg	630.455	6.007.797	8,2	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 28	IO 28 Cismarfelde 15	627.807	6.008.129	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 31	IO 31 Rütting Söhlen 2	627.197	6.008.174	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 32	IO 32 Rütting Söhlen 5	626.892	6.007.779	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 33	IO 33 Rütting Söhlen 7	626.798	6.007.622	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 34	IO 34 Rütting Söhlen 11	626.671	6.007.415	15,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 35	IO 35 Rütting Chaussee 1	627.056	6.008.668	25,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 36	IO 36 Kathenkamp 1 (Rüttinger Hof)	626.737	6.008.865	24,6	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 37	IO 37 Rüttinger Klosterkamp 5	626.737	6.008.797	23,6	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 38	IO 38 Rüttinger Klosterkamp 9	626.626	6.008.796	23,6	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 39	IO 39 Rüttinger Kornhof 1 (Rütting)	626.632	6.008.936	23,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 40	IO 40 Rüttinger Kornhof 10 (Rütting)	626.542	6.008.948	21,9	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 41	IO 41 Kathenkamp 11 (Rütting)	626.629	6.008.999	22,7	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 42	IO 42 Kathenkamp 19 (Rütting)	626.484	6.009.093	20,4	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 43	IO 43 Kathenkamp 2 (Rütting)	626.309	6.009.066	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 44	IO 44 Kälberhof 5 (Rütting)	626.450	6.009.007	20,4	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 45	IO 45 Bäderstraße 20-22 (Kabelhorst)	625.876	6.008.779	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 46	IO 46 Bäderstraße 15 (Kabelhorst)	625.824	6.008.830	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 47	IO 47 Bäderstraße 18 (Kabelhorst)	625.689	6.008.831	22,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 48	IO 48 Bäderstraße 13 (Kabelhorst)	625.700	6.008.897	22,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 49	IO 49 Bäderstraße 10 (Kabelhorst)	625.563	6.008.931	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 50	IO 50 Schmiedeberg 26 (Kabelhorst)	625.655	6.009.307	16,9	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 51	IO 51 Grünbeck 2	625.972	6.009.891	14,9	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 52	IO 52 Grünbeck 16	626.050	6.010.124	15,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0

Projekt:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:

22.06.2022 18:22/3.5.584

## SHADOW - Hauptergebnis

**Berechnung:** Vorbelastung verbleibender Bestand nach Rückbau Großenholz

### Berechnungsergebnisse

Schattenrezeptor

Nr.	Name	astron. max. mögl. Beschattungsdauer		
		Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag
		[h/a]	[d/a]	[h/d]
IO 01	IO 01 Hohe Weide 6 (Riepsdorf)	26:57	182	0:21
IO 02	IO 02 Am Teich 4 (Riepsdorf)	64:05	257	0:30
IO 03	IO 03 Hauptstraße 4 (Riepsdorf)	66:09	239	0:32
IO 04	IO 04 Bäderstraße 2 (Gosdorf)	28:47	178	0:24
IO 05	IO 05 Bäderstraße 8 (Gosdorf)	21:03	165	0:20
IO 06	IO 06 Bäderstraße 17 (Gosdorf)	21:07	151	0:18
IO 07	IO 07 Bäderstraße 25 (Gosdorf)	10:27	88	0:15
IO 08	IO 08 Bäderstraße 34 (Gosdorf)	8:08	76	0:13
IO 09	IO 09 Bäderstraße 35 (Gosdorf)	5:31	62	0:11
IO 10	IO 10 Poggenpohler Weg 2 (Gosdorf)	11:58	106	0:15
IO 11	IO 11 Poggenpohler Weg 8 (Gosdorf)	15:47	127	0:16
IO 12	IO 12 Poggenpohler Weg 14 (Gosdorf)	13:22	115	0:16
IO 13	IO 13 Poggenpohler Weg 20 (Gosdorf)	8:52	97	0:15
IO 14	IO 14 Poggenpohler Weg 28 (Gosdorf)	6:02	80	0:14
IO 15	IO 15 Poggenpohler Weg 30 (Gosdorf)	8:48	68	0:18
IO 16	IO 16 Achterhof (Gosdorf)	18:36	140	0:20
IO 17	IO 17 Bäderstraße 24a (Gosdorf)	13:58	134	0:18
IO 18	IO 18 Ratjensdorfer Felde 1	0:02	2	0:01
IO 19	IO 19 Ratjensdorfer Felde 3	0:19	8	0:03
IO 20	IO 20 Ratjensdorfer Felde 2	1:56	31	0:08
IO 21	IO 21 Morest, Grömitz	16:44	74	0:23
IO 22	IO 22 Poggenpohl 4 (Cismarfelde)	0:04	4	0:01
IO 23	IO 23 Poggenpohl 1 (Cismarfelde)	0:03	3	0:01
IO 24	IO 24 Wintersberg	1:35	27	0:08
IO 28	IO 28 Cismarfelde 15	46:49	161	0:34
IO 31	IO 31 Rütting Söhlen 2	18:23	74	0:32
IO 32	IO 32 Rütting Söhlen 5	94:16	239	0:45
IO 33	IO 33 Rütting Söhlen 7	66:42	196	0:33
IO 34	IO 34 Rütting Söhlen 11	24:33	87	0:26
IO 35	IO 35 Rütting Chaussee 1	47:57	201	0:27
IO 36	IO 36 Kathenkamp 1 (Rüttinger Hof)	37:26	161	0:25
IO 37	IO 37 Rüttinger Klosterkamp 5	45:42	209	0:24
IO 38	IO 38 Rüttinger Klosterkamp 9	40:37	165	0:26
IO 39	IO 39 Rüttinger Kornenhof 1 (Rütting)	33:36	170	0:27
IO 40	IO 40 Rüttinger Kornenhof 10 (Rütting)	18:29	106	0:20
IO 41	IO 41 Kathenkamp 11 (Rütting)	21:49	118	0:22
IO 42	IO 42 Kathenkamp 19 (Rütting)	54:58	188	0:31
IO 43	IO 43 Kathenkamp 2 (Rütting)	20:25	110	0:21
IO 44	IO 44 Kälberhof 5 (Rütting)	46:29	179	0:30
IO 45	IO 45 Bäderstraße 20-22 (Kabelhorst)	16:39	121	0:20
IO 46	IO 46 Bäderstraße 15 (Kabelhorst)	18:51	127	0:19
IO 47	IO 47 Bäderstraße 18 (Kabelhorst)	21:52	125	0:22
IO 48	IO 48 Bäderstraße 13 (Kabelhorst)	11:10	110	0:16
IO 49	IO 49 Bäderstraße 10 (Kabelhorst)	16:24	101	0:19
IO 50	IO 50 Schmiedeberg 26 (Kabelhorst)	16:47	115	0:15
IO 51	IO 51 Grünbeck 2	54:15	228	0:26
IO 52	IO 52 Grünbeck 16	55:16	196	0:41

Gesamtdauer Beschattung an Rezeptoren pro WEA

Nr.	Name	Maximal
		[h/a]
WEA 01 (GRN)	WEA 01 Jacobs MD70	13:58
WEA 02 (GRN)	WEA 02 Jacobs MD70	32:33
WEA 03 (GRN)	WEA 03 Jacobs MD70	50:13
WEA 04 (GRN)	WEA 04 Jacobs MD70	24:59
WEA 05 (GRN)	WEA 05 Jacobs MD70	68:30
WEA 06 (GRN)	WEA 06 Enercon E-66 18.70	67:31
WEA 07 (GRN)	WEA 07 Enercon E-66 18.70	79:53
WEA 08 (GRN)	WEA 08 Enercon E-66 18.70	54:49
WEA 10 (GRS)	WEA 10 Jacobs MD70	33:11
WEA 11 (GRS)	WEA 11 Jacobs MD70	84:48
WEA 12 (GRS)	WEA 12 Jacobs MD70	37:41

(Fortsetzung nächste Seite)...



## SHADOW - Hauptergebnis

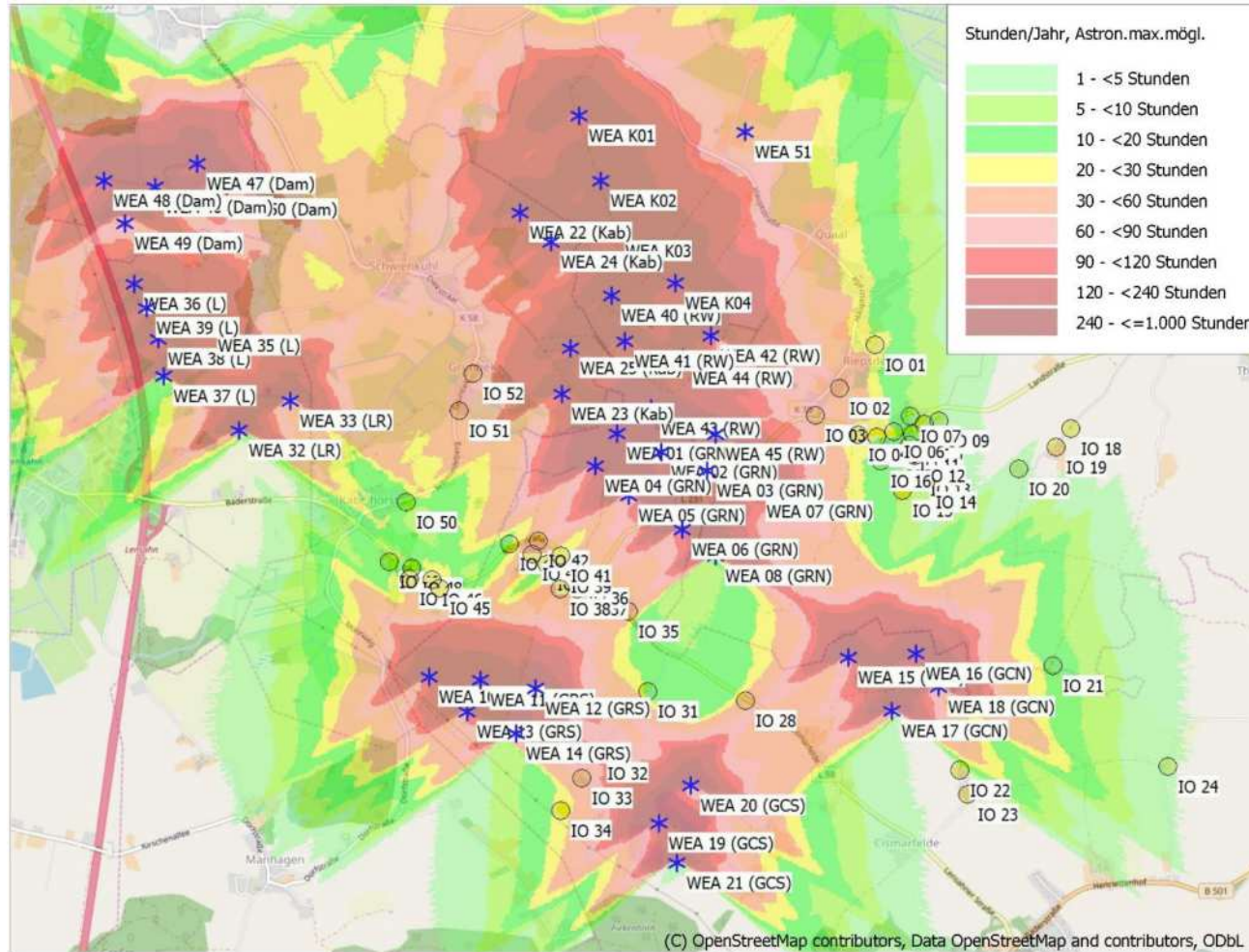
### Berechnung: Vorbelastung verbleibender Bestand nach Rückbau Großenholz

...(Fortsetzung von vorheriger Seite)

Nr.	Name	Maximal [h/a]
WEA 13 (GRS)	WEA 13 Jacobs MD70	36:25
WEA 14 (GRS)	WEA 14 Jacobs MD70	55:11
WEA 15 (GCN)	WEA 15 Jacobs MD70	20:59
WEA 16 (GCN)	WEA 16 Jacobs MD70	8:26
WEA 17 (GCN)	WEA 17 Jacobs MD70	7:22
WEA 18 (GCN)	WEA 18 Jacobs MD70	10:03
WEA 19 (GCS)	WEA 19 Jacobs MD70	63:40
WEA 20 (GCS)	WEA 20 Jacobs MD70	46:36
WEA 21 (GCS)	WEA 21 Jacobs MD70	26:01
WEA 22 (Kab)	WEA 22 NEG Micon NM 1500 C	0:00
WEA 23 (Kab)	WEA 23 NEG Micon NM 1500 C	29:07
WEA 24 (Kab)	WEA 24 NEG Micon NM 1500 C	0:00
WEA 25 (Kab)	WEA 25 NEG Micon NM 1500 C	28:02
WEA 32 (LR)	WEA 32 Enercon E-66/18.70	4:44
WEA 33 (LR)	WEA 33 Jacobs MD70	4:22
WEA 35 (L)	WEA 35 Enercon E-66/15.66	0:00
WEA 36 (L)	WEA 36 Enercon E-40/5.40	0:00
WEA 37 (L)	WEA 37 Enercon E-70 E4	0:00
WEA 38 (L)	WEA 38 Enercon E-70 E4	0:00
WEA 39 (L)	WEA 39 Enercon E-70 E4	0:00
WEA 40 (RW)	WEA 40 Jacobs MD70	12:51
WEA 41 (RW)	WEA 41 Jacobs MD70	13:50
WEA 42 (RW)	WEA 42 Jacobs MD70	31:35
WEA 43 (RW)	WEA 43 Jacobs MD70	14:30
WEA 44 (RW)	WEA 44 Vestas V47	0:00
WEA 45 (RW)	WEA 45 Vestas V47	7:54
WEA 46 (Dam)	WEA 46 Südwind S70	0:00
WEA 47 (Dam)	WEA 47 Südwind S70	0:00
WEA 48 (Dam)	WEA 48 Südwind S70	0:00
WEA 49 (Dam)	WEA 49 Enercon E-82	0:00
WEA 50 (Dam)	WEA 50 Enercon E-82	0:00
WEA 51	WEA 51 Easywind 6	0:00
WEA K01	WEA K01 Enercon E-115 EP3 E3/2.9 MW (TES)	0:00
WEA K02	WEA K02 Enercon E-115 EP3 E3/2.9 MW (TES)	2:17
WEA K03	WEA K03 Enercon E-115 EP3 E3/2.9 MW (TES)	11:21
WEA K04	WEA K04 Enercon E-115 EP3 E3/2.9 MW (TES)	50:12

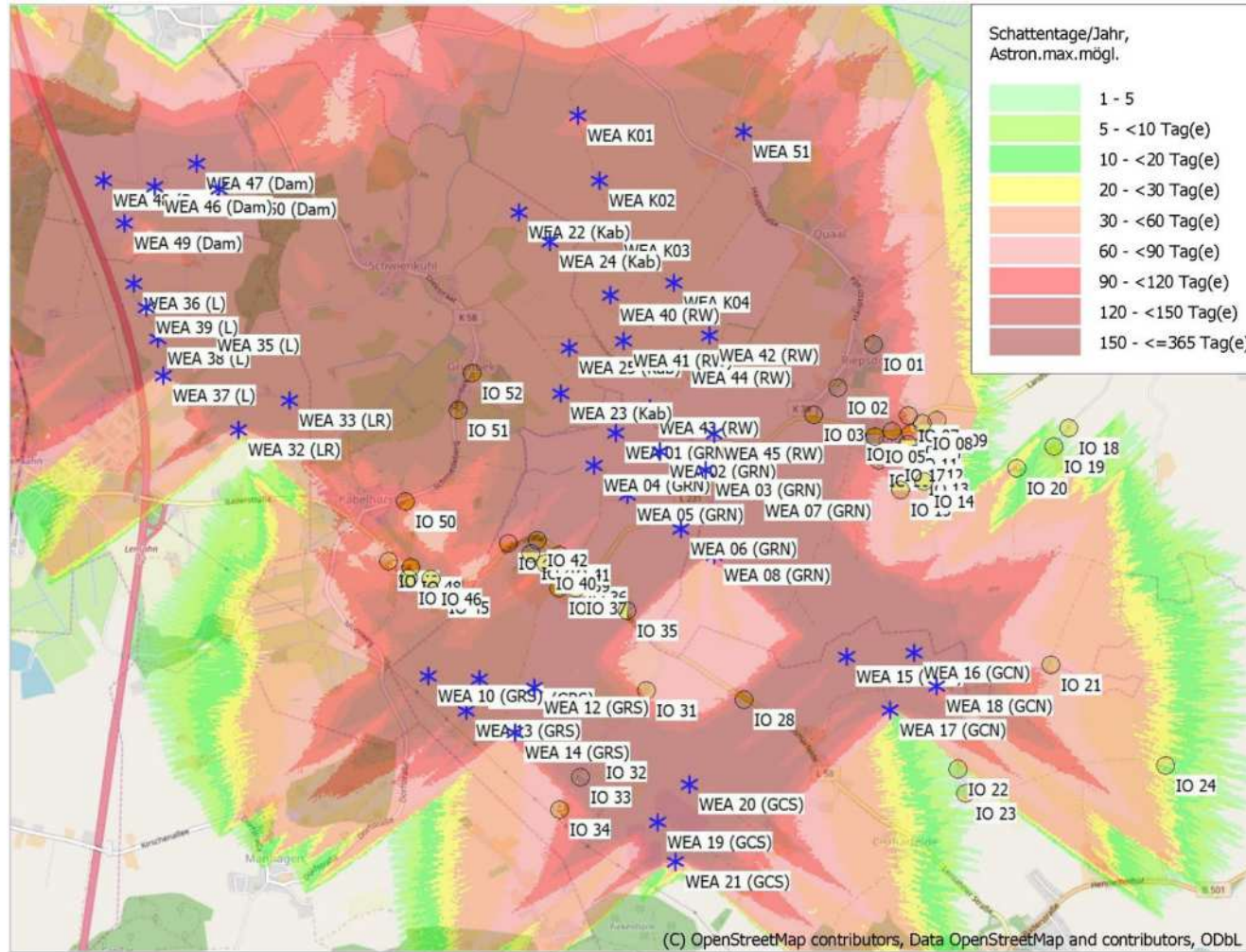
Summen in Rezeptortabelle und WEA-Tabelle können sich unterscheiden, da eine WEA gleichzeitig an zwei oder mehr Rezeptoren Beschattung verursachen kann und/oder ein Rezeptor gleichzeitig von zwei oder mehr WEA beschattet werden kann.

### 11.10 Schattenwurfkarte verbleibende Vorbelastung nach Rückbau, Stunden pro Jahr



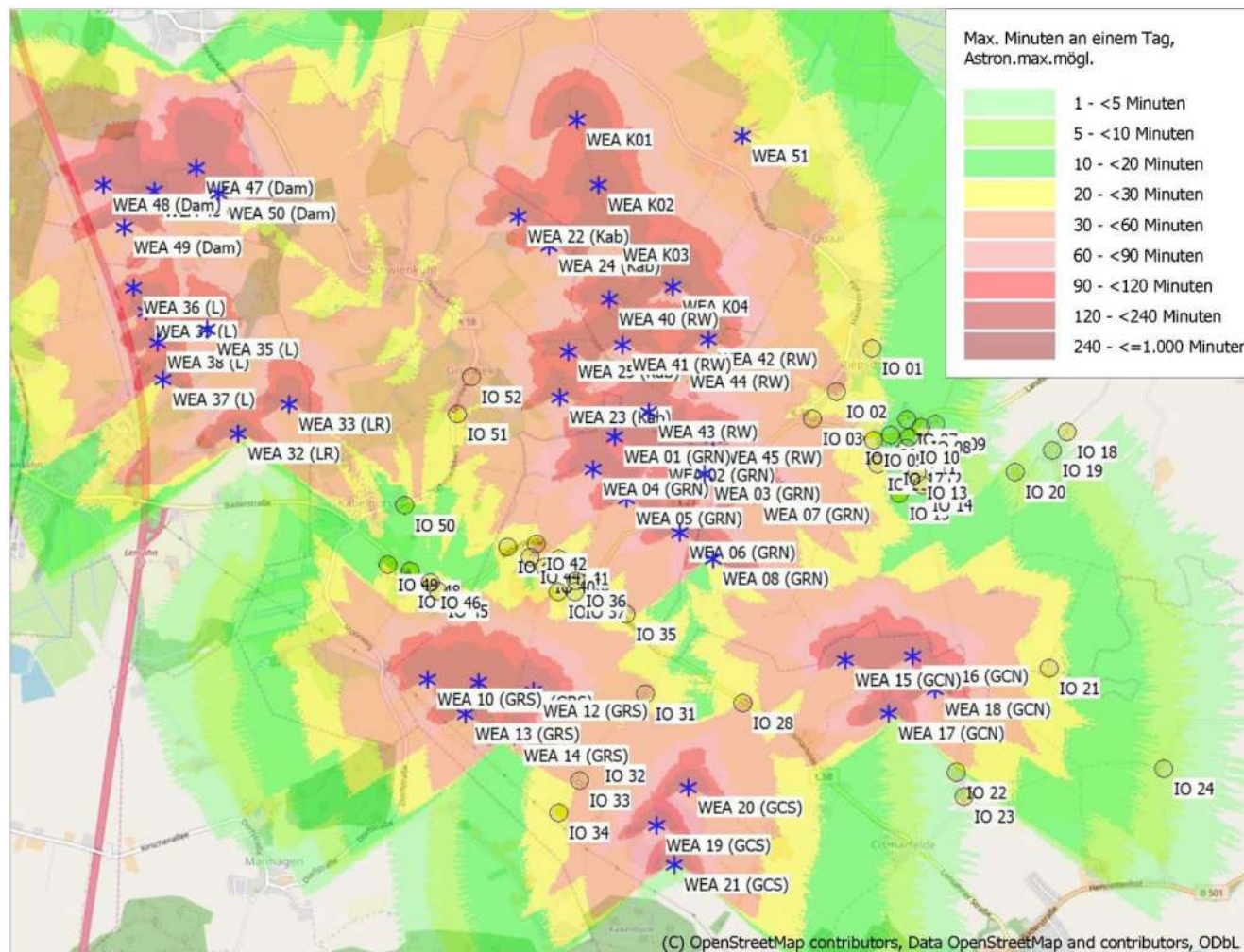
0 500 1000 1500 2000 m  
 Karte: EMD OpenStreetMap, Maßstab 1:38.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 626.999 Nord: 6.009.387  
 \* Existierende WEA    ● Schattenrezeptor  
 Höhe der Schattenkarte: Höhenlinien: oro\_2019-07-25.map (1)

### 11.11 Schattenwurfkarte verbleibende Vorbelastung nach Rückbau, Tage pro Jahr



0 500 1000 1500 2000 m  
 Karte: EMD OpenStreetMap , Maßstab 1:38.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 626.999 Nord: 6.009.387  
 \* Existierende WEA    ● Schattenrezeptor  
 Höhe der Schattenkarte: Höhenlinien: oro\_2019-07-25.map (1)

## 11.12 Schattenwurfkarte verbleibende Vorbelastung nach Rückbau, Minuten pro Tag



0 500 1000 1500 2000 m  
 Karte: EMD OpenStreetMap , Maßstab 1:38.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 626.999 Nord: 6.009.387  
 \* Existierende WEA    ● Schattenrezeptor  
 Höhe der Schattenkarte: Höhenlinien: oro\_2019-07-25.map (1)

## 11.13 Hauptergebnis Zusatzbelastung

Projekt:  
**SWP Windpark Großenholz**

Lizenzierter Anwender:  
**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:  
22.06.2022 18:31/3.5.584

### SHADOW - Hauptergebnis

**Berechnung:** Zusatzbelastung Großenholz (3 x V150-6.0)

#### 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: Höhenlinien: oro\_2019-07-25.map (1)  
Hindernisse in Berechnung nicht verwendet  
Rasterauflösung: 10,0 m

Alle Koordinatenangaben in:  
UTM (north)-ETRS89 Zone: 32

#### WEA

	Ost	Nord	Z	Beschreibung	WEA-Typ			Nennleistung	Rotor-durchmesser	Nabenhöhe	Schattendaten	
					Aktuell	Hersteller	Typ				Beschatt.-Bereich	U/min
			[m]					[kW]	[m]	[m]	[m]	[U/min]
WEA_G1	627.652	6.008.659	20,0	WEA G1 Vestas V150-6.0	Ja	VESTAS	V150-6.0-6.000	6.000	150,0	105,0	1.902	0,0
WEA_G2	628.057	6.008.621	20,0	WEA G2 Vestas V150-6.0	Ja	VESTAS	V150-6.0-6.000	6.000	150,0	105,0	1.902	0,0
WEA_G3	628.449	6.008.722	20,0	WEA G3 Vestas V150-6.0	Ja	VESTAS	V150-6.0-6.000	6.000	150,0	105,0	1.902	0,0

#### 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]
IO 01	IO 01 Hohe Weide 6 (Riepsdorf)	628.558	6.010.372	16,5	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 02	IO 02 Am Teich 4 (Riepsdorf)	628.337	6.010.091	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 03	IO 03 Hauptstraße 4 (Riepsdorf)	628.192	6.009.924	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 04	IO 04 Bäderstraße 2 (Gosdorf)	628.468	6.009.804	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 05	IO 05 Bäderstraße 8 (Gosdorf)	628.577	6.009.796	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 06	IO 06 Bäderstraße 17 (Gosdorf)	628.683	6.009.834	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 07	IO 07 Bäderstraße 25 (Gosdorf)	628.786	6.009.934	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 08	IO 08 Bäderstraße 34 (Gosdorf)	628.870	6.009.884	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 09	IO 09 Bäderstraße 35 (Gosdorf)	628.968	6.009.911	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 10	IO 10 Poggenpohler Weg 2 (Gosdorf)	628.801	6.009.822	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 11	IO 11 Poggenpohler Weg 8 (Gosdorf)	628.788	6.009.756	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 12	IO 12 Poggenpohler Weg 14 (Gosdorf)	628.820	6.009.685	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 13	IO 13 Poggenpohler Weg 20 (Gosdorf)	628.856	6.009.598	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 14	IO 14 Poggenpohler Weg 28 (Gosdorf)	628.894	6.009.522	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 15	IO 15 Poggenpohler Weg 30 (Gosdorf)	628.752	6.009.469	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 16	IO 16 Achterhof (Gosdorf)	628.608	6.009.649	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 17	IO 17 Bäderstraße 24a (Gosdorf)	628.706	6.009.684	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 18	IO 18 Ratjensdorfer Felde 1	629.789	6.009.880	15,1	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 19	IO 19 Ratjensdorfer Felde 3	629.701	6.009.765	15,1	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 20	IO 20 Ratjensdorfer Felde 2	629.474	6.009.621	15,1	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 21	IO 21 Morest, Grömitz	629.723	6.008.400	16,7	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 22	IO 22 Poggenpohl 4 (Cismarfelde)	629.157	6.007.735	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 23	IO 23 Poggenpohl 1 (Cismarfelde)	629.211	6.007.586	19,5	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 24	IO 24 Wintersberg	630.455	6.007.797	8,2	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 28	IO 28 Cismarfelde 15	627.807	6.008.129	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 31	IO 31 Rütting Söhlen 2	627.197	6.008.174	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 32	IO 32 Rütting Söhlen 5	626.892	6.007.779	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 33	IO 33 Rütting Söhlen 7	626.798	6.007.622	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0

(Fortsetzung nächste Seite)...

Projekt:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:

22.06.2022 18:31/3.5.584

## SHADOW - Hauptergebnis

**Berechnung: Zusatzbelastung Großenholz (3 x V150-6.0)**

...(Fortsetzung von vorheriger Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe	Neigung des	Ausrichtungsmodus	Augenhöhe
					[m]	[m]	ü.Gr.	Fensters		(ZVI)
								[°]		ü.Gr.
										[m]
IO 34	IO 34 Rütig Söhlen 11	626.671	6.007.415	15,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 35	IO 35 Rütig Chaussee 1	627.056	6.008.668	25,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 36	IO 36 Kathenkamp 1 (Rütiger Hof)	626.737	6.008.865	24,6	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 37	IO 37 Rütiger Klosterkamp 5	626.737	6.008.797	23,6	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 38	IO 38 Rütiger Klosterkamp 9	626.626	6.008.796	23,6	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 39	IO 39 Rütiger Kornenhof 1 (Rütig)	626.632	6.008.936	23,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 40	IO 40 Rütiger Kornenhof 10 (Rütig)	626.542	6.008.948	21,9	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 41	IO 41 Kathenkamp 11 (Rütig)	626.629	6.008.999	22,7	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 42	IO 42 Kathenkamp 19 (Rütig)	626.484	6.009.093	20,4	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 43	IO 43 Kathenkamp 2 (Rütig)	626.309	6.009.066	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 44	IO 44 Kälberhof 5 (Rütig)	626.450	6.009.007	20,4	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 45	IO 45 Bäderstraße 20-22 (Kabelhorst)	625.876	6.008.779	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 46	IO 46 Bäderstraße 15 (Kabelhorst)	625.824	6.008.830	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 47	IO 47 Bäderstraße 18 (Kabelhorst)	625.689	6.008.831	22,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 48	IO 48 Bäderstraße 13 (Kabelhorst)	625.700	6.008.897	22,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 49	IO 49 Bäderstraße 10 (Kabelhorst)	625.563	6.008.931	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 50	IO 50 Schmiedeberg 26 (Kabelhorst)	625.655	6.009.307	16,9	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 51	IO 51 Grünbeck 2	625.972	6.009.891	14,9	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 52	IO 52 Grünbeck 16	626.050	6.010.124	15,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0

## Berechnungsergebnisse

Schattenrezeptor

### astron. max. mögl. Beschattungsdauer

Nr.	Name	Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag
		[h/a]	[d/a]	[h/d]
IO 01	IO 01 Hohe Weide 6 (Riepsdorf)	0:00	0	0:00
IO 02	IO 02 Am Teich 4 (Riepsdorf)	0:00	0	0:00
IO 03	IO 03 Hauptstraße 4 (Riepsdorf)	0:00	0	0:00
IO 04	IO 04 Bäderstraße 2 (Gosdorf)	19:01	52	0:27
IO 05	IO 05 Bäderstraße 8 (Gosdorf)	20:02	62	0:26
IO 06	IO 06 Bäderstraße 17 (Gosdorf)	14:44	66	0:23
IO 07	IO 07 Bäderstraße 25 (Gosdorf)	11:04	64	0:21
IO 08	IO 08 Bäderstraße 34 (Gosdorf)	16:19	71	0:20
IO 09	IO 09 Bäderstraße 35 (Gosdorf)	18:36	74	0:22
IO 10	IO 10 Poggenpohler Weg 2 (Gosdorf)	18:37	76	0:22
IO 11	IO 11 Poggenpohler Weg 8 (Gosdorf)	24:04	82	0:26
IO 12	IO 12 Poggenpohler Weg 14 (Gosdorf)	36:18	92	0:45
IO 13	IO 13 Poggenpohler Weg 20 (Gosdorf)	56:12	102	0:54
IO 14	IO 14 Poggenpohler Weg 28 (Gosdorf)	65:28	112	0:56
IO 15	IO 15 Poggenpohler Weg 30 (Gosdorf)	80:46	112	1:10
IO 16	IO 16 Achterhof (Gosdorf)	27:40	82	0:26
IO 17	IO 17 Bäderstraße 24a (Gosdorf)	27:43	84	0:28
IO 18	IO 18 Ratjensdorfer Felde 1	6:02	30	0:19
IO 19	IO 19 Ratjensdorfer Felde 3	7:24	32	0:21
IO 20	IO 20 Ratjensdorfer Felde 2	17:55	52	0:34
IO 21	IO 21 Morest, Grömitz	16:23	59	0:27
IO 22	IO 22 Poggenpohl 4 (Cismarfelde)	14:23	64	0:19
IO 23	IO 23 Poggenpohl 1 (Cismarfelde)	7:36	45	0:14
IO 24	IO 24 Wintersberg	0:00	0	0:00
IO 28	IO 28 Cismarfelde 15	0:00	0	0:00
IO 31	IO 31 Rütig Söhlen 2	51:57	112	0:38
IO 32	IO 32 Rütig Söhlen 5	25:30	81	0:26
IO 33	IO 33 Rütig Söhlen 7	7:50	44	0:15
IO 34	IO 34 Rütig Söhlen 11	0:18	12	0:02
IO 35	IO 35 Rütig Chaussee 1	57:45	82	1:03
IO 36	IO 36 Kathenkamp 1 (Rütiger Hof)	24:51	48	0:47
IO 37	IO 37 Rütiger Klosterkamp 5	24:13	46	0:50
IO 38	IO 38 Rütiger Klosterkamp 9	18:26	41	0:43
IO 39	IO 39 Rütiger Kornenhof 1 (Rütig)	20:11	47	0:41
IO 40	IO 40 Rütiger Kornenhof 10 (Rütig)	13:58	37	0:36
IO 41	IO 41 Kathenkamp 11 (Rütig)	20:52	51	0:41
IO 42	IO 42 Kathenkamp 19 (Rütig)	13:40	37	0:36

(Fortsetzung nächste Seite)...

Projekt:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:

22.06.2022 18:31/3.5.584

## SHADOW - Hauptergebnis

**Berechnung: Zusatzbelastung Großenholz (3 x V150-6.0)**

...(Fortsetzung von vorheriger Seite)

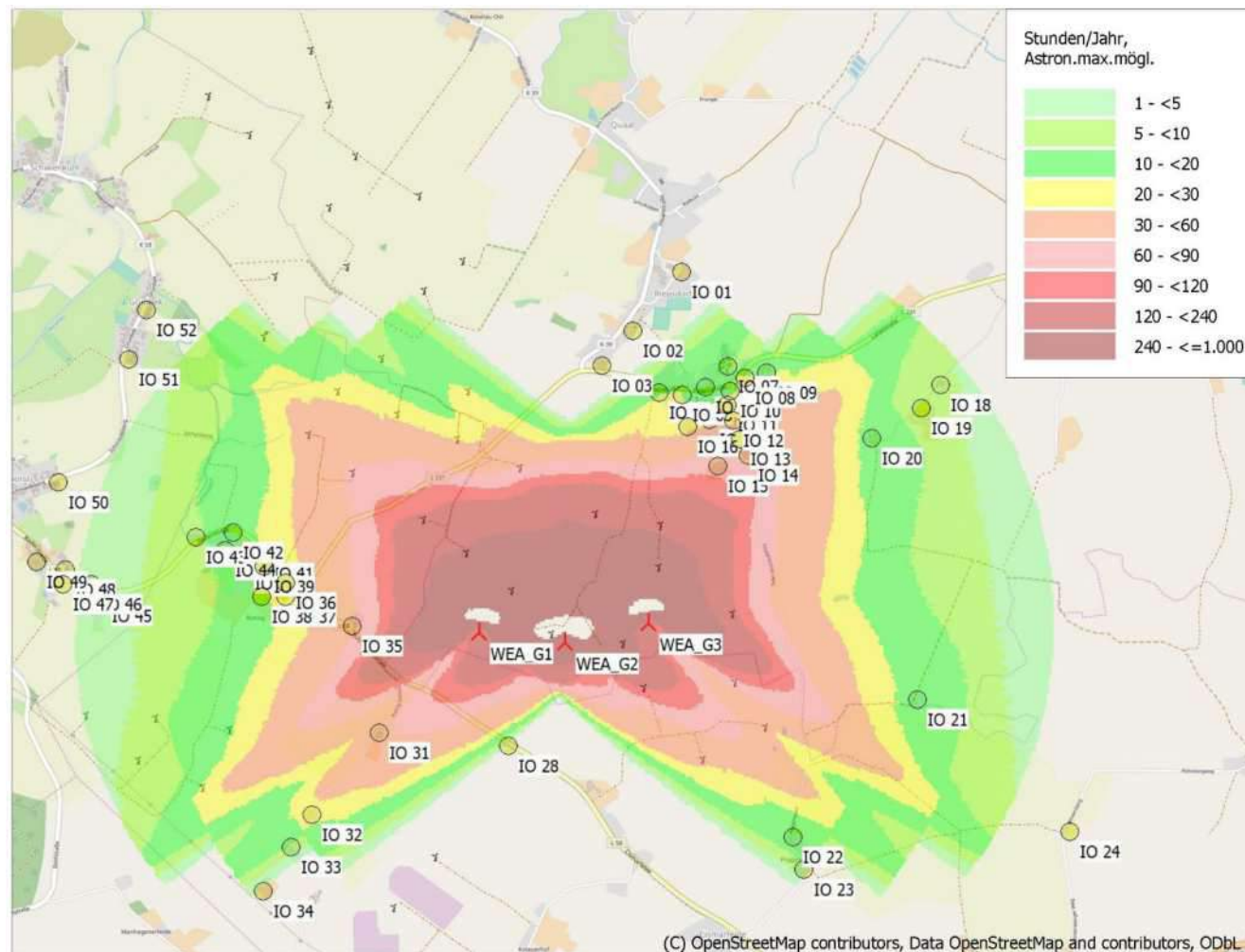
Nr.	Name	astron. max. mögl. Beschattungsdauer		
		Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag
		[h/a]	[d/a]	[h/d]
IO 43	IO 43 Kathenkamp 2 (Rüting)	9:04	29	0:29
IO 44	IO 44 Kälberhof 5 (Rüting)	11:55	33	0:33
IO 45	IO 45 Bäderstraße 20-22 (Kabelhorst)	3:37	21	0:17
IO 46	IO 46 Bäderstraße 15 (Kabelhorst)	3:14	19	0:16
IO 47	IO 47 Bäderstraße 18 (Kabelhorst)	0:00	0	0:00
IO 48	IO 48 Bäderstraße 13 (Kabelhorst)	0:00	0	0:00
IO 49	IO 49 Bäderstraße 10 (Kabelhorst)	0:00	0	0:00
IO 50	IO 50 Schmiedeberg 26 (Kabelhorst)	0:00	0	0:00
IO 51	IO 51 Grünbeck 2	0:00	0	0:00
IO 52	IO 52 Grünbeck 16	0:00	0	0:00

Gesamtdauer Beschattung an Rezeptoren pro WEA

Nr.	Name	Maximal
		[h/a]
WEA_G1	WEA G1 Vestas V150-6.0	173:40
WEA_G2	WEA G2 Vestas V150-6.0	181:32
WEA_G3	WEA G3 Vestas V150-6.0	125:11

*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.*

### 11.14 Schattenwurfkarte Zusatzbelastung, Stunden pro Jahr



0 500 1000 1500 2000 m

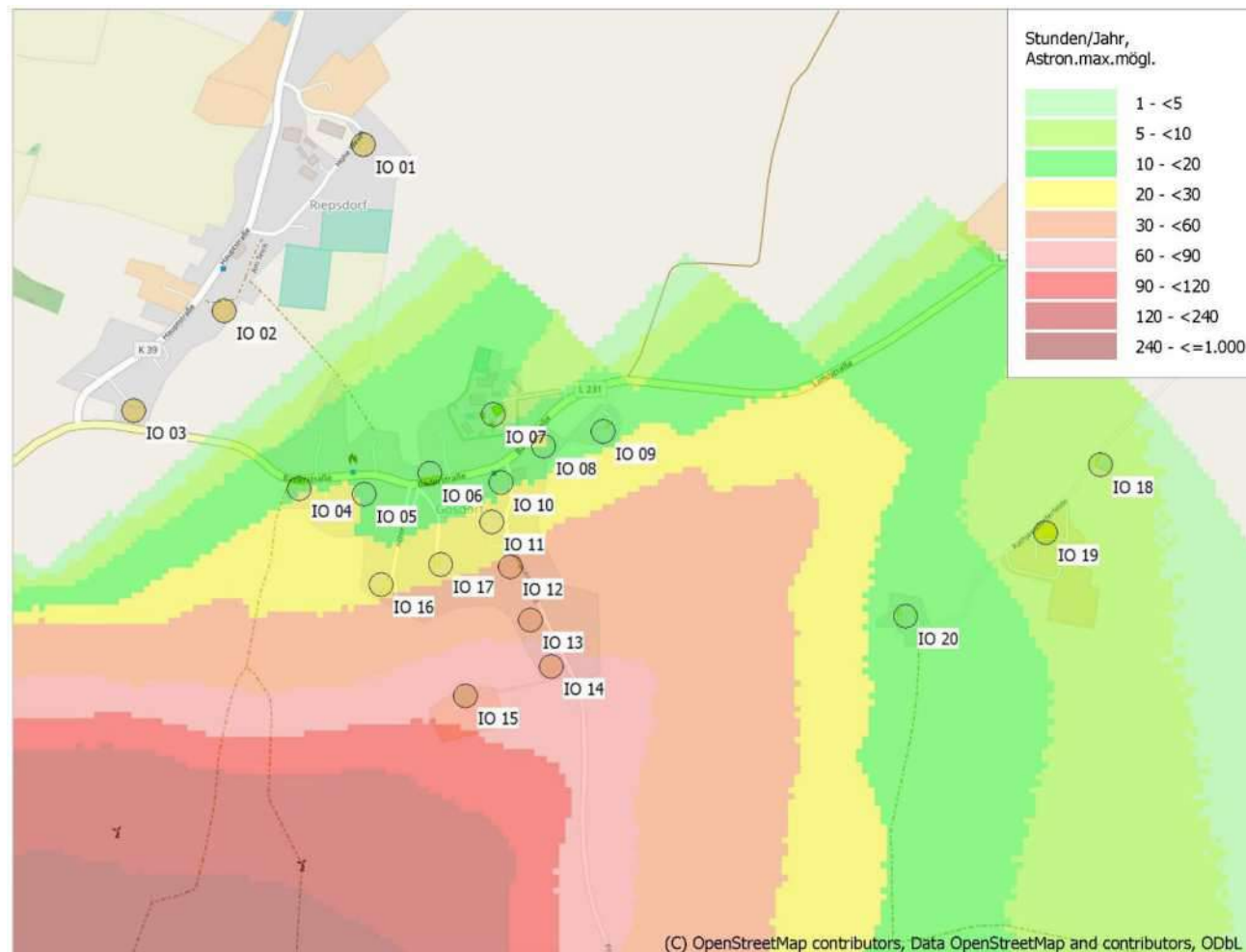
Karte: EMD OpenStreetMap , Maßstab 1:28.500, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 628.300 Nord: 6.009.300

Neue WEA Schattenrezeptor

Höhe der Schattenkarte: Höhenlinien: oro\_2019-07-25.map (1)



### 11.15 Schattenwurfkarte Zusatzbelastung Detail Gosdorf, Stunden pro Jahr



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

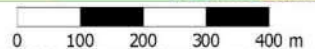
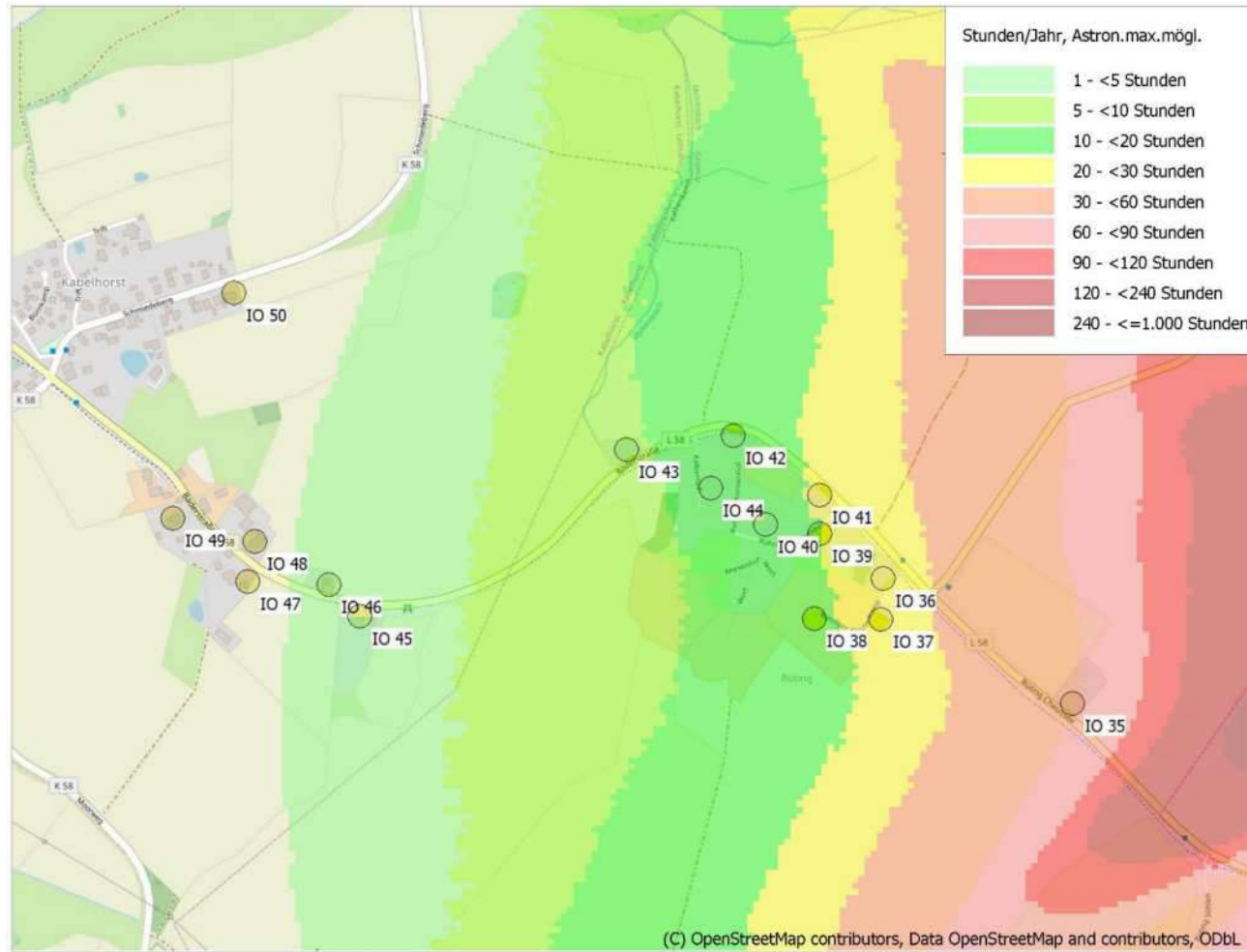
0 100 200 300 400 m

Karte: EMD OpenStreetMap , Maßstab 1:10.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 629.000 Nord: 6.009.800

▲ Neue WEA      ● Schattenrezeptor

Höhe der Schattenkarte: Höhenlinien: oro\_2019-07-25.map (1)

### 11.16 Schattenwurfkarte Zusatzbelastung Detail Rütting, Stunden pro Jahr



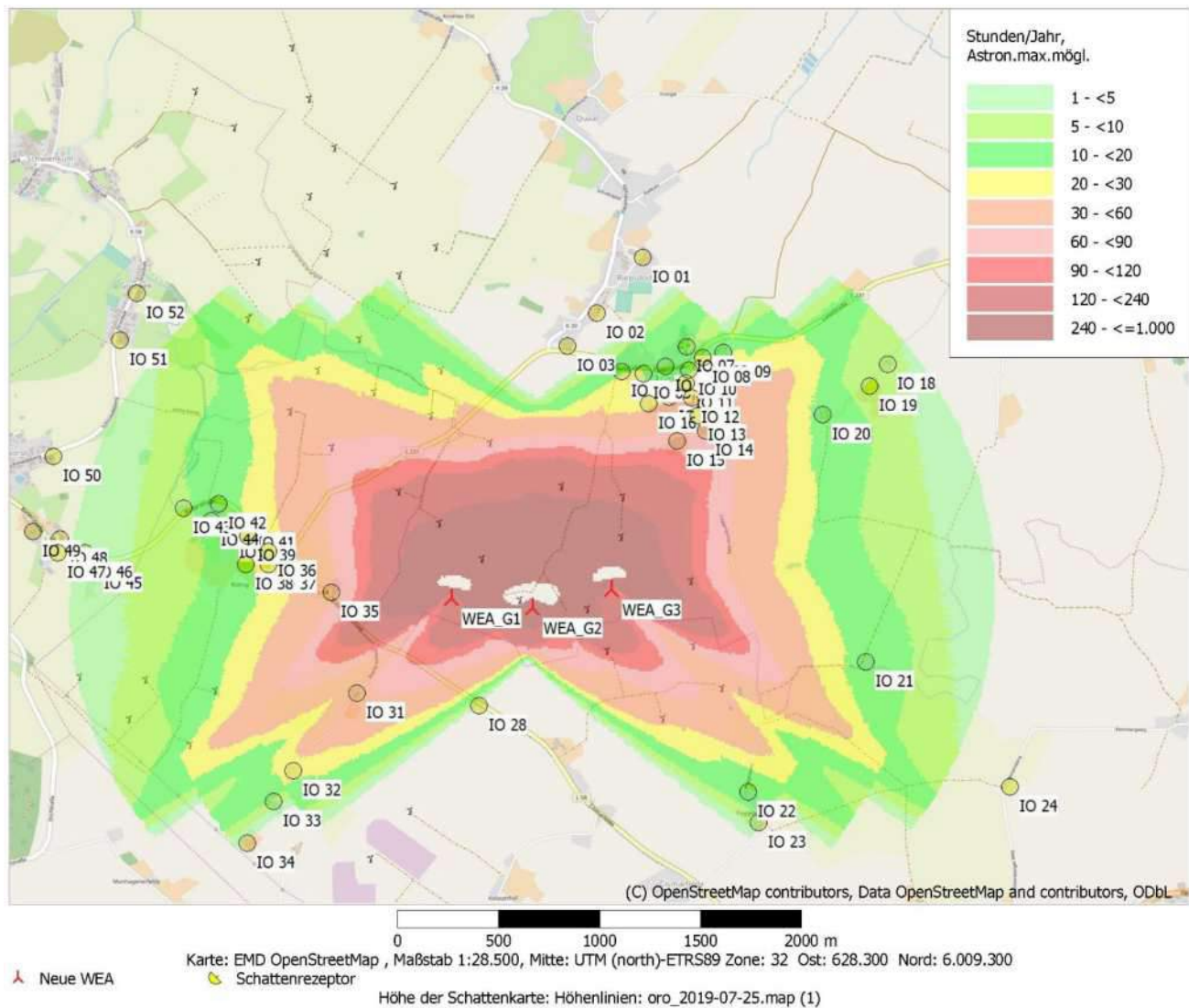
Karte: EMD OpenStreetMap , Maßstab 1:10.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 626.300 Nord: 6.008.990

Neue WEA

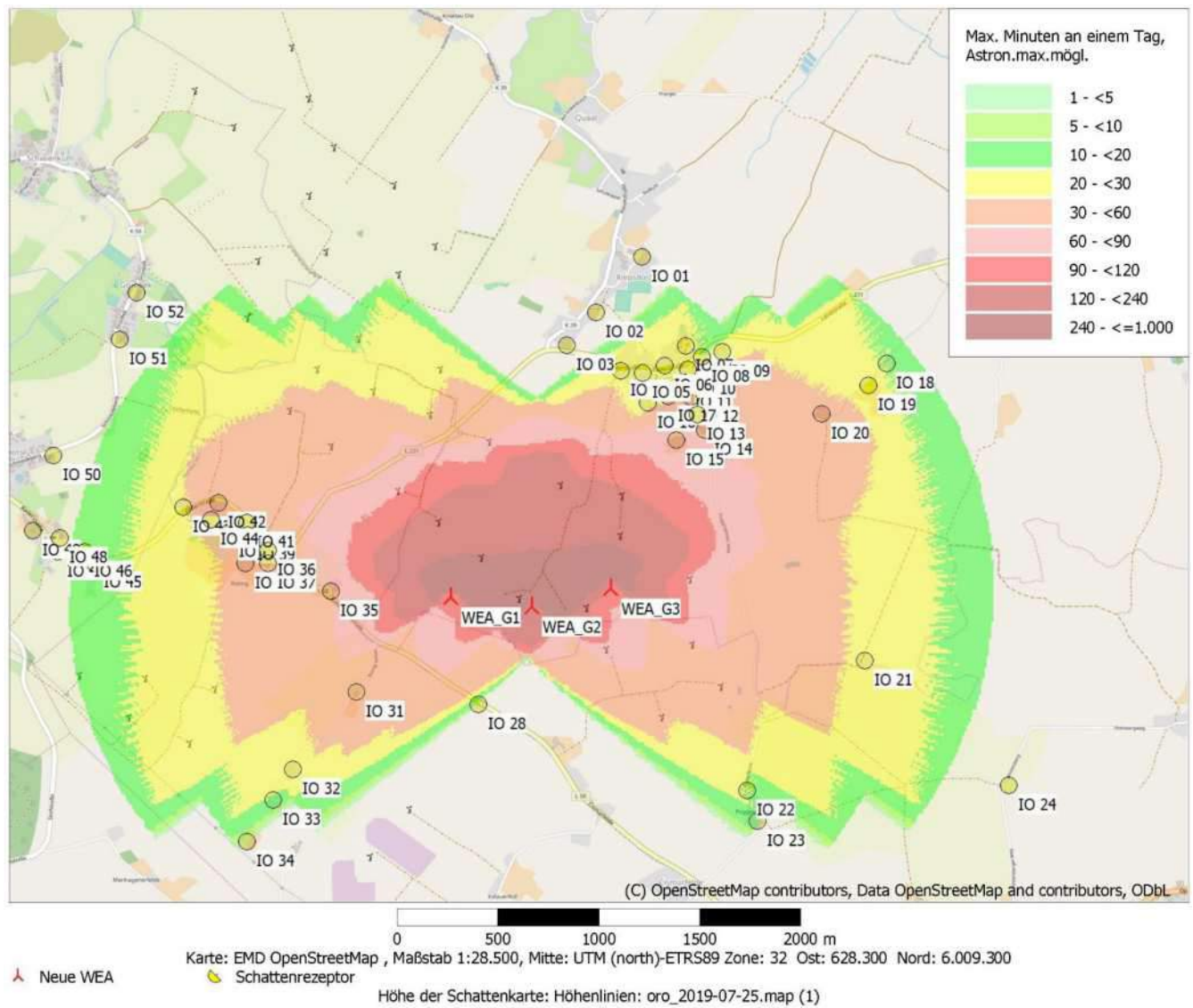
Schattenrezeptor

Höhe der Schattenkarte: Höhenlinien: oro\_2019-07-25.map (1)

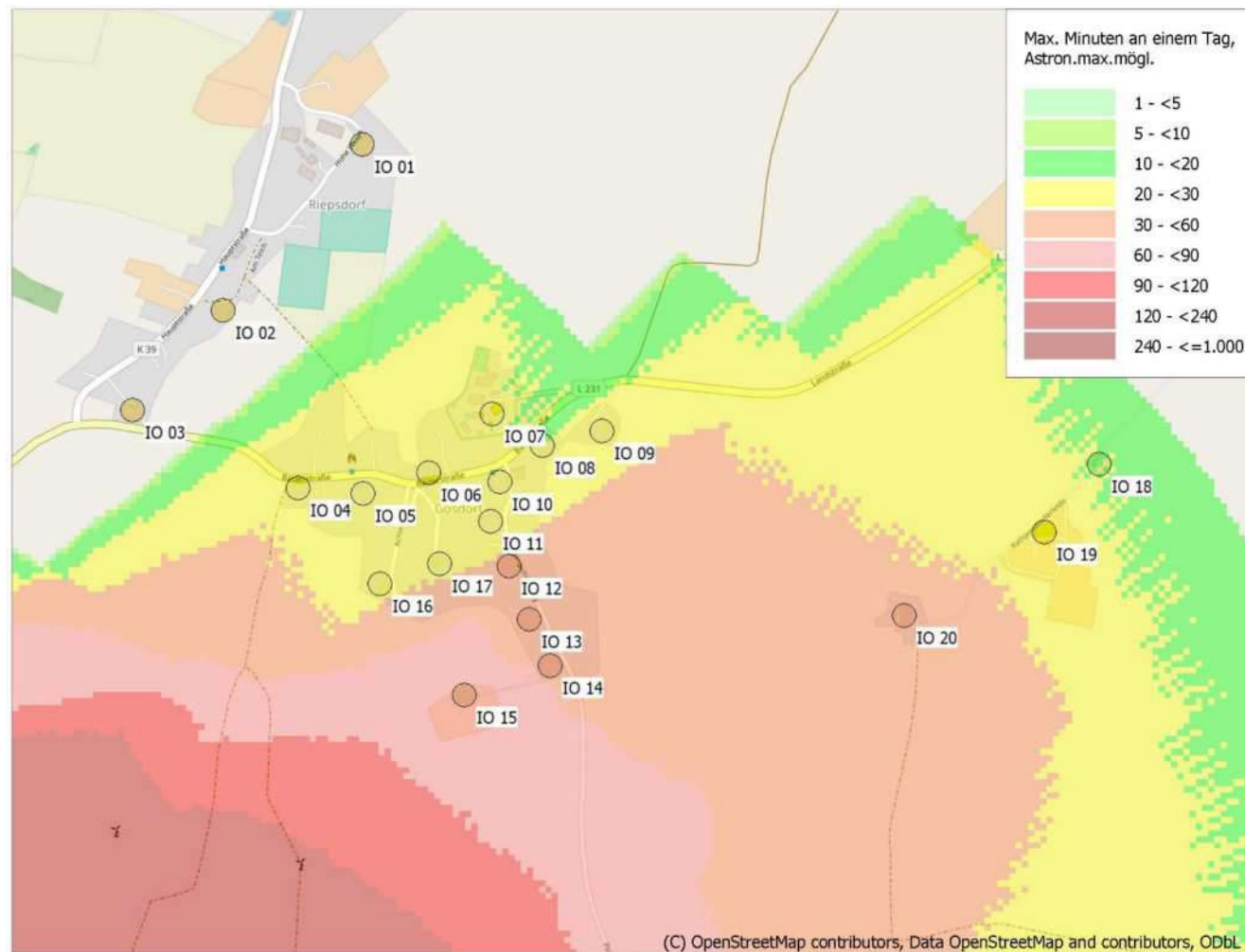
### 11.17 Schattenwurfkarte Zusatzbelastung, Tage pro Jahr



### 11.18 Schattenwurfkarte Zusatzbelastung, Minuten pro Tag



### 11.19 Schattenwurfkarte Zusatzbelastung Detail Gosdorf, Minuten pro Tag



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

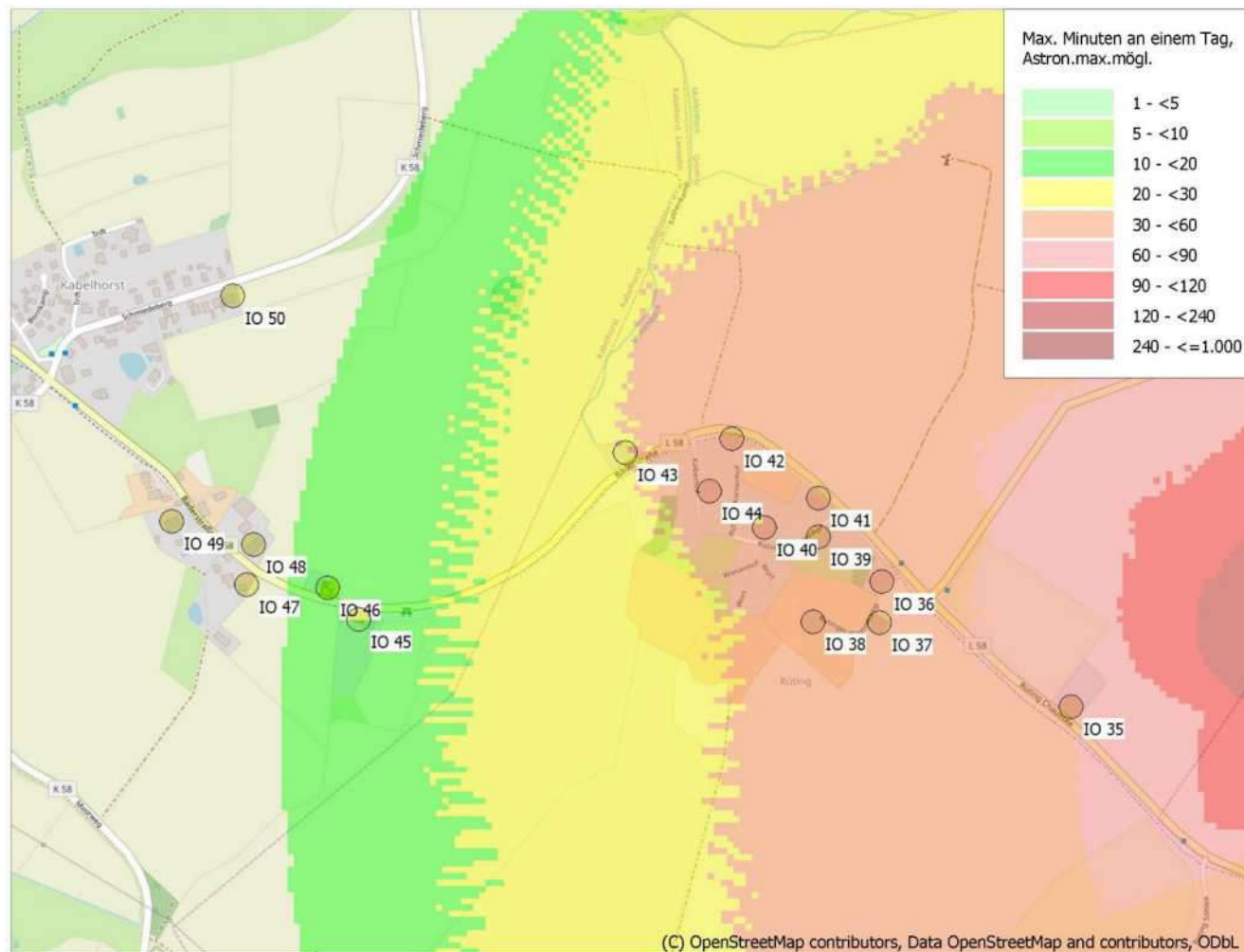
0 100 200 300 400 m

Karte: EMD OpenStreetMap , Maßstab 1:10.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 629.000 Nord: 6.009.800

Neue WEA    Schattenrezeptor

Höhe der Schattenkarte: Höhenlinien: oro\_2019-07-25.map (1)

## 11.20 Schattenwurfkarte Zusatzbelastung Detail Rütting, Minuten pro Tag



0 100 200 300 400 m

Karte: EMD OpenStreetMap , Maßstab 1:10.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 626.300 Nord: 6.008.990

Neue WEA

Schattenrezeptor

Höhe der Schattenkarte: Höhenlinien: oro\_2019-07-25.map (1)

## 11.21 Hauptergebnis Gesamtbelastung (nach Repowering)

Projekt:  
**SWP Windpark Großenholz**

Lizenzierter Anwender:  
**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0

DNV

Berechnet:  
22.06.2022 20:19/3.5.584

### SHADOW - Hauptergebnis

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0)

#### Annahmen für Schattenschattenberechnung

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: Höhenlinien: oro\_2019-07-25.map (1)  
Hindernisse in Berechnung nicht verwendet  
Rasterauflösung: 10,0 m

Alle Koordinatenangaben in:  
UTM (north)-ETRS89 Zone: 32

#### WEA

WEA	Ost	Nord	Z	Beschreibung	WEA-Typ		Typ	Nennleistung	Rotor-durch-messer	Naben-höhe	Schattendaten	
					Aktuell	Hersteller					Beschatt.-Bereich	U/min
			[m]					[kW]	[m]	[m]	[m]	[U/min]
WEA 01 (GRN)	626.955	6.009.774	20,8	WEA 01 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 02 (GRN)	627.240	6.009.666	25,0	WEA 02 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 03 (GRN)	627.525	6.009.556	25,0	WEA 03 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 04 (GRN)	626.826	6.009.569	20,0	WEA 04 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 05 (GRN)	627.037	6.009.390	23,9	WEA 05 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 06 (GRN)	627.377	6.009.189	25,0	WEA 06 Ener...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
WEA 07 (GRN)	627.835	6.009.437	25,0	WEA 07 Ener...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
WEA 08 (GRN)	627.591	6.009.028	20,6	WEA 08 Ener...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
WEA 10 (GRS)	625.825	6.008.222	16,4	WEA 10 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 11 (GRS)	626.145	6.008.219	21,9	WEA 11 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 12 (GRS)	626.491	6.008.169	25,0	WEA 12 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 13 (GRS)	626.067	6.008.014	16,5	WEA 13 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 14 (GRS)	626.378	6.007.889	16,8	WEA 14 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 15 (GCN)	628.439	6.008.420	25,0	WEA 15 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 16 (GCN)	628.861	6.008.454	20,7	WEA 16 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 17 (GCN)	628.721	6.008.093	21,8	WEA 17 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 18 (GCN)	629.006	6.008.251	20,0	WEA 18 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 19 (GCS)	627.286	6.007.351	20,0	WEA 19 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 20 (GCS)	627.481	6.007.592	20,0	WEA 20 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 21 (GCS)	627.404	6.007.112	17,5	WEA 21 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 22 (Kab)	626.313	6.011.135	16,1	WEA 22 NEG...	Nein	NEG MICON	NM1500/64-1.500/750	1.500	64,0	68,0	3.000	17,1
WEA 23 (Kab)	626.606	6.010.014	18,8	WEA 23 NEG...	Nein	NEG MICON	NM1500/64-1.500/750	1.500	64,0	68,0	3.000	17,1
WEA 24 (Kab)	626.513	6.010.960	17,0	WEA 24 NEG...	Nein	NEG MICON	NM1500/64-1.500/750	1.500	64,0	68,0	3.000	17,1
WEA 25 (Kab)	626.649	6.010.300	18,9	WEA 25 NEG...	Nein	NEG MICON	NM1500/64-1.500/750	1.500	64,0	68,0	3.000	17,1
WEA 32 (LR)	624.599	6.009.726	25,0	WEA 32 Ener...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
WEA 33 (LR)	624.912	6.009.921	15,0	WEA 33 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 35 (L)	624.386	6.010.378	20,0	WEA 35 Ener...	Nein	ENERCON	E-66/15.66-1.500	1.500	66,0	85,0	1.462	22,0
WEA 36 (L)	623.918	6.010.628	15,0	WEA 36 Ener...	Nein	ENERCON	E-40/5.40-500	500	40,3	65,0	897	38,0
WEA 37 (L)	624.118	6.010.054	24,0	WEA 37 Ener...	Ja	ENERCON	E-70 E4 2,3 MW-2.300	2.300	71,0	64,0	1.644	20,0
WEA 38 (L)	624.081	6.010.287	20,0	WEA 38 Ener...	Ja	ENERCON	E-70 E4 2,3 MW-2.300	2.300	71,0	64,0	1.644	20,0
WEA 39 (L)	624.003	6.010.476	24,7	WEA 39 Ener...	Ja	ENERCON	E-70 E4 2,3 MW-2.300	2.300	71,0	64,0	1.644	20,0
WEA 40 (RW)	626.898	6.010.632	20,0	WEA 40 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 41 (RW)	626.988	6.010.354	23,9	WEA 41 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 42 (RW)	627.526	6.010.398	24,2	WEA 42 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 43 (RW)	627.165	6.009.938	25,0	WEA 43 Jaco...	Nein	JACOBS	MD 70-1.500	1.500	70,0	65,0	3.000	19,0
WEA 44 (RW)	627.353	6.010.254	25,0	WEA 44 Vest...	Nein	VESTAS	V47-660	660	47,0	65,0	880	28,5
WEA 45 (RW)	627.569	6.009.788	25,0	WEA 45 Vest...	Nein	VESTAS	V47-660	660	47,0	65,0	880	28,5
WEA 46 (Dam)	624.033	6.011.232	25,0	WEA 46 Süd...	Nein	SÜDWIND	S70-1.500	1.500	70,0	65,0	1.467	19,0

(Fortsetzung nächste Seite)...

Projekt:

SWP Windpark Großenholz

Lizenzierter Anwender:

GL Garrad Hassan Deutschland GmbH  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Hauptergebnis

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0)

...(Fortsetzung von vorheriger Seite)

	Ost	Nord	Z	Beschreibung	WEA-Typ			Nennleistung	Rotor-durchmesser	Nabenhöhe	Schattendaten	
					Aktuell	Hersteller	Typ				Beschatt.-Bereich	U/min
			[m]				[kW]	[m]	[m]	[m]	[U/min]	
WEA 47 (Dam)	624.290	6.011.385	20,0	WEA 47 Süd...	Nein	SÜDWIND	S70-1.500	1.500	70,0	65,0	1.467	19,0
WEA 48 (Dam)	623.712	6.011.262	15,0	WEA 48 Süd...	Nein	SÜDWIND	S70-1.500	1.500	70,0	65,0	1.467	19,0
WEA 49 (Dam)	623.845	6.011.006	18,8	WEA 49 Ener...	Ja	ENERCON	E-82 E2-2.300	2.300	82,0	108,4	1.601	18,0
WEA 50 (Dam)	624.437	6.011.234	20,0	WEA 50 Ener...	Ja	ENERCON	E-82 E2-2.300	2.300	82,0	108,4	1.601	18,0
WEA 51	627.701	6.011.676	7,8	WEA 51 Easy...	Nein	EasyWind	EasyWind 6-6	6	6,0	19,0	3.000	124,0
WEA K01	626.666	6.011.752	12,9	WEA K01 En...	Ja	ENERCON	E-115 EP3 E3 TES-2.900	2.900	115,7	92,0	2.069	0,0
WEA K02	626.813	6.011.347	20,0	WEA K02 En...	Ja	ENERCON	E-115 EP3 E3 TES-2.900	2.900	115,7	92,0	2.069	0,0
WEA K03	626.913	6.011.037	20,0	WEA K03 En...	Ja	ENERCON	E-115 EP3 E3 TES-2.900	2.900	115,7	92,0	2.069	0,0
WEA K04	627.292	6.010.722	21,5	WEA K04 En...	Ja	ENERCON	E-115 EP3 E3 TES-2.900	2.900	115,7	92,0	2.069	0,0
WEA_G1	627.652	6.008.659	20,0	WEA G1 Vest...	Ja	VESTAS	V150-6.0-6.000	6.000	150,0	105,0	1.902	0,0
WEA_G2	628.057	6.008.621	20,0	WEA G2 Vest...	Ja	VESTAS	V150-6.0-6.000	6.000	150,0	105,0	1.902	0,0
WEA_G3	628.449	6.008.722	20,0	WEA G3 Vest...	Ja	VESTAS	V150-6.0-6.000	6.000	150,0	105,0	1.902	0,0

## 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]
IO 01	IO 01 Hohe Weide 6 (Riepsdorf)	628.558	6.010.372	16,5	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 02	IO 02 Am Teich 4 (Riepsdorf)	628.337	6.010.091	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 03	IO 03 Hauptstraße 4 (Riepsdorf)	628.192	6.009.924	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 04	IO 04 Bäderstraße 2 (Gosdorf)	628.468	6.009.804	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 05	IO 05 Bäderstraße 8 (Gosdorf)	628.577	6.009.796	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 06	IO 06 Bäderstraße 17 (Gosdorf)	628.683	6.009.834	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 07	IO 07 Bäderstraße 25 (Gosdorf)	628.786	6.009.934	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 08	IO 08 Bäderstraße 34 (Gosdorf)	628.870	6.009.884	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 09	IO 09 Bäderstraße 35 (Gosdorf)	628.968	6.009.911	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 10	IO 10 Poggenpohler Weg 2 (Gosdorf)	628.801	6.009.822	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 11	IO 11 Poggenpohler Weg 8 (Gosdorf)	628.788	6.009.756	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 12	IO 12 Poggenpohler Weg 14 (Gosdorf)	628.820	6.009.685	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 13	IO 13 Poggenpohler Weg 20 (Gosdorf)	628.856	6.009.598	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 14	IO 14 Poggenpohler Weg 28 (Gosdorf)	628.894	6.009.522	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 15	IO 15 Poggenpohler Weg 30 (Gosdorf)	628.752	6.009.469	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 16	IO 16 Achterhof (Gosdorf)	628.608	6.009.649	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 17	IO 17 Bäderstraße 24a (Gosdorf)	628.706	6.009.684	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 18	IO 18 Ratjensdorfer Felde 1	629.789	6.009.880	15,1	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 19	IO 19 Ratjensdorfer Felde 3	629.701	6.009.765	15,1	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 20	IO 20 Ratjensdorfer Felde 2	629.474	6.009.621	15,1	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 21	IO 21 Morest, Grömitz	629.723	6.008.400	16,7	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 22	IO 22 Poggenpohl 4 (Cismarfelde)	629.157	6.007.735	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 23	IO 23 Poggenpohl 1 (Cismarfelde)	629.211	6.007.586	19,5	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 24	IO 24 Wintersberg	630.455	6.007.797	8,2	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 28	IO 28 Cismarfelde 15	627.807	6.008.129	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 31	IO 31 Rütting Söhlen 2	627.197	6.008.174	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 32	IO 32 Rütting Söhlen 5	626.892	6.007.779	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 33	IO 33 Rütting Söhlen 7	626.798	6.007.622	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 34	IO 34 Rütting Söhlen 11	626.671	6.007.415	15,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 35	IO 35 Rütting Chaussee 1	627.056	6.008.668	25,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 36	IO 36 Kathenkamp 1 (Rüttinger Hof)	626.737	6.008.865	24,6	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 37	IO 37 Rüttinger Klosterkamp 5	626.737	6.008.797	23,6	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 38	IO 38 Rüttinger Klosterkamp 9	626.626	6.008.796	23,6	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 39	IO 39 Rüttinger Kornenhof 1 (Rütting)	626.632	6.008.936	23,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 40	IO 40 Rüttinger Kornenhof 10 (Rütting)	626.542	6.008.948	21,9	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 41	IO 41 Kathenkamp 11 (Rütting)	626.629	6.008.999	22,7	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 42	IO 42 Kathenkamp 19 (Rütting)	626.484	6.009.093	20,4	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 43	IO 43 Kathenkamp 2 (Rütting)	626.309	6.009.066	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 44	IO 44 Kälberhof 5 (Rütting)	626.450	6.009.007	20,4	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 45	IO 45 Bäderstraße 20-22 (Kabelhorst)	625.876	6.008.779	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 46	IO 46 Bäderstraße 15 (Kabelhorst)	625.824	6.008.830	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 47	IO 47 Bäderstraße 18 (Kabelhorst)	625.689	6.008.831	22,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 48	IO 48 Bäderstraße 13 (Kabelhorst)	625.700	6.008.897	22,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0

(Fortsetzung nächste Seite)...



Projekt:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Hauptergebnis

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0)

...(Fortsetzung von vorheriger Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe	Neigung des	Ausrichtungsmodus	Augenhöhe
					[m]	[m]	[m]	ü.Gr. Fensters		(ZVI)
								[°]		ü.Gr.
										[m]
IO 49	IO 49 Bäderstraße 10 (Kabelhorst)	625.563	6.008.931	20,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 50	IO 50 Schmiedeberg 26 (Kabelhorst)	625.655	6.009.307	16,9	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 51	IO 51 Grünbeck 2	625.972	6.009.891	14,9	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0
IO 52	IO 52 Grünbeck 16	626.050	6.010.124	15,0	1,0	1,0	2,0	0,0	"Gewächshaus-Modus"	2,0

## Berechnungsergebnisse

Schattenrezeptor

Nr.	Name	astron. max. mögl. Beschattungsdauer		
		Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag
		[h/a]	[d/a]	[h/d]
IO 01	IO 01 Hohe Weide 6 (Riepsdorf)	26:57	182	0:21
IO 02	IO 02 Am Teich 4 (Riepsdorf)	64:05	257	0:30
IO 03	IO 03 Hauptstraße 4 (Riepsdorf)	66:09	239	0:32
IO 04	IO 04 Bäderstraße 2 (Gosdorf)	47:48	230	0:27
IO 05	IO 05 Bäderstraße 8 (Gosdorf)	41:05	227	0:26
IO 06	IO 06 Bäderstraße 17 (Gosdorf)	35:51	217	0:23
IO 07	IO 07 Bäderstraße 25 (Gosdorf)	21:31	152	0:21
IO 08	IO 08 Bäderstraße 34 (Gosdorf)	24:27	147	0:20
IO 09	IO 09 Bäderstraße 35 (Gosdorf)	24:07	136	0:22
IO 10	IO 10 Poggenpohler Weg 2 (Gosdorf)	30:35	182	0:22
IO 11	IO 11 Poggenpohler Weg 8 (Gosdorf)	39:51	209	0:26
IO 12	IO 12 Poggenpohler Weg 14 (Gosdorf)	49:40	207	0:45
IO 13	IO 13 Poggenpohler Weg 20 (Gosdorf)	65:04	199	0:54
IO 14	IO 14 Poggenpohler Weg 28 (Gosdorf)	71:30	192	0:56
IO 15	IO 15 Poggenpohler Weg 30 (Gosdorf)	89:34	180	1:10
IO 16	IO 16 Achterhof (Gosdorf)	46:16	222	0:26
IO 17	IO 17 Bäderstraße 24a (Gosdorf)	41:41	218	0:28
IO 18	IO 18 Ratjensdorfer Felde 1	6:04	32	0:19
IO 19	IO 19 Ratjensdorfer Felde 3	7:43	40	0:21
IO 20	IO 20 Ratjensdorfer Felde 2	19:51	83	0:34
IO 21	IO 21 Morest, Grömitz	32:33	119	0:27
IO 22	IO 22 Poggenpohl 4 (Cismarfelde)	14:27	68	0:19
IO 23	IO 23 Poggenpohl 1 (Cismarfelde)	7:39	48	0:14
IO 24	IO 24 Wintersberg	1:35	27	0:08
IO 28	IO 28 Cismarfelde 15	46:49	161	0:34
IO 31	IO 31 Rütting Söhlen 2	70:20	186	0:38
IO 32	IO 32 Rütting Söhlen 5	119:46	253	0:45
IO 33	IO 33 Rütting Söhlen 7	74:32	196	0:48
IO 34	IO 34 Rütting Söhlen 11	24:51	99	0:26
IO 35	IO 35 Rütting Chaussee 1	105:42	283	1:03
IO 36	IO 36 Kathenkamp 1 (Rüttinger Hof)	62:14	206	0:47
IO 37	IO 37 Rüttinger Klosterkamp 5	69:54	254	0:50
IO 38	IO 38 Rüttinger Klosterkamp 9	59:03	206	0:43
IO 39	IO 39 Rüttinger Kornenhof 1 (Rütting)	53:47	217	0:41
IO 40	IO 40 Rüttinger Kornenhof 10 (Rütting)	32:27	143	0:36
IO 41	IO 41 Kathenkamp 11 (Rütting)	42:41	169	0:41
IO 42	IO 42 Kathenkamp 19 (Rütting)	68:38	225	0:36
IO 43	IO 43 Kathenkamp 2 (Rütting)	29:29	139	0:29
IO 44	IO 44 Kälberhof 5 (Rütting)	58:24	212	0:33
IO 45	IO 45 Bäderstraße 20-22 (Kabelhorst)	20:16	142	0:20
IO 46	IO 46 Bäderstraße 15 (Kabelhorst)	22:05	146	0:19
IO 47	IO 47 Bäderstraße 18 (Kabelhorst)	21:52	125	0:22
IO 48	IO 48 Bäderstraße 13 (Kabelhorst)	11:10	110	0:16
IO 49	IO 49 Bäderstraße 10 (Kabelhorst)	16:24	101	0:19
IO 50	IO 50 Schmiedeberg 26 (Kabelhorst)	16:47	115	0:15
IO 51	IO 51 Grünbeck 2	54:15	228	0:26
IO 52	IO 52 Grünbeck 16	55:16	196	0:41

Projekt:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Hauptergebnis

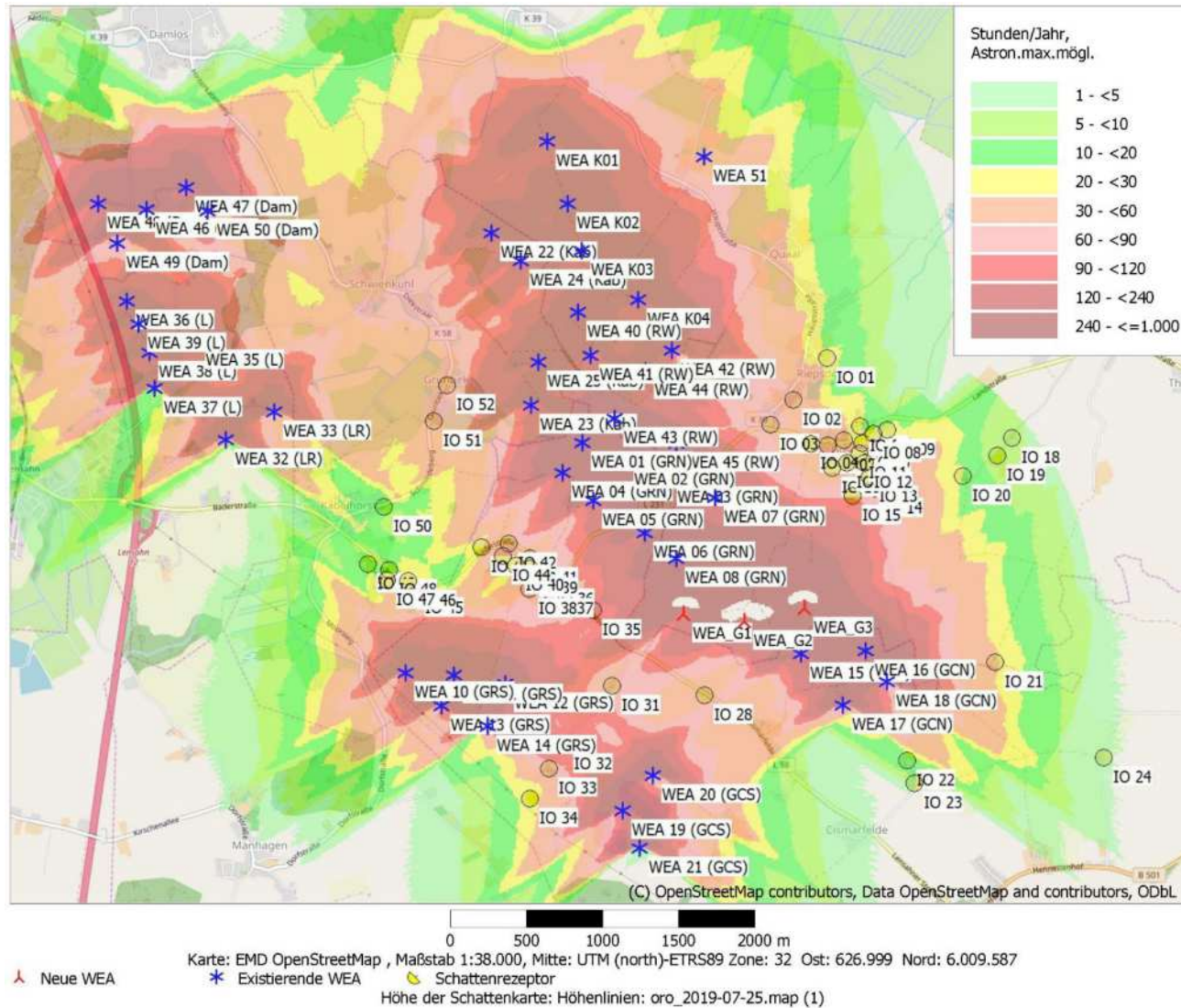
**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0)

Gesamtdauer Beschattung an Rezeptoren pro WEA

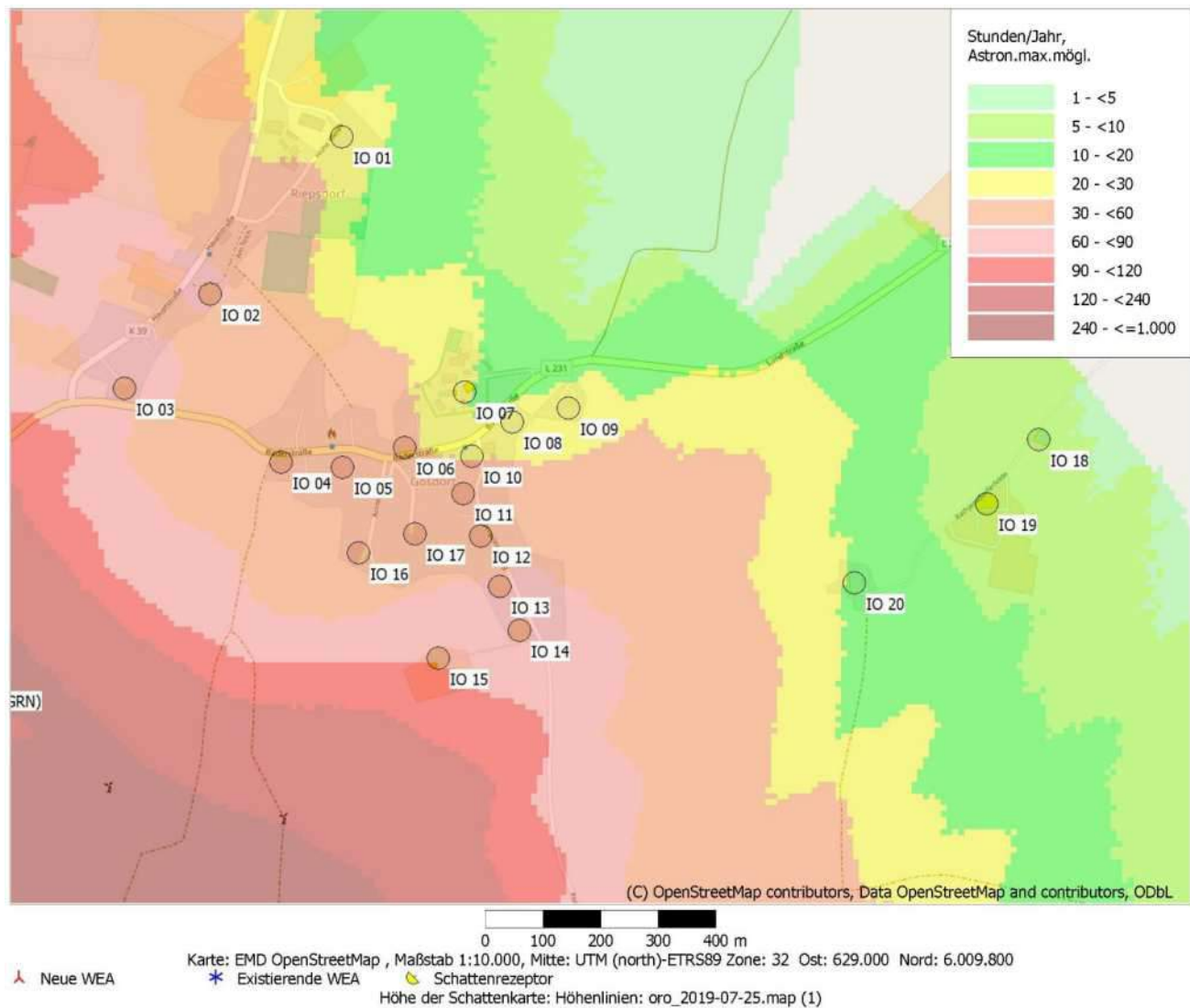
Nr.	Name	Maximal [h/a]
WEA 01 (GRN)	WEA 01 Jacobs MD70	13:58
WEA 02 (GRN)	WEA 02 Jacobs MD70	32:33
WEA 03 (GRN)	WEA 03 Jacobs MD70	50:13
WEA 04 (GRN)	WEA 04 Jacobs MD70	24:59
WEA 05 (GRN)	WEA 05 Jacobs MD70	68:30
WEA 06 (GRN)	WEA 06 Enercon E-66 18.70	67:31
WEA 07 (GRN)	WEA 07 Enercon E-66 18.70	79:53
WEA 08 (GRN)	WEA 08 Enercon E-66 18.70	54:49
WEA 10 (GRS)	WEA 10 Jacobs MD70	33:11
WEA 11 (GRS)	WEA 11 Jacobs MD70	84:48
WEA 12 (GRS)	WEA 12 Jacobs MD70	37:41
WEA 13 (GRS)	WEA 13 Jacobs MD70	36:25
WEA 14 (GRS)	WEA 14 Jacobs MD70	55:11
WEA 15 (GCN)	WEA 15 Jacobs MD70	20:59
WEA 16 (GCN)	WEA 16 Jacobs MD70	8:26
WEA 17 (GCN)	WEA 17 Jacobs MD70	7:22
WEA 18 (GCN)	WEA 18 Jacobs MD70	10:03
WEA 19 (GCS)	WEA 19 Jacobs MD70	63:40
WEA 20 (GCS)	WEA 20 Jacobs MD70	46:36
WEA 21 (GCS)	WEA 21 Jacobs MD70	26:01
WEA 22 (Kab)	WEA 22 NEG Micon NM 1500 C	0:00
WEA 23 (Kab)	WEA 23 NEG Micon NM 1500 C	29:07
WEA 24 (Kab)	WEA 24 NEG Micon NM 1500 C	0:00
WEA 25 (Kab)	WEA 25 NEG Micon NM 1500 C	28:02
WEA 32 (LR)	WEA 32 Enercon E-66/18.70	4:44
WEA 33 (LR)	WEA 33 Jacobs MD70	4:22
WEA 35 (L)	WEA 35 Enercon E-66/15.66	0:00
WEA 36 (L)	WEA 36 Enercon E-40/5.40	0:00
WEA 37 (L)	WEA 37 Enercon E-70 E4	0:00
WEA 38 (L)	WEA 38 Enercon E-70 E4	0:00
WEA 39 (L)	WEA 39 Enercon E-70 E4	0:00
WEA 40 (RW)	WEA 40 Jacobs MD70	12:51
WEA 41 (RW)	WEA 41 Jacobs MD70	13:50
WEA 42 (RW)	WEA 42 Jacobs MD70	31:35
WEA 43 (RW)	WEA 43 Jacobs MD70	14:30
WEA 44 (RW)	WEA 44 Vestas V47	0:00
WEA 45 (RW)	WEA 45 Vestas V47	7:54
WEA 46 (Dam)	WEA 46 Südwind S70	0:00
WEA 47 (Dam)	WEA 47 Südwind S70	0:00
WEA 48 (Dam)	WEA 48 Südwind S70	0:00
WEA 49 (Dam)	WEA 49 Enercon E-82	0:00
WEA 50 (Dam)	WEA 50 Enercon E-82	0:00
WEA 51	WEA 51 Easywind 6	0:00
WEA K01	WEA K01 Enercon E-115 EP3 E3/2,9 MW (TES)	0:00
WEA K02	WEA K02 Enercon E-115 EP3 E3/2,9 MW (TES)	2:17
WEA K03	WEA K03 Enercon E-115 EP3 E3/2,9 MW (TES)	11:21
WEA K04	WEA K04 Enercon E-115 EP3 E3/2,9 MW (TES)	50:12
WEA_G1	WEA G1 Vestas V150-6.0	173:40
WEA_G2	WEA G2 Vestas V150-6.0	181:32
WEA_G3	WEA G3 Vestas V150-6.0	125:11

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.

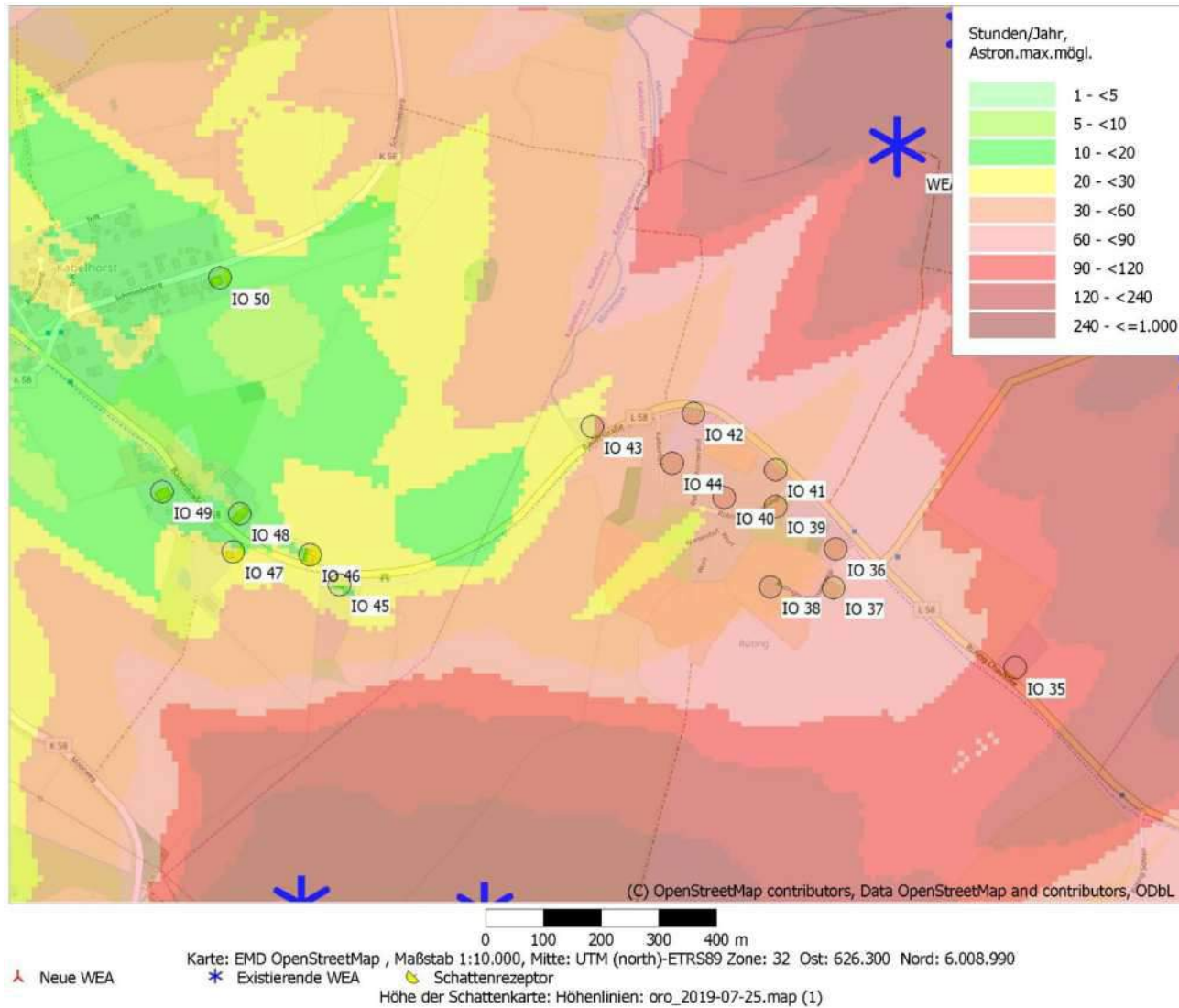
## 11.22 Schattenwurfkarte Gesamtbelastung (nach Repowering), Stunden pro Jahr



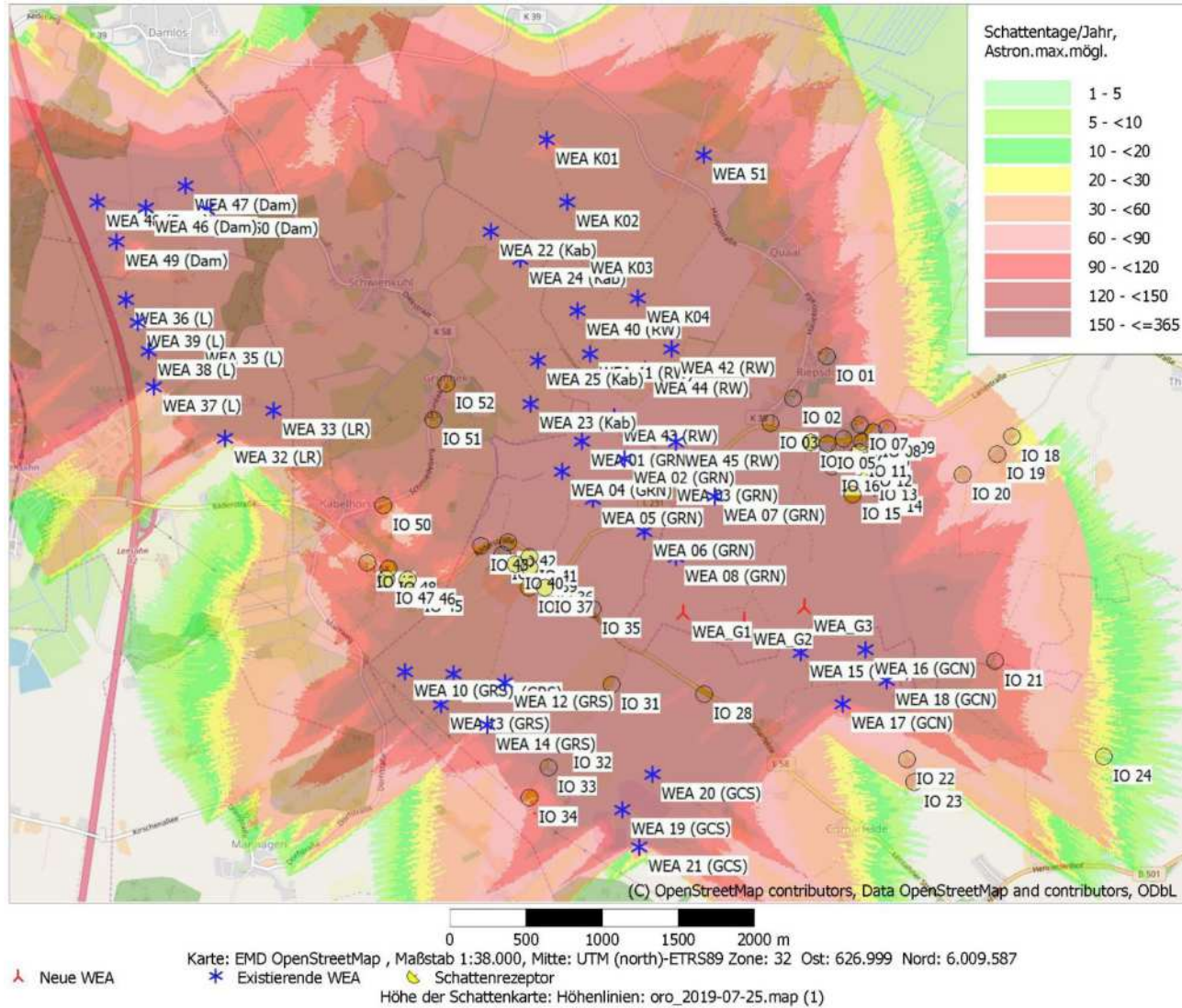
### 11.23 Schattenwurfkarte Gesamtbelastung (nach Repowering) Detail Gosdorf, Stunden pro Jahr



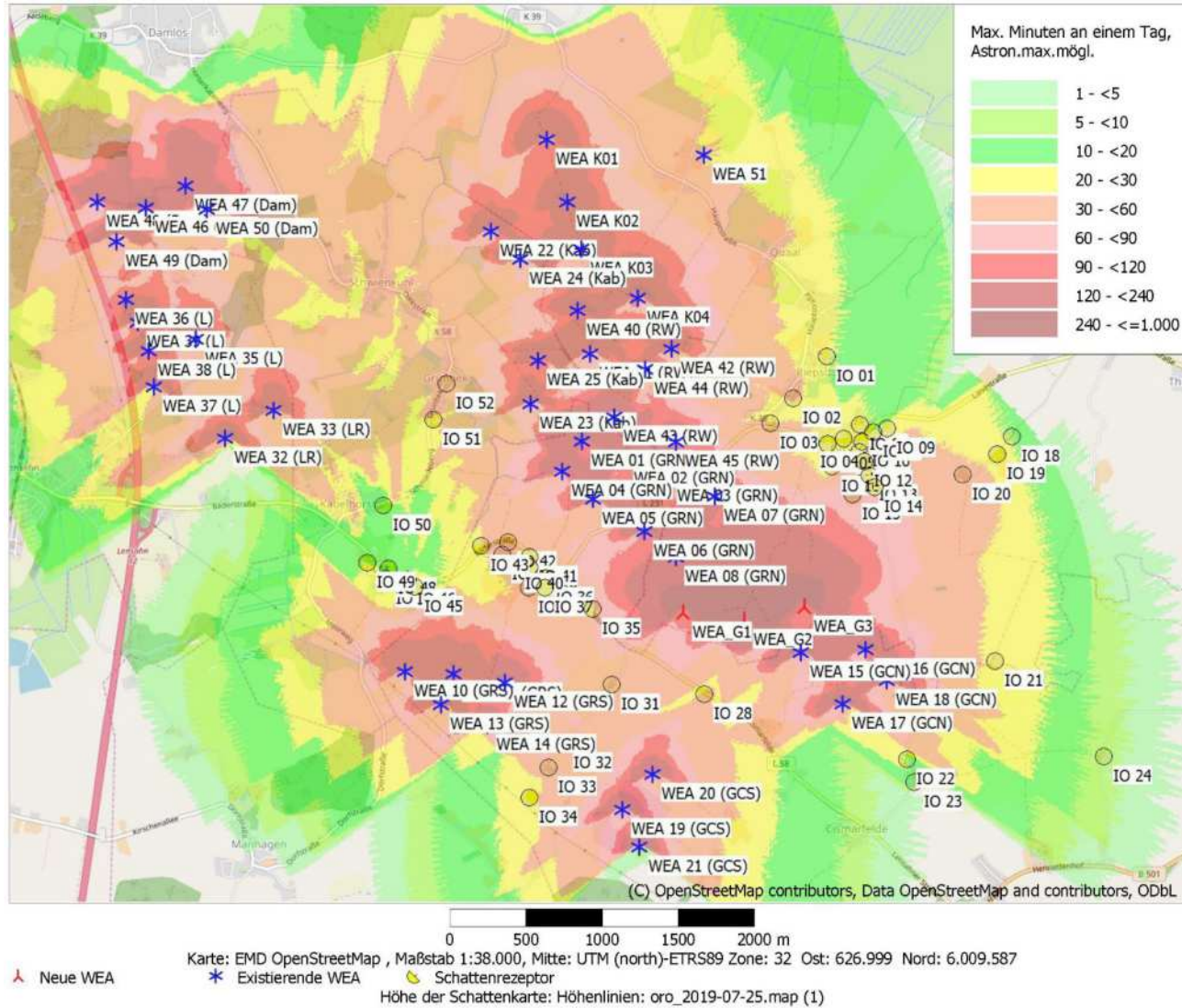
## 11.24 Schattenwurfkarte Gesamtbelastung (nach Repowering) Detail Rütting, Stunden pro Jahr



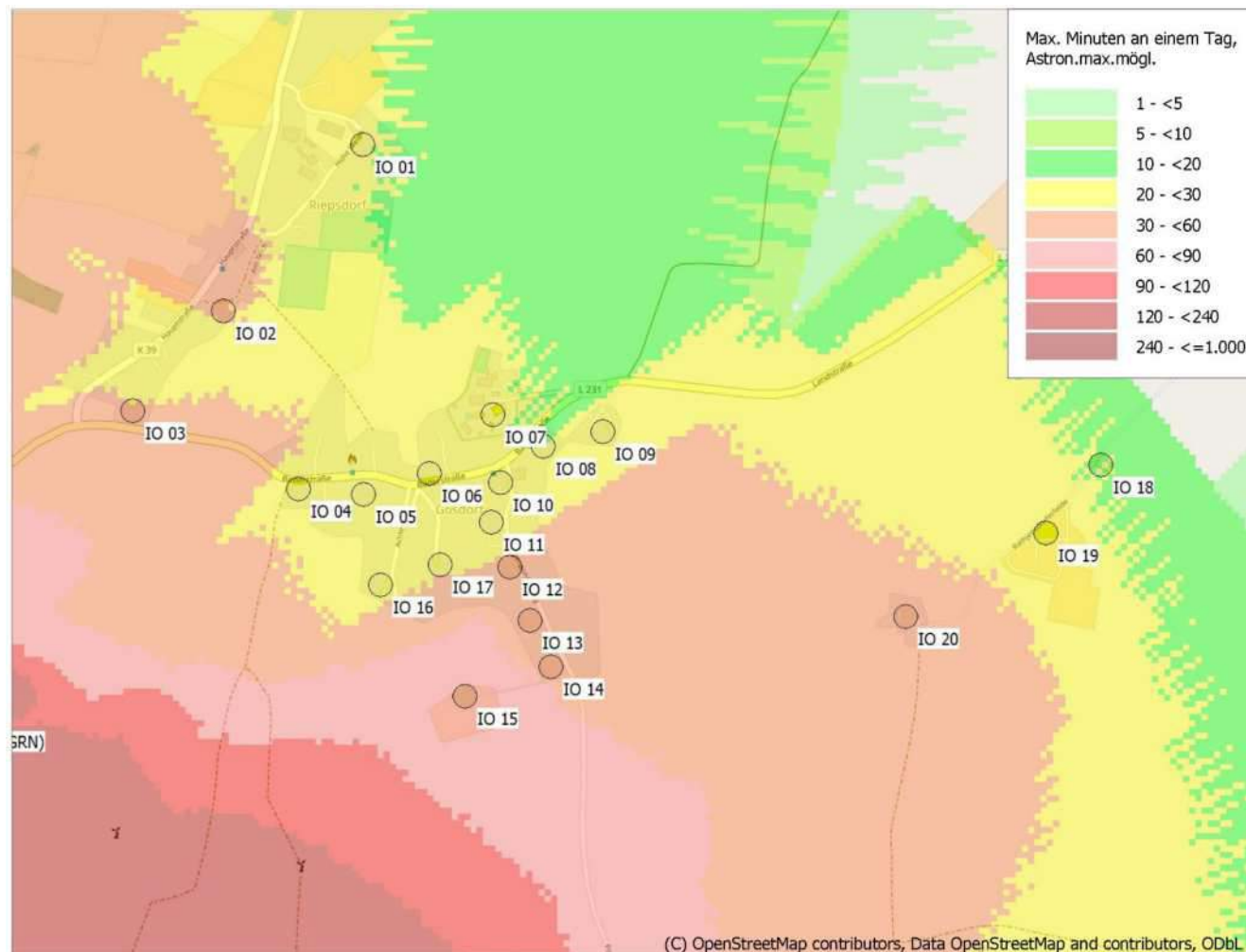
## 11.25 Schattenwurfkarte Gesamtbelastung (nach Repowering), Tage pro Jahr



## 11.26 Schattenwurfkarte Gesamtbelastung (nach Repowering), Minuten pro Tag



## 11.27 Schattenwurfkarte Gesamtbelastung (nach Repowering) Detail Gosdorf, Minuten pro Tag



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

0 100 200 300 400 m

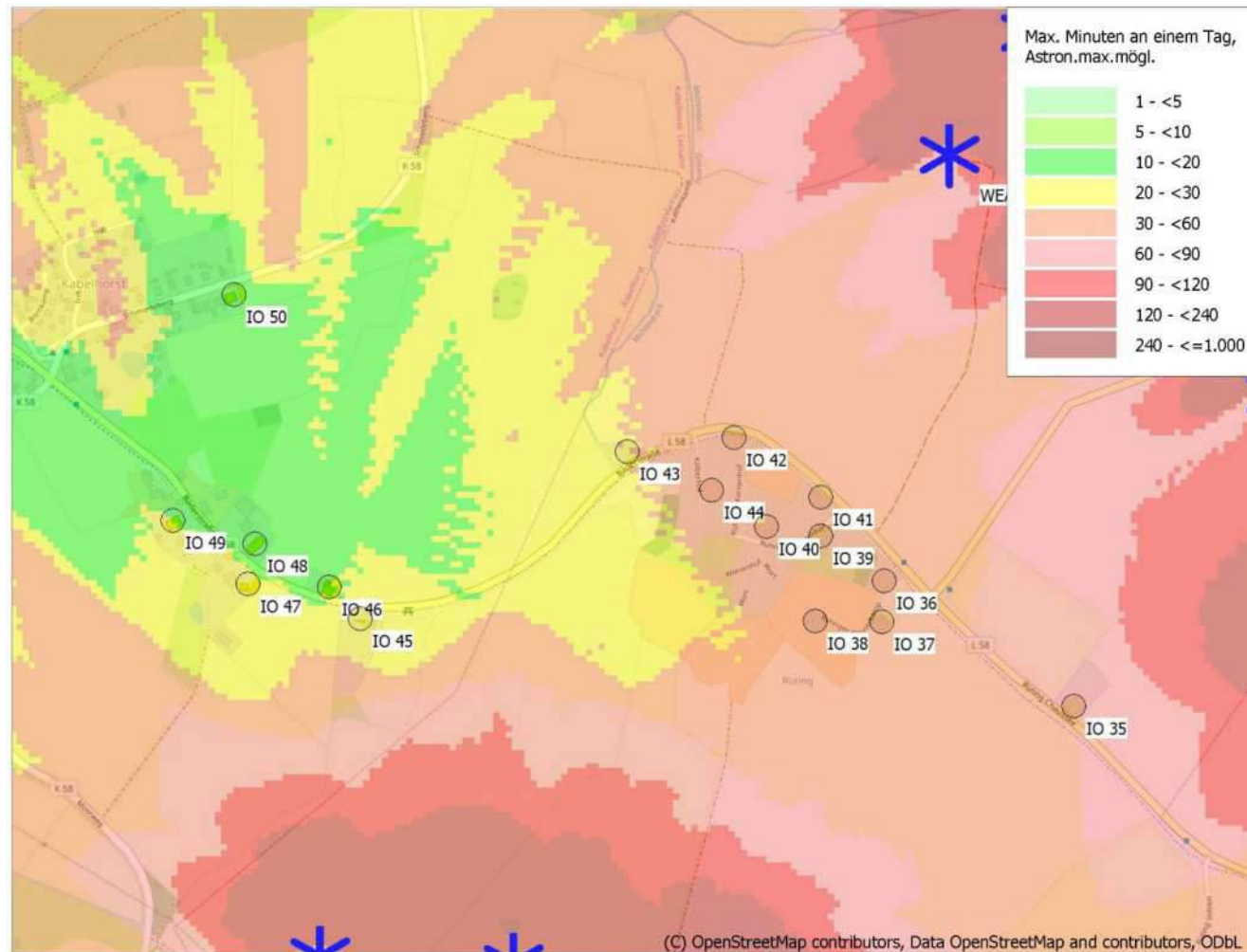
Karte: EMD OpenStreetMap , Maßstab 1:10.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 629.000 Nord: 6.009.800

▲ Neue WEA    
 ★ Existierende WEA    
 ● Schattenrezeptor

Höhe der Schattenkarte: Höhenlinien: oro\_2019-07-25.map (1)



## 11.28 Schattenwurfkarte Gesamtbelastung (nach Repowering) Detail Rütting, Minuten pro Tag



Karte: EMD OpenStreetMap , Maßstab 1:10.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 626.300 Nord: 6.008.990

▲ Neue WEA

★ Existierende WEA

● Schattenrezeptor

Höhe der Schattenkarte: Höhenlinien: oro\_2019-07-25.map (1)

# 11.29 Schattenwurfkalender Gesamtbelastung (nach Repowering), grafisch

Projekt:  
**SWP Windpark Großenholz**

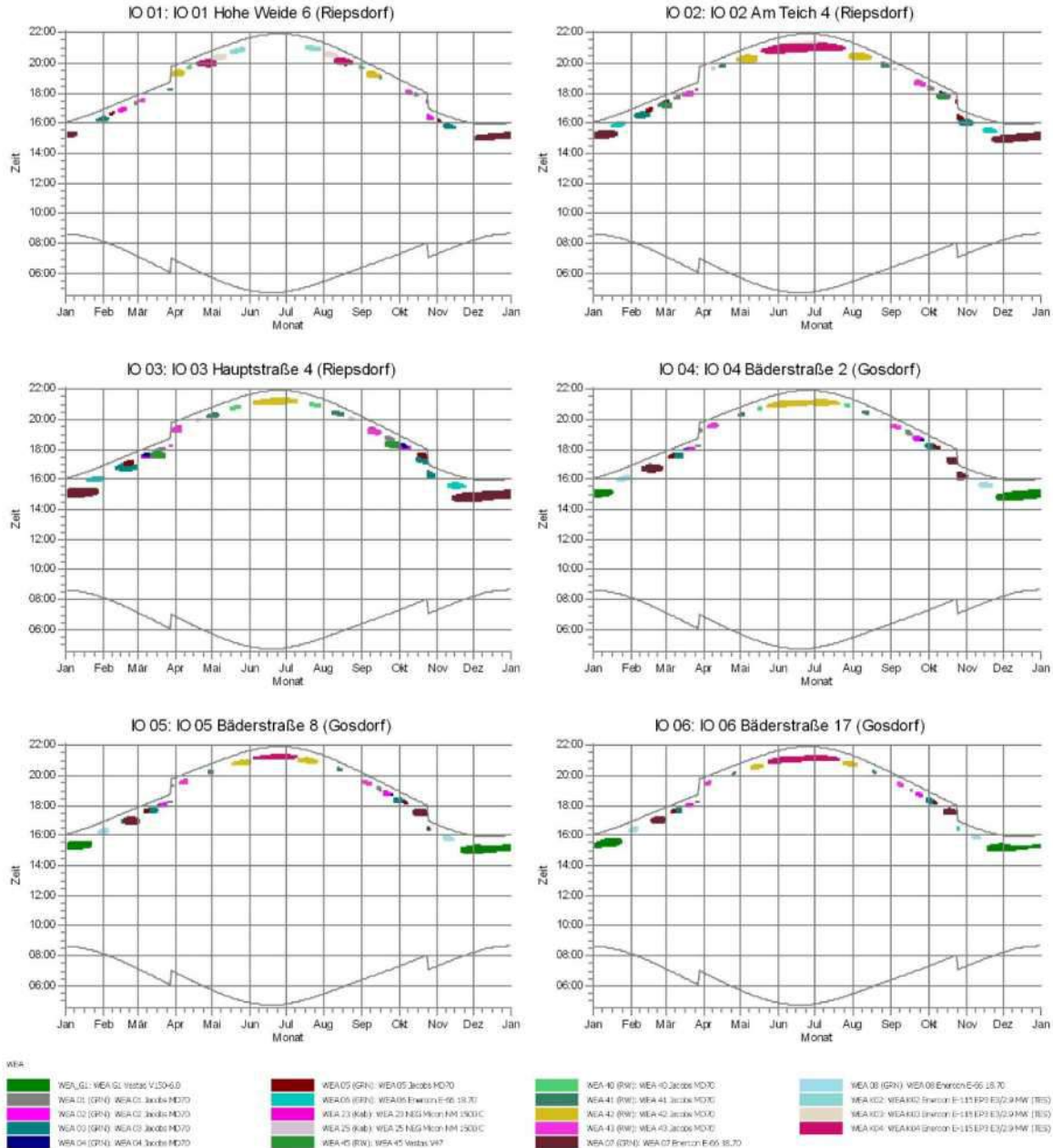
Lizenzierter Anwender:  
**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:  
22.06.2022 20:19/3.5.584

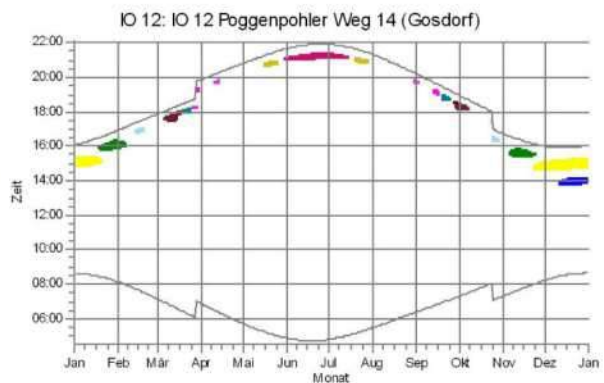
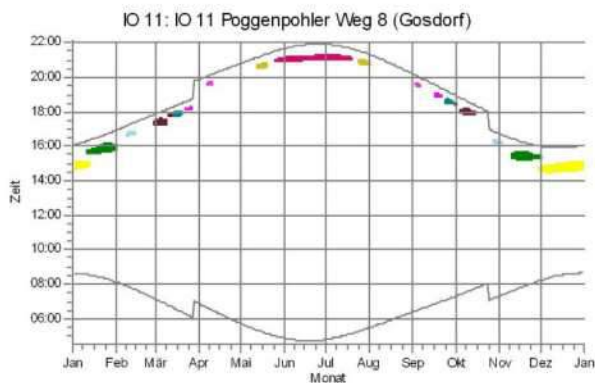
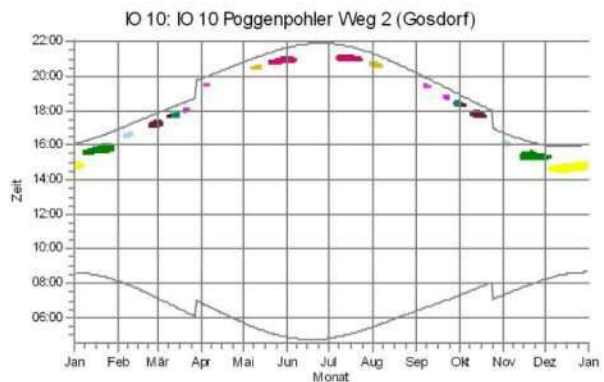
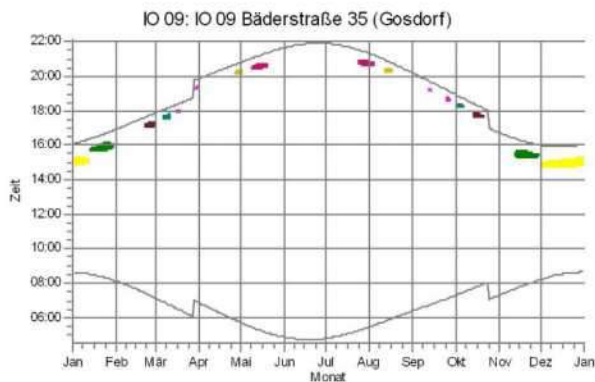
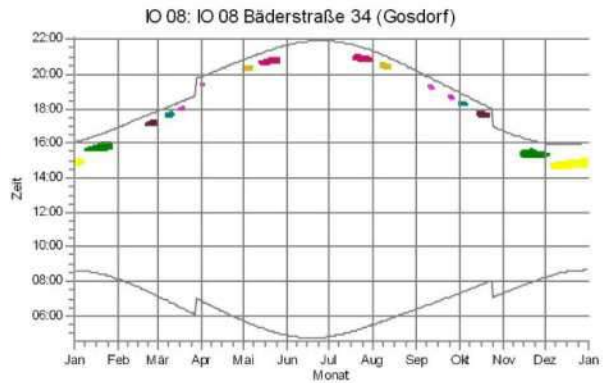
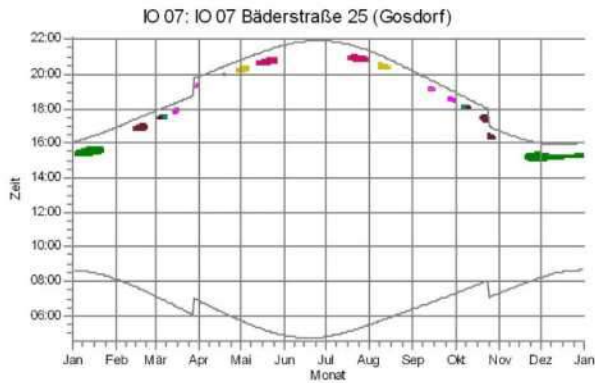
## SHADOW - Grafischer Kalender

Berechnung: Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0)



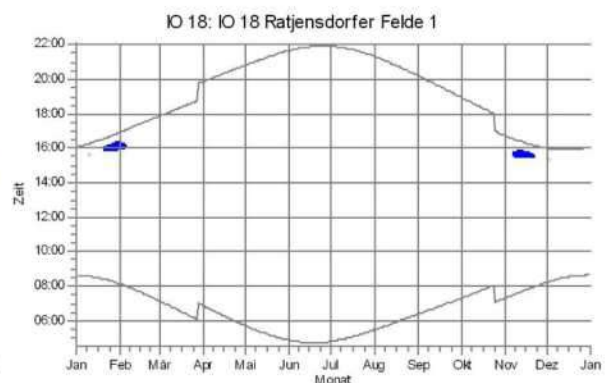
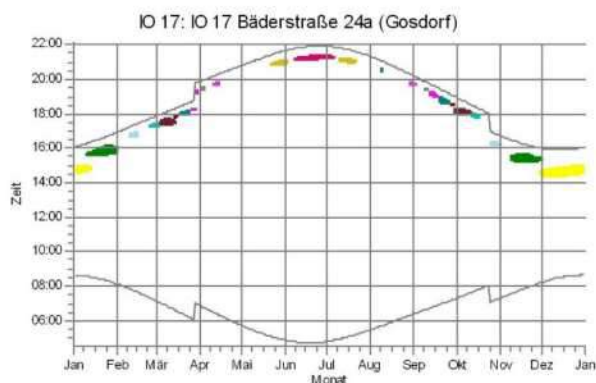
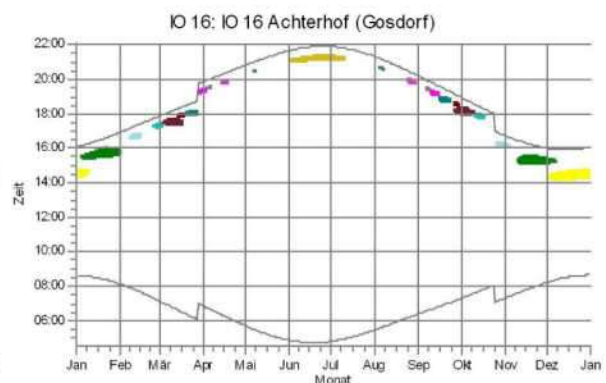
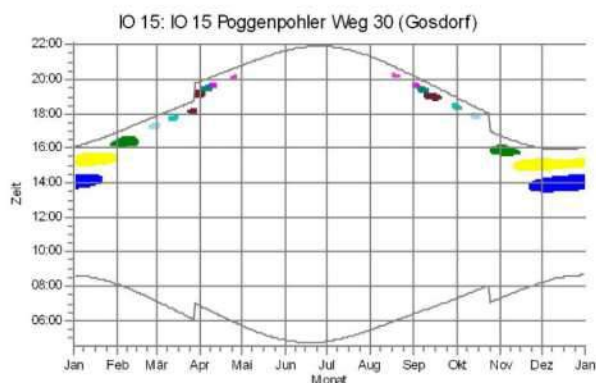
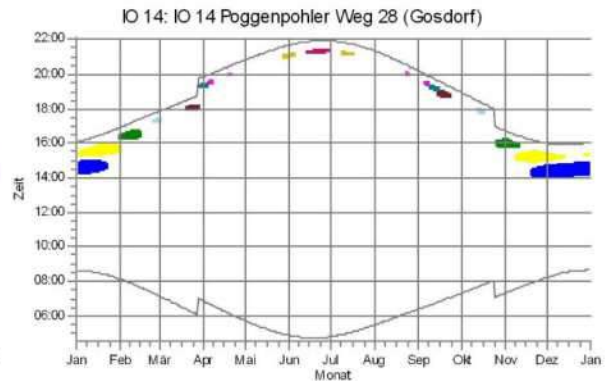
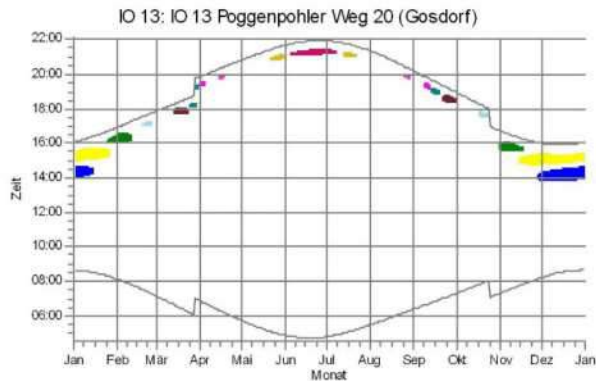
## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung; Vorbelastung und Projekt Großenholz (3 x V150-6.0)



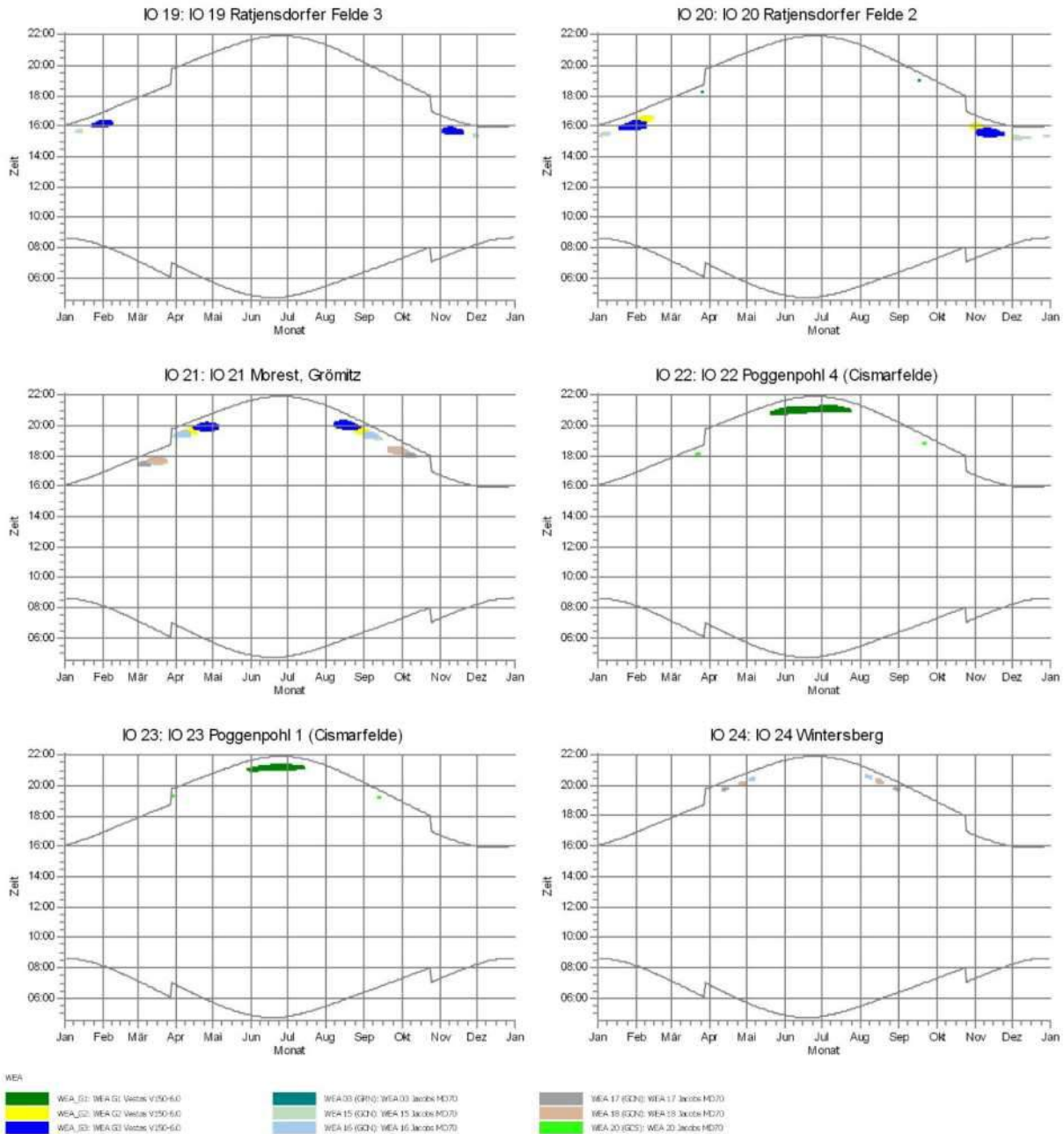
## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung; Vorbelastung und Projekt Großenholz (3 x V150-6.0)



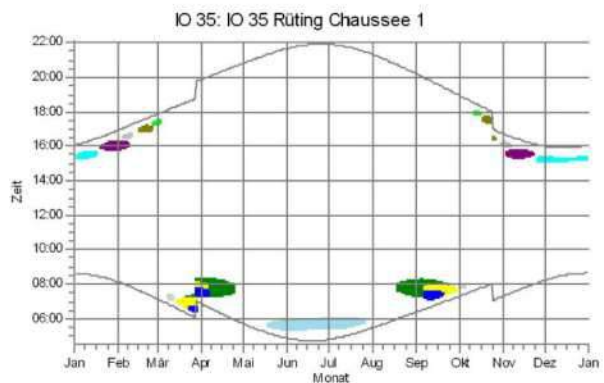
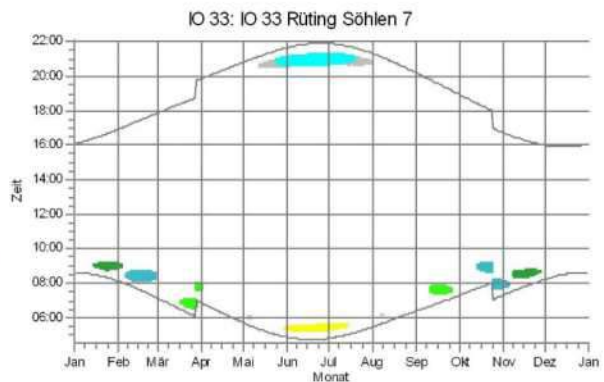
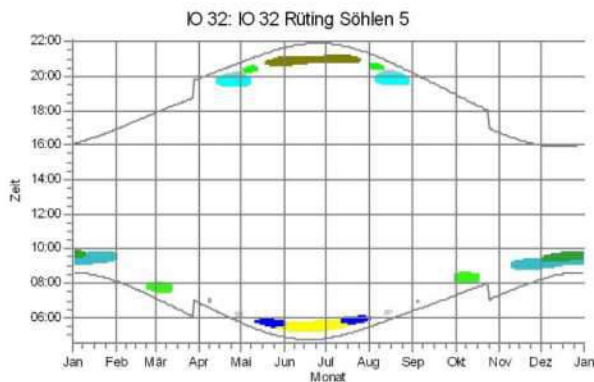
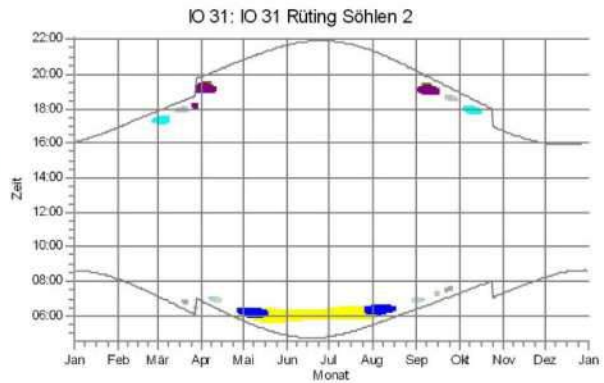
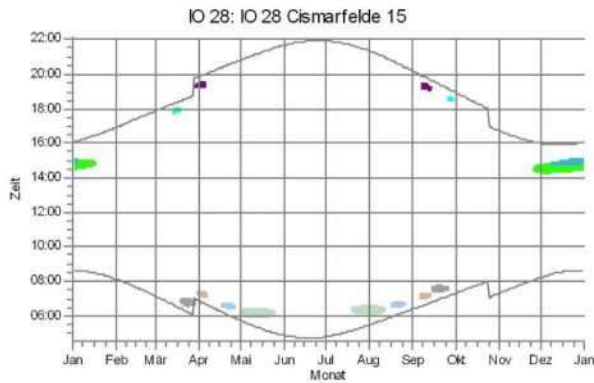
## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung; Vorbelastung und Projekt Großenholz (3 x V150-6.0)



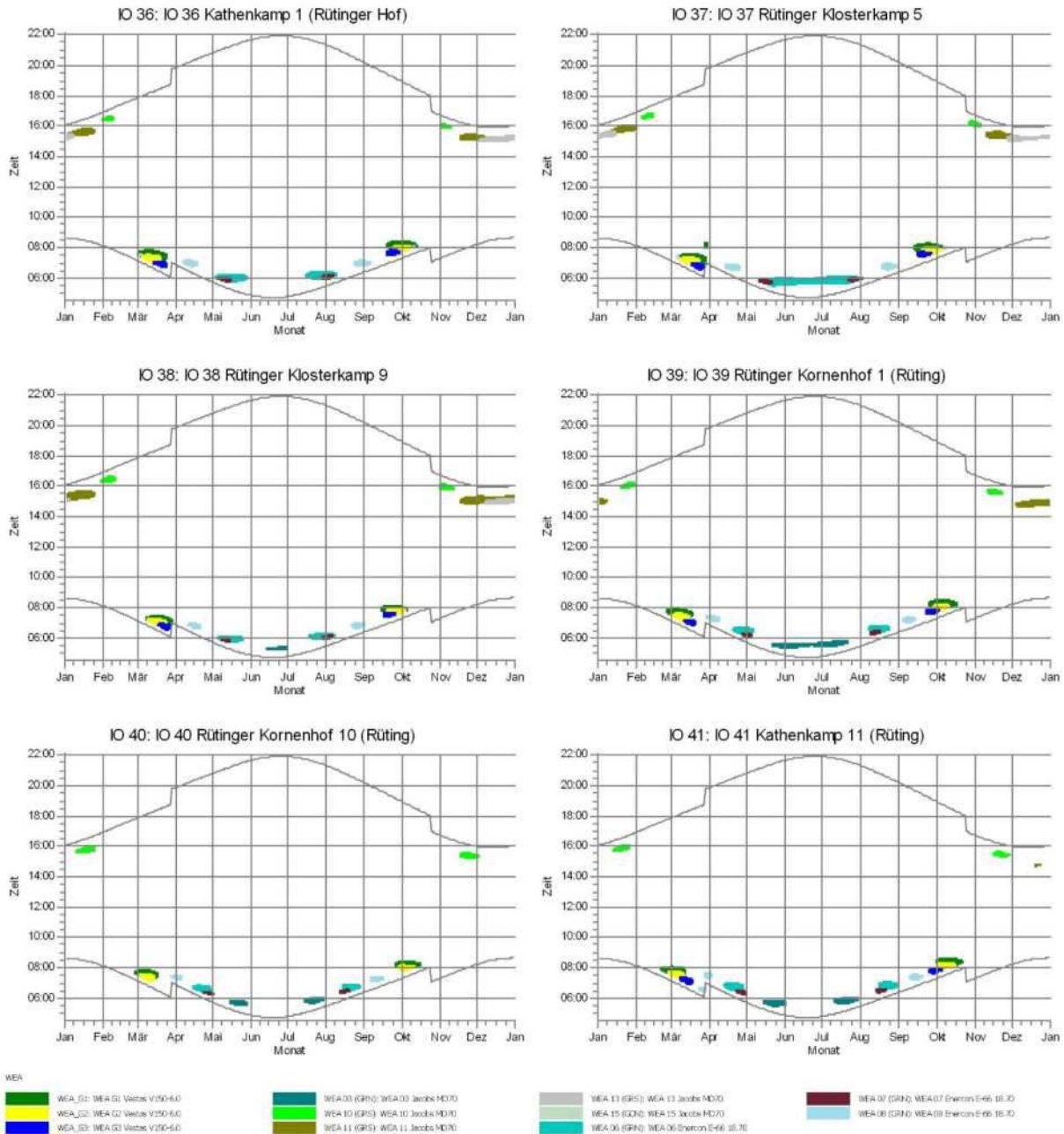
## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung; Vorbelastung und Projekt Großenholz (3 x V150-6.0)



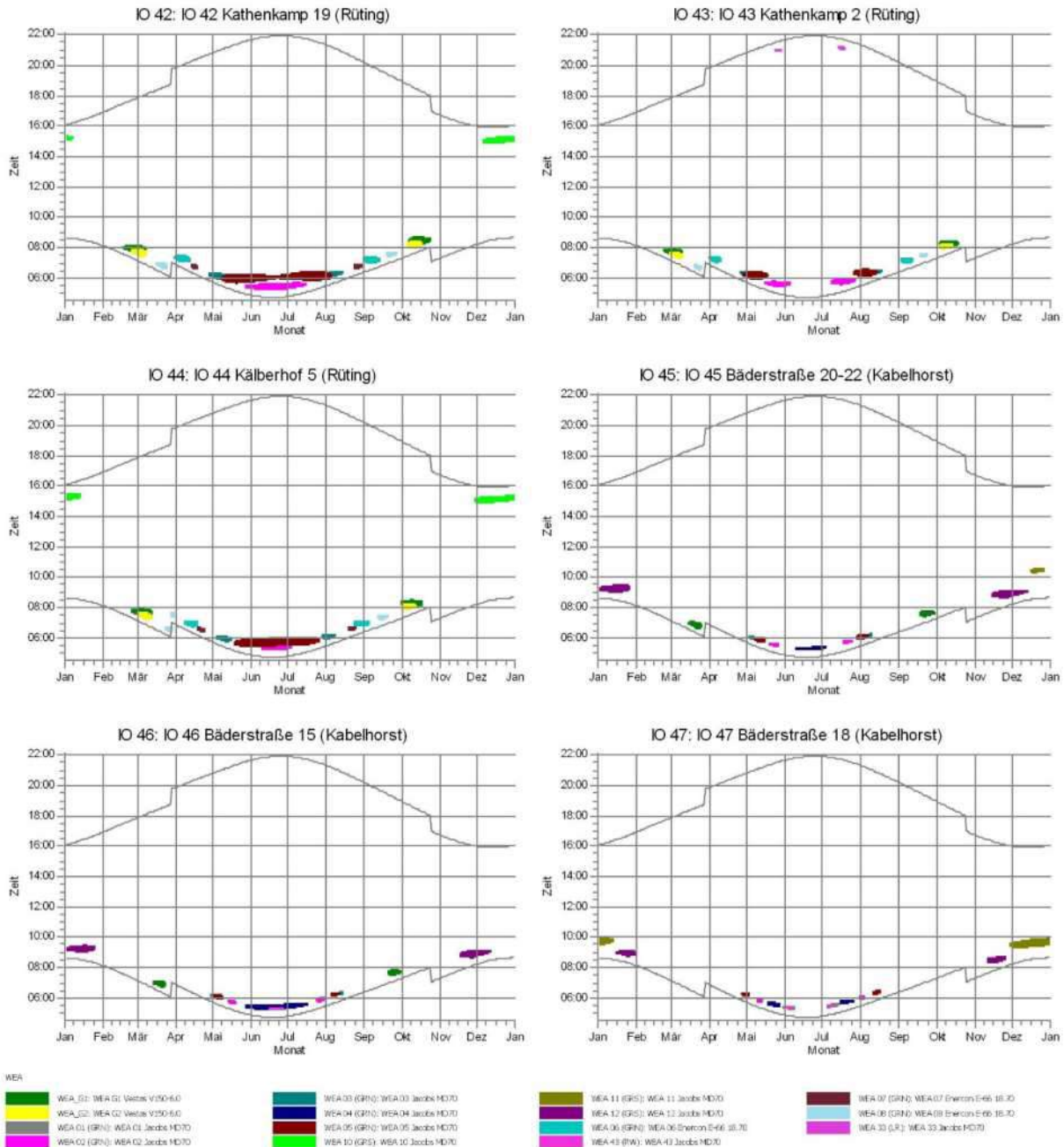
## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung; Vorbelastung und Projekt Großenholz (3 x V150-6.0)



## SHADOW - Grafischer Kalender

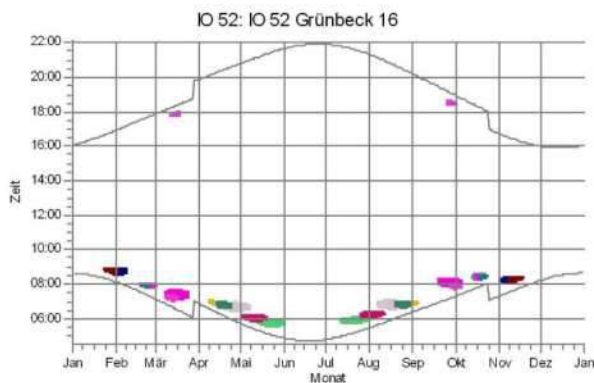
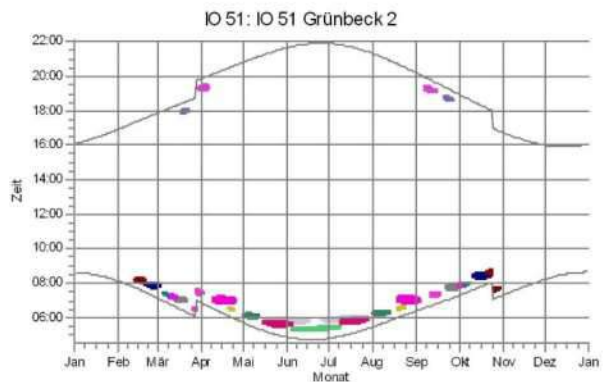
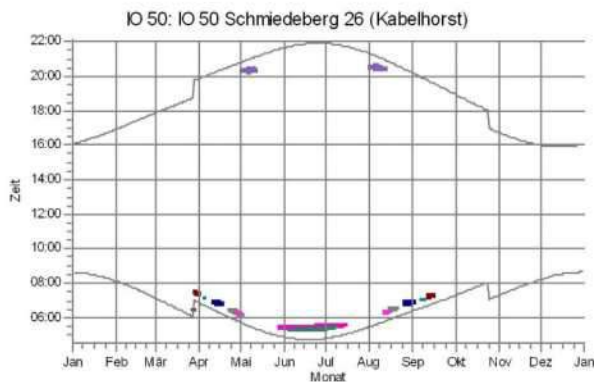
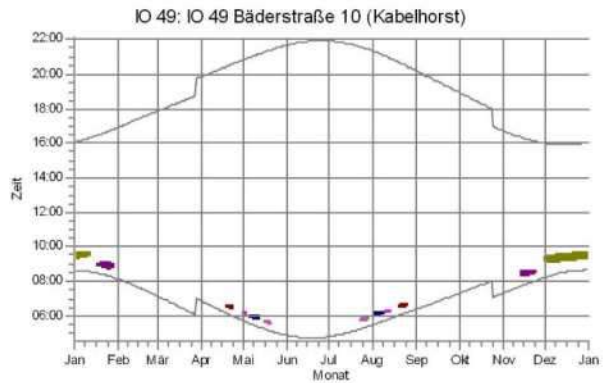
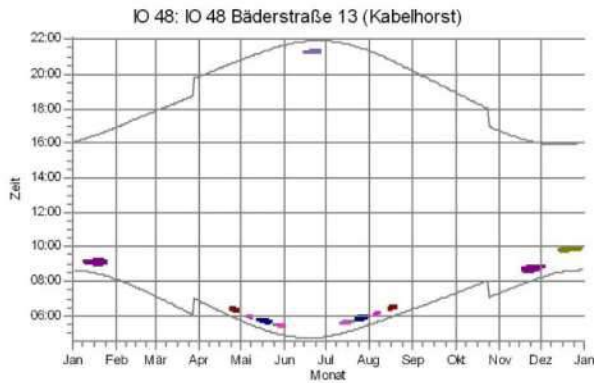
**Berechnung:** Gesamtbelastung; Vorbelastung und Projekt Großenholz (3 x V150-6.0)





## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung; Vorbelastung und Projekt Großenholz (3 x V150-6.0)





## 11.30 Schattenwurfkalender Gesamtbelastung (nach Repowering), tabellarisch

Projekt:  
SWP Windpark Großenholz

Lizenzierter Anwender:  
GL Garrad Hassan Deutschland GmbH  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:  
22.06.2022 20:19/3.5.584

### SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 01 - IO 01 Hohe Weide 6 (Riepsdorf)  
**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	08:37	15:07 (WEA 07 (GRN))	08:06	16:11 (WEA 03 (GRN))	07:08		06:52	19:13 (WEA 42 (RW))	05:41	19:51 (WEA 04)	04:51
2	08:37	15:08 (WEA 07 (GRN))	08:04	16:12 (WEA 03 (GRN))	07:05	17:25 (WEA 43 (RW))	06:49	19:13 (WEA 42 (RW))	05:39	19:53 (WEA 04)	04:50
3	08:37	15:08 (WEA 07 (GRN))	08:03	16:14 (WEA 03 (GRN))	07:03	17:25 (WEA 43 (RW))	06:47	19:12 (WEA 42 (RW))	05:37	19:55 (WEA 04)	04:49
4	08:36	15:09 (WEA 07 (GRN))	08:01	16:18 (WEA 03 (GRN))	07:01	17:25 (WEA 43 (RW))	06:44	19:12 (WEA 42 (RW))	05:35	20:16 (WEA 03)	04:48
5	08:36	15:09 (WEA 07 (GRN))	07:59	16:20 (WEA 03 (GRN))	07:58	17:30 (WEA 43 (RW))	06:42	19:13 (WEA 42 (RW))	05:33	20:23 (WEA 03)	04:47
6	08:36	15:11 (WEA 07 (GRN))	07:57		06:56	17:35 (WEA 43 (RW))	06:39	19:14 (WEA 42 (RW))	05:31	20:28 (WEA 03)	04:46
7	08:35	15:12 (WEA 07 (GRN))	07:55	16:35 (WEA 05 (GRN))	06:53	17:35 (WEA 43 (RW))	06:37	19:17 (WEA 42 (RW))	05:29	20:34 (WEA 03)	04:45
8	08:35	15:13 (WEA 07 (GRN))	07:53	16:36 (WEA 05 (GRN))	06:51		06:34	19:22 (WEA 42 (RW))	05:27	20:38 (WEA 03)	04:44
9	08:34	15:14 (WEA 07 (GRN))	07:51	16:38 (WEA 05 (GRN))	06:49		06:32		05:25	20:44 (WEA 03)	04:43
10	08:33	15:19 (WEA 07 (GRN))	07:49	16:40 (WEA 05 (GRN))	06:47		06:30		05:23	20:53 (WEA 03)	04:42
11	08:33		07:47		06:44		06:27	19:41 (WEA 40 (RW))	05:22	20:21 (WEA 03)	04:41
12	08:32		07:45		06:41		06:25	19:42 (WEA 40 (RW))	05:20	20:28 (WEA 03)	04:40
13	08:31		07:43		06:39		06:22	19:44 (WEA 40 (RW))	05:18	20:43 (WEA 03)	04:39
14	08:30		07:41	16:49 (WEA 02 (GRN))	06:38		06:20	19:44 (WEA 40 (RW))	05:16	20:54 (WEA 03)	04:38
15	08:29		07:39	16:50 (WEA 02 (GRN))	06:34		06:18		05:14	20:28 (WEA 03)	04:37
16	08:28		07:37	16:54 (WEA 02 (GRN))	06:31		06:15		05:13	20:43 (WEA 03)	04:36
17	08:27		07:35	16:58 (WEA 02 (GRN))	06:28		06:13		05:11	20:42 (WEA 03)	04:35
18	08:26		07:33	16:59 (WEA 02 (GRN))	06:26		06:10		05:09	20:43 (WEA 03)	04:34
19	08:25		07:30	16:57 (WEA 02 (GRN))	06:23		06:08	19:56 (WEA 04)	05:08	20:42 (WEA 03)	04:33
20	08:24		07:28		06:21		06:06	19:57 (WEA 04)	05:06	20:47 (WEA 03)	04:32
21	08:23		07:26		06:19		06:04	19:54 (WEA 04)	05:06	20:48 (WEA 03)	04:31
22	08:21		07:24		06:16		06:01	19:52 (WEA 04)	05:05	20:42 (WEA 03)	04:30
23	08:20		07:22		06:14		05:59	19:51 (WEA 04)	05:03	20:46 (WEA 03)	04:29
24	08:19		07:19		06:11		05:57	20:02 (WEA 04)	05:03	20:51 (WEA 03)	04:28
25	08:17		07:17		06:09		05:54	20:07 (WEA 04)	05:02	20:55 (WEA 03)	04:27
26	08:16		07:15		06:07		05:52	19:50 (WEA 04)	05:00	20:44 (WEA 03)	04:26
27	08:14	16:10 (WEA 03 (GRN))	07:12	17:18 (WEA 01 (GRN))	06:04	18:14 (WEA 41 (RW))	05:50	20:09 (WEA 04)	04:58	20:46 (WEA 03)	04:25
28	08:13	16:11 (WEA 03 (GRN))	07:10	17:20 (WEA 01 (GRN))	06:02	18:15 (WEA 41 (RW))	05:48	20:09 (WEA 04)	04:56	20:52 (WEA 03)	04:24
29	08:11	16:11 (WEA 03 (GRN))	07:08	17:22 (WEA 01 (GRN))	06:00	18:16 (WEA 41 (RW))	05:46	20:09 (WEA 04)	04:54	20:33 (WEA 03)	04:23
30	08:09	16:16 (WEA 03 (GRN))	07:06		05:59	19:14 (WEA 41 (RW))	05:44	19:50 (WEA 04)	04:54	20:08 (WEA 03)	04:22
31	08:08	16:11 (WEA 03 (GRN))	07:03		05:57	19:15 (WEA 41 (RW))	05:44	19:50 (WEA 04)	04:53	20:13 (WEA 03)	04:21
1	08:08	16:11 (WEA 03 (GRN))	07:01		05:54	19:20 (WEA 41 (RW))	05:42	20:07 (WEA 04)	04:52		04:20
2	08:07	16:20 (WEA 03 (GRN))	06:58		05:52	19:14 (WEA 42 (RW))	05:40	20:27 (WEA 04)	04:50		04:19
3	08:06		06:56		05:50	19:22 (WEA 42 (RW))	05:38		04:49		04:18
4	08:05		06:54		05:48		05:36		04:47		04:17
5	08:04		06:52		05:46		05:34		04:46		04:16
6	08:03		06:50		05:44		05:32		04:44		04:15
7	08:02		06:48		05:42		05:30		04:43		04:14
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12	07:58		06:38		05:32		05:20		04:38		04:09
13	07:57		06:36		05:30		05:18		04:37		04:08
14	07:56		06:34		05:28		05:16		04:36		04:07
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16	07:54		06:30		05:24		05:12		04:34		04:05
17	07:53		06:28		05:22		05:10		04:33		04:04
18	07:52		06:26		05:20		05:08		04:32		04:03
19	07:51		06:24		05:18		05:06		04:31		04:02
20	07:50		06:22		05:16		05:04		04:30		04:01
21	07:49		06:20		05:14		05:02		04:29		04:00
22	07:48		06:18		05:12		05:00		04:28		03:59
23	07:47		06:16		05:10		04:58		04:27		03:58
24	07:46		06:14		05:08		04:56		04:26		03:57
25	07:45		06:12		05:06		04:54		04:25		03:56
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28	07:42		06:06		05:00		04:48		04:22		03:53
29	07:41		06:04		04:58		04:46		04:21		03:52
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31	07:39		06:00		04:54		04:42		04:19		03:50
1	07:38		05:58		04:52		04:40		04:18		03:49
2	07:37		05:56		04:50		04:38		04:17		03:48
3	07:36		05:54		04:48		04:36		04:16		03:47
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5	07:34		05:50		04:44		04:32		04:14		03:45
6	07:33		05:48		04:42		04:30		04:13		03:44
7	07:32		05:46		04:40		04:28		04:12		03:43
8	07:31		05:44		04:38		04:26		04:11		03:42
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16	07:23		05:28		04:22		04:10		04:03		03:34
17	07:22		05:26		04:20		04:08		04:02		03:33
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19	07:20		05:22		04:16		04:04		04:00		03:31
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21	07:18		05:18		04:12		04:00		03:58		03:29
22	07:17		05:16		04:10		03:58		03:57		03:28
23	07:16		05:14		04:08		03:56		03:56		03:27
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25	07:14		05:10		04:04		03:52		03:54		03:25
26	07:13		05:08		04:02		03:50		03:53		03:24
27	07:12		05:06		04:00		03:48		03:52		03:23
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29	07:10		05:02		03:56		03:44		03:50		03:21
30	07:09		05:00		03:54		03:42		03:49		03:20
31	07:08		04:58		03:52		03:40		03:48		03:19
1	07:07		04:56		03:50		03:38		03:47		03:18
2	07:06		04:54		03:48		03:36		03:46		03:17
3	07:05		04:52		03:46		03:34		03:45		03:16
4	07:04		04:50		03:44		03:32		03:44		03:15
5	07:03		04:48		03:42		03:30		03:43		03:14
6	07:02		04:46		03:40		03:28		03:42		03:13
7	07:01		04:44		03:38		03:26		03:41		03:12
8	07:00		04:42		03:36		03:24		03:40		03:11
9	06:59		04:40		03:34		03:22		03:39		03:10
10	06:58		04:38		03:32		03:20		03:38		03:09
11	06:57		04:36		03:30		03:18		03:37		03:08
12	06:56		04:34		03:28		03:16		03:36		03:07
13	06:55		04:32		03:26		03:14		03:35		03:06
14	06:54		04:30		03:24		03:12		03:34		03:05
15	06:53		04:28		03:22		03:10		03:33		03:04
16	06:52		04:26		03:20		03:08		03:32		03:03
17	06:51		04:24		03:18		03:06		03:31		03:02
18	06:50		04:22		03:16		03:04		03:30		03:01
19	06:49		04:20		03:14		03:02		03:29		03:00
20	06:48		04:18		03:12						

Projekt:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0

Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 01 - IO 01 Höhe Weide 6 (Riepsdorf)

### 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

Jul	August	September	Oktober	November	Dezember
1   04:47	05:27	06:23	19:40 (WEA 40 (RW))   07:17	07:16	08:12
21:54	21:17	20:10	19:41 (WEA 40 (RW))   18:55	16:44	15:58
2   04:47	05:29	20:30 (WEA K03)   06:24	1	07:18	08:14
21:53	21:16	20:36 (WEA K03)   20:07	18:53	2   16:08 (WEA 05 (GRN))   16:42	15:58
3   04:48	05:31	20:29 (WEA K03)   06:25	07:21	16:40	16:08
21:53	21:14	20:39 (WEA K03)   20:05	18:50	1   16:07 (WEA 05 (GRN))   16:40	15:57
4   04:49	05:32	20:27 (WEA K03)   06:26	07:22	16:40	4   14:59 (WEA 07 (GRN))
21:52	21:12	20:39 (WEA K03)   20:03	18:48	16:38	15:56
5   04:50	05:34	20:27 (WEA K03)   06:26	19:13 (WEA 42 (RW))   07:24	16:38	7   15:04 (WEA 07 (GRN))
21:52	21:10	20:39 (WEA K03)   20:00	4   19:17 (WEA 42 (RW))   18:45	16:36	15:56
6   04:51	05:36	20:25 (WEA K03)   06:32	19:10 (WEA 42 (RW))   07:26	16:34	9   15:06 (WEA 07 (GRN))
21:51	21:08	20:29 (WEA K03)   19:50	10   19:20 (WEA 42 (RW))   18:43	16:34	15:55
7   04:52	05:38	20:25 (WEA K03)   06:33	19:09 (WEA 42 (RW))   07:28	18:04 (WEA 43 (RW))   07:28	10   14:57 (WEA 07 (GRN))
21:50	21:06	20:35 (WEA K03)   19:55	12   19:21 (WEA 42 (RW))   18:40	3   18:07 (WEA 43 (RW))   16:32	3   15:50 (WEA 03 (GRN))   15:54
8   04:53	05:39	20:25 (WEA K03)   06:35	19:07 (WEA 42 (RW))   07:30	18:01 (WEA 43 (RW))   07:30	15:44 (WEA 03 (GRN))   08:22
21:50	21:04	20:33 (WEA K03)   19:53	14   19:21 (WEA 42 (RW))   18:38	8   18:09 (WEA 43 (RW))   16:30	8   15:52 (WEA 03 (GRN))   15:54
9   04:54	05:41	20:25 (WEA K03)   06:37	19:06 (WEA 42 (RW))   07:32	18:00 (WEA 43 (RW))   07:32	15:43 (WEA 03 (GRN))   08:23
21:49	21:02	20:31 (WEA K03)   19:50	16   19:22 (WEA 42 (RW))   18:36	6   18:06 (WEA 43 (RW))   16:28	10   15:53 (WEA 03 (GRN))   15:54
10   04:55	05:43	20:04 (WEA K04)   06:39	19:06 (WEA 42 (RW))   07:34	17:59 (WEA 43 (RW))   07:34	15:42 (WEA 03 (GRN))   08:25
21:48	21:00	20:29 (WEA K03)   19:48	13   19:19 (WEA 42 (RW))   18:33	5   18:04 (WEA 43 (RW))   16:26	11   15:53 (WEA 03 (GRN))   15:53
11   04:56	05:45	20:22 (WEA K04)   06:41	19:06 (WEA 42 (RW))   07:35	17:59 (WEA 43 (RW))   07:36	15:43 (WEA 03 (GRN))   08:26
21:47	20:58	20:28 (WEA K03)   19:45	11   19:17 (WEA 42 (RW))   18:31	3   18:02 (WEA 43 (RW))   16:25	9   15:52 (WEA 03 (GRN))   15:53
12   04:57	05:47	19:59 (WEA K04)   06:42	19:05 (WEA 42 (RW))   07:37	07:38	15:43 (WEA 03 (GRN))   08:27
21:46	20:56	20:15 (WEA K04)   19:43	9   19:14 (WEA 42 (RW))   18:28	16:23	7   15:50 (WEA 03 (GRN))   15:53
13   04:59	05:48	19:59 (WEA K04)   06:44	19:06 (WEA 42 (RW))   07:39	17:40	15:43 (WEA 03 (GRN))   08:28
21:45	20:54	20:16 (WEA K04)   19:40	6   19:12 (WEA 42 (RW))   18:26	16:21	5   15:48 (WEA 03 (GRN))   15:53
14   05:00	05:50	19:58 (WEA K04)   06:46	19:05 (WEA 41 (RW))   07:41	17:52 (WEA 01 (GRN))   07:42	15:43 (WEA 03 (GRN))   08:29
21:44	20:51	20:17 (WEA K04)   19:38	5   19:10 (WEA 41 (RW))   18:24	2   17:54 (WEA 01 (GRN))   16:20	3   15:46 (WEA 03 (GRN))   15:53
15   05:01	05:52	19:57 (WEA K04)   06:48	19:04 (WEA 41 (RW))   07:43	17:50 (WEA 01 (GRN))   07:44	15:43 (WEA 03 (GRN))   08:30
21:43	20:49	20:16 (WEA K04)   19:35	3   19:07 (WEA 41 (RW))   18:21	2   17:52 (WEA 01 (GRN))   16:18	1   15:44 (WEA 03 (GRN))   15:53
16   05:03	05:54	19:56 (WEA K04)   06:50	19:02 (WEA 41 (RW))   07:45	07:45	08:31
21:42	20:47	20:17 (WEA K04)   19:33	2   19:04 (WEA 41 (RW))   18:19	16:16	15:53
17   05:04	20:56 (WEA K02)   05:56	19:56 (WEA K04)   06:51	07:47	07:47	15:53
21:41	21:02 (WEA K02)   20:45	20:15 (WEA K04)   19:30	18:17	16:15	15:53
18   05:05	20:55 (WEA K02)   05:57	19:55 (WEA K04)   06:53	07:49	07:49	15:53
21:39	21:03 (WEA K02)   20:43	20:13 (WEA K04)   19:28	18:14	16:13	15:53
19   05:07	20:54 (WEA K02)   05:59	19:56 (WEA K04)   06:55	07:51	07:51	15:53
21:38	21:04 (WEA K02)   20:40	20:11 (WEA K04)   19:25	18:12	16:12	15:53
20   05:08	20:54 (WEA K02)   06:01	19:56 (WEA K04)   06:57	07:53	07:53	15:53
21:37	21:03 (WEA K02)   20:38	20:09 (WEA K04)   19:23	18:10	16:11	15:54
21   05:10	20:53 (WEA K02)   06:03	19:57 (WEA K04)   06:59	07:55	07:55	15:54
21:35	21:02 (WEA K02)   20:36	20:07 (WEA K04)   19:20	18:07	16:09	15:54
22   05:11	20:52 (WEA K02)   06:05	19:57 (WEA K04)   07:00	07:57	07:57	15:54
21:34	21:00 (WEA K02)   20:34	20:04 (WEA K04)   19:18	18:05	16:08	15:55
23   05:13	20:53 (WEA K02)   06:06	19:58 (WEA K04)   07:02	07:58	07:58	15:55
21:32	20:59 (WEA K02)   20:31	20:02 (WEA K04)   19:15	18:03	16:07	15:55
24   05:14	20:52 (WEA K02)   06:08	07:04	08:00	17:22 (WEA 02 (GRN))   08:00	08:36
21:31	20:57 (WEA K02)   20:29	19:13	18:01	6   17:28 (WEA 02 (GRN))   16:05	15:56
25   05:16	20:53 (WEA K02)   06:10	07:06	17:02	16:21 (WEA 02 (GRN))   08:02	08:36
21:29	20:57 (WEA K02)   20:27	19:10	16:58	7   16:28 (WEA 02 (GRN))   16:04	15:56
26   05:17	20:52 (WEA K02)   06:12	07:08	16:56	16:20 (WEA 02 (GRN))   08:04	08:37
21:28	20:55 (WEA K02)   20:24	19:08	16:56	5   16:25 (WEA 02 (GRN))   16:03	15:57
27   05:19	20:53 (WEA K02)   06:14	07:10	16:56	16:19 (WEA 02 (GRN))   08:05	08:37
21:26	20:54 (WEA K02)   20:22	19:05	16:54	4   16:23 (WEA 02 (GRN))   16:02	15:58
28   05:21	06:15	07:11	16:54	16:19 (WEA 02 (GRN))   08:07	08:37
21:25	20:20	19:03	16:52	1   16:20 (WEA 02 (GRN))   16:01	15:59
29   05:22	06:17	07:13	16:50	16:09	08:37
21:23	20:17	19:00	16:50	16:00	15:59
30   05:24	06:19	19:43 (WEA 40 (RW))   07:15	07:12	16:10	08:37
21:21	20:15	3   19:46 (WEA 40 (RW))   18:58	16:48	15:59	16:01
31   05:26	06:21	19:42 (WEA 40 (RW))   18:58	07:14	16:00	08:37
21:19	20:12	2   19:44 (WEA 40 (RW))   18:58	16:46	16:02	16:02
Sommereinheiten   515	461	383	328	257	231
astr. max. mögl. Beschattung   69	294	106	52	60	383

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

Projekt:

SWP Windpark Großenholz

Lizenzierter Anwender:

GL Garrad Hassan Deutschland GmbH  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 02 - IO 02 Am Teich 4 (Riepsdorf)

### 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 08:37	15:00 (WEA 07 (GRN))   08:06	07:00	17:05 (WEA 45 (RW))   06:52	05:41	20:00 (WEA 42 (RW))   04:51	20:42 (WEA K04)	
16:03	21 15:21 (WEA 07 (GRN))   16:55	17:52	19 17:24 (WEA 04 (GRN))   19:51	20:48	9 20:17 (WEA 40 (RW))   21:39	21 21:03 (WEA K04)	
2 08:37	15:01 (WEA 07 (GRN))   08:04	07:05	17:06 (WEA 45 (RW))   06:49	05:39	20:07 (WEA 42 (RW))   04:50	20:42 (WEA K04)	
16:04	21 15:22 (WEA 07 (GRN))   16:57	17:54	18 17:26 (WEA 04 (GRN))   19:53	20:49	12 20:19 (WEA 40 (RW))   21:40	22 21:04 (WEA K04)	
3 08:37	15:00 (WEA 07 (GRN))   08:03	07:03	17:06 (WEA 45 (RW))   06:47	05:37	20:06 (WEA 42 (RW))   04:49	20:43 (WEA K04)	
16:05	22 15:22 (WEA 07 (GRN))   16:59	17:56	12 17:18 (WEA 45 (RW))   19:55	20:51	14 20:20 (WEA 40 (RW))   21:41	23 21:06 (WEA K04)	
4 08:36	15:01 (WEA 07 (GRN))   08:01	16:29 (WEA 03 (GRN))   07:01	17:07 (WEA 45 (RW))   06:44	05:35	20:07 (WEA 42 (RW))   04:48	20:43 (WEA K04)	
16:07	22 15:23 (WEA 07 (GRN))   17:01	1 16:30 (WEA 03 (GRN))   17:58	9 17:16 (WEA 45 (RW))   19:57	20:53	18 20:23 (WEA 42 (RW))   21:42	25 21:07 (WEA K03)	
5 08:36	15:01 (WEA 07 (GRN))   07:59	16:29 (WEA 03 (GRN))   06:58	17:10 (WEA 45 (RW))   06:42	05:33	20:06 (WEA 42 (RW))   04:47	20:42 (WEA K04)	
16:08	22 15:23 (WEA 07 (GRN))   17:03	4 16:32 (WEA 03 (GRN))   18:00	4 17:14 (WEA 45 (RW))   19:59	20:55	18 20:24 (WEA 42 (RW))   21:43	26 21:08 (WEA K03)	
6 08:36	15:02 (WEA 07 (GRN))   07:57	16:26 (WEA 03 (GRN))   06:56	06:39	05:31	20:06 (WEA 42 (RW))   04:47	20:43 (WEA K04)	
16:09	22 15:24 (WEA 07 (GRN))   17:05	7 16:33 (WEA 03 (GRN))   18:02	20:01	20:57	19 20:25 (WEA 42 (RW))   21:44	26 21:09 (WEA K03)	
7 08:35	15:03 (WEA 07 (GRN))   07:55	16:26 (WEA 03 (GRN))   06:53	06:37	05:29	20:06 (WEA 42 (RW))   04:46	20:43 (WEA K04)	
16:10	21 15:24 (WEA 07 (GRN))   17:07	10 16:36 (WEA 03 (GRN))   18:03	20:02	20:59	19 20:26 (WEA 42 (RW))   21:45	27 21:10 (WEA K03)	
8 08:35	15:03 (WEA 07 (GRN))   07:53	16:25 (WEA 03 (GRN))   06:51	06:34	05:27	20:06 (WEA 42 (RW))   04:45	20:44 (WEA K04)	
16:12	21 15:24 (WEA 07 (GRN))   17:09	13 16:38 (WEA 03 (GRN))   18:05	20:04	21:00	19 20:26 (WEA 42 (RW))   21:46	27 21:11 (WEA K03)	
9 08:34	15:03 (WEA 07 (GRN))   07:51	16:25 (WEA 03 (GRN))   06:49	17:30 (WEA 01 (GRN))   06:32	05:25	20:06 (WEA 42 (RW))   04:45	20:44 (WEA K04)	
16:13	21 15:24 (WEA 07 (GRN))   17:11	15 16:40 (WEA 03 (GRN))   18:07	3 17:41 (WEA 01 (GRN))   20:06	2 19:37 (WEA 25 (Kob))   21:02	18 20:24 (WEA 42 (RW))   21:47	27 21:11 (WEA K03)	
10 08:33	15:04 (WEA 07 (GRN))   07:49	16:26 (WEA 03 (GRN))   06:46	17:38 (WEA 01 (GRN))   06:30	05:23	20:07 (WEA 42 (RW))   04:44	20:44 (WEA K04)	
16:15	20 15:24 (WEA 07 (GRN))   17:13	17 16:43 (WEA 03 (GRN))   18:09	4 17:42 (WEA 01 (GRN))   20:08	21:04	20:24 (WEA 42 (RW))   21:48	28 21:12 (WEA K03)	
11 08:33	15:04 (WEA 07 (GRN))   07:47	16:26 (WEA 03 (GRN))   06:44	17:39 (WEA 01 (GRN))   06:27	05:22	20:07 (WEA 42 (RW))   04:44	20:44 (WEA K04)	
16:16	20 15:24 (WEA 07 (GRN))   17:15	17 16:43 (WEA 03 (GRN))   18:11	6 17:45 (WEA 01 (GRN))   20:10	21:06	16 20:23 (WEA 42 (RW))   21:49	28 21:12 (WEA K03)	
12 08:32	15:05 (WEA 07 (GRN))   07:45	16:27 (WEA 03 (GRN))   06:41	6 17:46 (WEA 01 (GRN))   20:12	05:20	20:08 (WEA 42 (RW))   04:43	20:45 (WEA K04)	
16:18	19 15:24 (WEA 07 (GRN))   17:17	16 16:43 (WEA 03 (GRN))   18:13	20:12	21:09	14 20:22 (WEA 42 (RW))   21:50	28 21:13 (WEA K03)	
13 08:31	15:06 (WEA 07 (GRN))   07:43	16:28 (WEA 03 (GRN))   06:39	06:22	05:18	20:10 (WEA 42 (RW))   04:43	20:45 (WEA K04)	
16:20	18 15:24 (WEA 07 (GRN))   17:19	14 16:42 (WEA 03 (GRN))   18:15	20:14	21:09	11 20:21 (WEA 42 (RW))   21:50	29 21:14 (WEA K03)	
14 08:30	15:07 (WEA 07 (GRN))   07:41	16:28 (WEA 03 (GRN))   06:36	06:20	05:16	20:11 (WEA 42 (RW))   04:43	20:46 (WEA K04)	
16:21	17 15:24 (WEA 07 (GRN))   17:22	14 16:51 (WEA 03 (GRN))   18:17	20:16	2 19:47 (WEA 41 (RW))   21:11	8 20:19 (WEA 42 (RW))   21:51	29 21:15 (WEA K03)	
15 08:29	15:08 (WEA 07 (GRN))   07:39	16:30 (WEA 03 (GRN))   06:34	06:18	05:14	20:12 (WEA 42 (RW))   04:42	20:46 (WEA K04)	
16:23	16 15:24 (WEA 07 (GRN))   17:24	12 16:54 (WEA 03 (GRN))   18:19	20:18	4 19:49 (WEA 41 (RW))   21:13	21:52	30 21:16 (WEA K03)	
16 08:28	15:09 (WEA 07 (GRN))   07:37	16:50 (WEA 03 (GRN))   06:31	17:52 (WEA 43 (RW))   06:15	05:13	20:13 (WEA 42 (RW))   04:42	20:46 (WEA K04)	
16:25	15 15:24 (WEA 07 (GRN))   17:26	6 16:56 (WEA 03 (GRN))   18:21	2 17:54 (WEA 43 (RW))   20:19	7 19:52 (WEA 41 (RW))   21:14	21:52	29 21:15 (WEA K03)	
17 08:27	15:11 (WEA 07 (GRN))   07:35	16:52 (WEA 03 (GRN))   06:29	17:52 (WEA 43 (RW))   06:13	05:11	19:45 (WEA 41 (RW))   21:16	20:46 (WEA K04)	
16:26	14 15:51 (WEA 06 (GRN))   17:28	7 16:59 (WEA 03 (GRN))   18:23	4 17:56 (WEA 43 (RW))   20:21	8 19:53 (WEA 41 (RW))   21:16	21:53	29 21:15 (WEA K03)	
18 08:26	15:12 (WEA 07 (GRN))   07:33	06:26	17:51 (WEA 43 (RW))   06:10	05:09	20:14 (WEA 42 (RW))   04:42	20:46 (WEA K04)	
16:28	13 15:52 (WEA 06 (GRN))   17:30	18:25	7 17:58 (WEA 43 (RW))   20:23	21:18	7 19:53 (WEA 41 (RW))   21:18	21:53	29 21:15 (WEA K03)
19 08:25	15:15 (WEA 07 (GRN))   07:30	06:24	17:51 (WEA 43 (RW))   06:08	05:08	20:15 (WEA 42 (RW))   04:42	20:47 (WEA K04)	
16:30	11 15:55 (WEA 06 (GRN))   17:32	18:27	9 18:00 (WEA 43 (RW))   20:25	21:19	1 20:47 (WEA K04)   21:54	29 21:16 (WEA K03)	
20 08:24	15:51 (WEA 06 (GRN))   07:28	06:21	17:50 (WEA 43 (RW))   06:06	05:06	20:45 (WEA K04)   21:54	29 21:16 (WEA K03)	
16:32	6 15:57 (WEA 06 (GRN))   17:34	18:28	11 18:01 (WEA 43 (RW))   20:27	21:21	3 20:48 (WEA K04)   21:54	29 21:16 (WEA K03)	
21 08:23	15:51 (WEA 06 (GRN))   07:26	06:19	17:51 (WEA 43 (RW))   06:04	05:05	20:44 (WEA K04)   21:54	29 21:16 (WEA K03)	
16:34	8 15:59 (WEA 06 (GRN))   17:36	18:30	12 18:03 (WEA 43 (RW))   20:29	21:23	5 20:49 (WEA K04)   21:54	29 21:16 (WEA K03)	
22 08:21	15:52 (WEA 06 (GRN))   07:24	06:16	17:52 (WEA 43 (RW))   06:01	05:03	20:44 (WEA K04)   21:54	29 21:16 (WEA K03)	
16:35	9 16:01 (WEA 06 (GRN))   17:38	18:32	8 18:00 (WEA 43 (RW))   20:31	21:24	7 20:51 (WEA K04)   21:54	29 21:16 (WEA K03)	
23 08:20	15:52 (WEA 06 (GRN))   07:22	06:14	05:59	05:02	20:42 (WEA K04)   21:54	29 21:16 (WEA K03)	
16:37	11 16:03 (WEA 06 (GRN))   17:40	18:34	20:33	21:26	10 20:52 (WEA K04)   21:55	29 21:16 (WEA K03)	
24 08:19	15:53 (WEA 06 (GRN))   07:19	17:11 (WEA 02 (GRN))   06:12	05:57	05:00	20:42 (WEA K04)   21:55	29 21:16 (WEA K03)	
16:39	9 16:02 (WEA 06 (GRN))   17:42	2 17:13 (WEA 02 (GRN))   18:36	20:34	21:27	11 20:53 (WEA K04)   21:55	29 21:17 (WEA K03)	
25 08:17	15:53 (WEA 06 (GRN))   07:17	17:10 (WEA 45 (RW))   06:09	05:54	04:58	20:42 (WEA K04)   21:55	29 21:17 (WEA K03)	
16:41	7 16:02 (WEA 06 (GRN))   17:44	6 17:15 (WEA 02 (GRN))   18:38	20:36	21:29	13 20:55 (WEA K04)   21:55	29 21:17 (WEA K03)	
26 08:16	15:58 (WEA 06 (GRN))   07:15	17:08 (WEA 45 (RW))   06:07	18:12 (WEA 23 (Kob))   05:52	04:58	20:42 (WEA K04)   21:55	29 21:17 (WEA K03)	
16:43	1 15:59 (WEA 06 (GRN))   17:46	10 17:18 (WEA 45 (RW))   18:40	1 18:13 (WEA 23 (Kob))   05:50	21:30	14 20:56 (WEA K04)   21:55	29 21:18 (WEA K03)	
27 08:14	15:59 (WEA 06 (GRN))   07:12	17:06 (WEA 45 (RW))   06:04	05:48	04:57	20:42 (WEA K04)   21:55	29 21:18 (WEA K03)	
16:45	17:48	14 17:20 (WEA 02 (GRN))   18:42	20:40	21:32	16 20:58 (WEA K04)   21:55	30 21:18 (WEA K03)	
28 08:13	07:10	17:06 (WEA 45 (RW))   06:02	05:48	04:55	20:42 (WEA K04)   21:55	29 21:18 (WEA K03)	
16:47	17:50	16 17:22 (WEA 04 (GRN))   18:44	20:42	21:33	17 20:59 (WEA K04)   21:54	29 21:18 (WEA K03)	
29 08:11		06:59	05:46	04:54	20:42 (WEA K04)   21:54	29 21:18 (WEA K03)	
16:49		19:46	20:44	3 20:14 (WEA 42 (RW))   21:35	18 21:00 (WEA K04)   21:54	30 21:18 (WEA K03)	
30 08:09		06:57	05:44	20:09 (WEA 42 (RW))   21:36	19 20:42 (WEA K04)   21:54	29 21:18 (WEA K03)	
16:51		19:47	20:46	6 20:15 (WEA 42 (RW))   21:36	19 21:01 (WEA K04)   21:54	29 21:18 (WEA K03)	
31 08:08		06:54	05:42	04:52	20:42 (WEA K04)   21:54	29 21:18 (WEA K03)	
16:53		19:49		21:37	20 21:02 (WEA K04)   21:54	29 21:18 (WEA K03)	
Sommerscheinstunden	248	272	421	496	513	833	
astr. max. mögl. Beschattung	407	201	135	39	364	833	

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:

SWP Windpark Großenholz

Lizenzierter Anwender:

GL Garrad Hassan Deutschland GmbH
Sommerdeich 14 b
DE-25709 Kaiser-Wilhelm-Koog
(0 48 56)901-0

Berechnet:

22.06.2022 20:19/3.5.584

SHADOW - Kalender

Berechnung: Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) Schattenrezeptor: IO 02 - IO 02 Am Teich 4 (Riepsdorf)

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

Table with columns for months (July to December) and rows for individual days, listing sunrise, sunset, and shadow times for various WEA units.

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

Table with 3 columns: 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)

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großholz (3 x V150-6.0) **Schattenrezeptor:** IO 03 - IO 03 Hauptstraße 4 (Riesdorf)

### 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	08:37	14:49 (WEA 07 (GRN))	08:06			07:08		06:52	19:11 (WEA 43 (RW))	05:41	20:09 (WEA 41 (RW))	04:51	
1	14:03	27	15:16 (WEA 07 (GRN))	14:55		17:52		19:51	13	19:24 (WEA 43 (RW))	20:48	21:39	
2	08:37	14:50 (WEA 07 (GRN))	08:04			07:05		06:49	19:11 (WEA 43 (RW))	05:39	20:09 (WEA 41 (RW))	04:50	
1	16:04	27	15:17 (WEA 07 (GRN))	16:57		17:54		19:53	15	19:26 (WEA 43 (RW))	20:49	21:40	
3	08:37	14:50 (WEA 07 (GRN))	08:03			07:03		06:47	19:12 (WEA 43 (RW))	05:37	20:10 (WEA 41 (RW))	04:49	
1	16:05	27	15:17 (WEA 07 (GRN))	16:59		17:56		19:55	16	19:28 (WEA 43 (RW))	20:51	21:41	
4	08:36	14:50 (WEA 07 (GRN))	08:01			07:01		06:44	19:12 (WEA 43 (RW))	05:35	20:12 (WEA 41 (RW))	04:48	
1	16:07	28	15:18 (WEA 07 (GRN))	17:01		17:58		19:57	15	19:30 (WEA 43 (RW))	20:53	21:42	
5	08:36	14:50 (WEA 07 (GRN))	07:58			06:58	17:39 (WEA 02 (GRN))	06:42	19:14 (WEA 43 (RW))	05:33	20:14 (WEA 41 (RW))	04:47	
1	16:08	28	15:18 (WEA 07 (GRN))	17:03		18:00	4	17:33 (WEA 02 (GRN))	19:59	9	19:23 (WEA 43 (RW))	20:55	
6	08:36	14:51 (WEA 07 (GRN))	07:57			06:56		17:27 (WEA 02 (GRN))	06:39		05:31	04:47	
1	16:09	28	15:19 (WEA 07 (GRN))	17:05		18:02	7	17:34 (WEA 04 (GRN))	20:01		20:57	21:44	
7	08:34	14:51 (WEA 07 (GRN))	07:55			06:53		17:28 (WEA 02 (GRN))	06:37		05:29	04:46	
1	16:11	28	15:19 (WEA 07 (GRN))	17:07		18:04	11	17:37 (WEA 04 (GRN))	20:02		20:59	21:45	
8	08:35	14:51 (WEA 07 (GRN))	07:53			06:51		17:25 (WEA 02 (GRN))	06:34		05:27	04:45	
1	16:12	29	15:20 (WEA 07 (GRN))	17:09		18:05	13	17:38 (WEA 04 (GRN))	20:04		21:00	21:46	
9	08:34	14:51 (WEA 07 (GRN))	07:51			06:49		17:25 (WEA 02 (GRN))	06:32		05:25	04:45	
1	16:13	29	15:20 (WEA 07 (GRN))	17:11		18:07	16	17:41 (WEA 04 (GRN))	20:06		21:02	21:47	
10	08:33	14:52 (WEA 07 (GRN))	07:49			06:46		17:25 (WEA 02 (GRN))	06:30		05:23	04:44	
1	16:15	28	15:20 (WEA 07 (GRN))	17:13		18:09	16	17:41 (WEA 02 (GRN))	20:08		21:04	21:48	
11	08:33	14:52 (WEA 07 (GRN))	07:47			06:44		17:28 (WEA 02 (GRN))	06:27		05:22	04:44	
1	16:16	29	15:21 (WEA 07 (GRN))	17:15		18:11	15	17:41 (WEA 02 (GRN))	20:10		21:06	21:49	
12	08:32	14:52 (WEA 07 (GRN))	07:45	16:44 (WEA 03 (GRN))	06:41			17:28 (WEA 02 (GRN))	06:25		05:20	04:43	
1	16:18	29	15:21 (WEA 07 (GRN))	17:17	4	16:48 (WEA 03 (GRN))	18:13	13	17:39 (WEA 45 (RW))	20:12	21:08	21:50	
13	08:31	14:53 (WEA 07 (GRN))	07:43	16:42 (WEA 03 (GRN))	06:39			17:38 (WEA 02 (GRN))	06:22		05:18	04:43	
1	16:20	28	15:21 (WEA 07 (GRN))	17:19	8	16:50 (WEA 03 (GRN))	18:15	14	17:42 (WEA 45 (RW))	20:14	21:09	21:50	
14	08:30	14:53 (WEA 07 (GRN))	07:41	16:39 (WEA 03 (GRN))	06:36			17:39 (WEA 45 (RW))	06:20		05:16	04:43	
1	16:21	29	15:22 (WEA 07 (GRN))	17:22	12	16:51 (WEA 03 (GRN))	18:17	14	17:43 (WEA 45 (RW))	20:16	21:11	21:51	
15	08:29	14:54 (WEA 07 (GRN))	07:39	16:38 (WEA 03 (GRN))	06:34			17:39 (WEA 45 (RW))	06:18		05:14	04:42	
1	16:23	28	15:22 (WEA 07 (GRN))	17:24	16	16:54 (WEA 03 (GRN))	18:19	15	17:44 (WEA 45 (RW))	20:18	21:13	21:52	
16	08:28	14:55 (WEA 07 (GRN))	07:37	16:38 (WEA 03 (GRN))	06:31			17:37 (WEA 45 (RW))	06:15		05:13	04:42	
1	16:25	28	15:23 (WEA 07 (GRN))	17:26	18	16:56 (WEA 03 (GRN))	18:21	17	17:44 (WEA 45 (RW))	20:19	21:14	21:52	
17	08:27	14:55 (WEA 07 (GRN))	07:35	16:36 (WEA 03 (GRN))	06:29			17:37 (WEA 45 (RW))	06:13		05:11	04:42	
1	16:26	28	15:23 (WEA 07 (GRN))	17:28	20	16:58 (WEA 03 (GRN))	18:23	18	17:56 (WEA 01 (GRN))	20:21	21:16	21:53	
18	08:26	14:55 (WEA 07 (GRN))	07:33	16:37 (WEA 03 (GRN))	06:26			17:37 (WEA 45 (RW))	06:10		05:09	04:42	
1	16:28	28	15:23 (WEA 07 (GRN))	17:30	21	16:58 (WEA 03 (GRN))	18:25	21	17:58 (WEA 01 (GRN))	20:23	21:18	21:53	
19	08:25	14:56 (WEA 07 (GRN))	07:30	16:37 (WEA 03 (GRN))	06:24			17:37 (WEA 45 (RW))	06:08		05:08	04:42	
1	16:30	28	15:55 (WEA 06 (GRN))	17:32	24	17:03 (WEA 05 (GRN))	18:27	22	18:00 (WEA 01 (GRN))	20:25	2	19:57 (WEA 25 (Kab))	
20	08:24	14:58 (WEA 07 (GRN))	07:28	16:37 (WEA 03 (GRN))	06:21			17:37 (WEA 45 (RW))	06:06		05:06	04:42	
1	16:32	28	15:57 (WEA 06 (GRN))	17:34	27	17:05 (WEA 05 (GRN))	18:29	23	18:01 (WEA 01 (GRN))	20:27	3	19:59 (WEA 25 (Kab))	
21	08:23	14:58 (WEA 07 (GRN))	07:26	16:36 (WEA 03 (GRN))	06:19			17:39 (WEA 45 (RW))	06:04		05:05	04:42	
1	16:34	30	15:59 (WEA 06 (GRN))	17:36	29	17:08 (WEA 05 (GRN))	18:30	22	18:04 (WEA 01 (GRN))	20:29	3	20:00 (WEA 25 (Kab))	
22	08:21	14:59 (WEA 07 (GRN))	07:24	16:37 (WEA 03 (GRN))	06:16			17:39 (WEA 45 (RW))	06:01		05:03	04:43	
1	16:35	31	16:01 (WEA 06 (GRN))	17:38	29	17:09 (WEA 05 (GRN))	18:32	15	18:02 (WEA 01 (GRN))	20:31	3	20:01 (WEA 25 (Kab))	
23	08:20	15:00 (WEA 07 (GRN))	07:22	16:38 (WEA 03 (GRN))	06:14			18:02 (WEA 01 (GRN))	06:59		05:02	04:43	
1	16:37	32	16:03 (WEA 06 (GRN))	17:40	29	17:11 (WEA 05 (GRN))	18:34		06:57		05:02	04:43	
24	08:19	15:01 (WEA 07 (GRN))	07:19	16:39 (WEA 03 (GRN))	06:12			18:03 (WEA 01 (GRN))	06:57		05:01	04:43	
1	16:39	32	16:05 (WEA 06 (GRN))	17:42	23	17:09 (WEA 05 (GRN))	18:36		06:55		05:01	04:43	
25	08:17	15:03 (WEA 07 (GRN))	07:17	16:41 (WEA 03 (GRN))	06:09			18:03 (WEA 01 (GRN))	06:54		05:00	04:43	
1	16:41	31	16:08 (WEA 06 (GRN))	17:44	12	16:53 (WEA 03 (GRN))	18:38		06:52		05:00	04:43	
26	08:16	15:05 (WEA 07 (GRN))	07:15	16:44 (WEA 03 (GRN))	06:07			18:03 (WEA 01 (GRN))	06:52		05:00	04:44	
1	16:43	29	16:09 (WEA 06 (GRN))	17:46	7	16:51 (WEA 03 (GRN))	18:40		06:50		05:00	04:44	
27	08:14	15:07 (WEA 07 (GRN))	07:12					18:03 (WEA 01 (GRN))	06:49		05:00	04:44	
1	16:45	24	16:09 (WEA 06 (GRN))	17:48				18:03 (WEA 01 (GRN))	06:48		05:00	04:44	
28	08:13	15:06 (WEA 07 (GRN))	07:10					18:03 (WEA 01 (GRN))	06:47		05:00	04:44	
1	16:47	13	16:09 (WEA 06 (GRN))	17:50				18:15 (WEA 43 (RW))	06:46		05:00	04:45	
29	08:11	15:07 (WEA 07 (GRN))						18:16 (WEA 43 (RW))	06:44	2	20:12 (WEA 41 (RW))	21:33	
1	16:49	11	16:08 (WEA 06 (GRN))					18:17 (WEA 43 (RW))	06:44	2	20:14 (WEA 41 (RW))	21:35	
30	08:09	15:08 (WEA 07 (GRN))						18:18 (WEA 43 (RW))	06:43	2	20:15 (WEA 41 (RW))	21:36	
1	16:51	9	16:07 (WEA 06 (GRN))					18:19 (WEA 43 (RW))	06:42	2	20:16 (WEA 41 (RW))	21:37	
31	08:08	15:01 (WEA 07 (GRN))						18:20 (WEA 43 (RW))	06:41	2	20:17 (WEA 41 (RW))	21:38	
1	16:53	3	16:04 (WEA 06 (GRN))					18:21 (WEA 43 (RW))	06:40	2	20:18 (WEA 41 (RW))	21:39	
Sommerstunden		248											
astr. max. mögl. Beschattung		807		279		302		89		65		312	

**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:

SWP Windpark Großenholz

Lizenzierter Anwender:

GL Garrad Hassan Deutschland GmbH
Sommerdeich 14 b
DE-25709 Kaiser-Wilhelm-Koog
(0 48 56)901-0



Berechnet:

22.06.2022 20:19/3.5.584

SHADOW - Kalender

Berechnung: Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) Schattenrezeptor: IO 03 - IO 03 Hauptstraße 4 (Riepsdorf)

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

Table with columns for months (Juli, August, September, Oktober, November, Dezember) and rows for time slots (e.g., 1 04:47, 2 04:47, etc.), showing start and end times for shadows.

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

Table with 4 columns: 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)



Projekt:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 04 - IO 04 Bäderstraße 2 (Gosdorf)

### 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   08:37 16:03	14:50 (WEA_G1)   08:06 15:16 (WEA_G1)   16:55	07:08 17:52	06:52 19:51	05:41 20:40	04:51 21:38
2   08:37 16:04	14:51 (WEA_G1)   08:04 15:17 (WEA_G1)   16:57	07:05 17:54	06:49 19:53	05:39 20:49	04:50 21:40
3   08:37 16:05	14:51 (WEA_G1)   08:03 15:16 (WEA_G1)   16:59	07:03 17:56	06:47 19:55	05:37 20:51	04:49 21:41
4   08:36 16:07	14:53 (WEA_G1)   08:01 15:17 (WEA_G1)   17:01	07:01 17:58	06:44 19:57	05:35 20:53	04:48 21:42
5   08:36 16:08	14:53 (WEA_G1)   07:59 15:17 (WEA_G1)   17:03	06:58 18:00	06:42 19:59	05:33 20:55	04:47 21:43
6   08:36 16:09	14:53 (WEA_G1)   07:57 15:17 (WEA_G1)   17:05	06:56 18:02	06:39 20:01	05:31 20:57	04:47 21:44
7   08:35 16:10	14:55 (WEA_G1)   07:55 15:17 (WEA_G1)   17:07	06:53 18:03	06:37 20:02	05:29 20:59	04:46 21:45
8   08:35 16:12	14:55 (WEA_G1)   07:53 15:17 (WEA_G1)   17:09	06:51 18:05	06:34 20:04	05:27 21:00	04:45 21:46
9   08:34 16:13	14:56 (WEA_G1)   07:51 15:17 (WEA_G1)   17:11	06:49 18:07	06:32 20:06	05:25 21:02	04:44 21:47
10   08:33 16:15	14:57 (WEA_G1)   07:49 15:17 (WEA_G1)   17:13	06:46 18:09	06:30 20:08	05:23 21:04	04:44 21:48
11   08:33 16:16	14:58 (WEA_G1)   07:47 15:16 (WEA_G1)   17:15	06:44 18:11	06:27 20:10	05:22 21:06	04:44 21:49
12   08:32 16:18	14:59 (WEA_G1)   07:45 15:16 (WEA_G1)   17:17	06:41 18:13	06:25 20:12	05:20 21:07	04:43 21:50
13   08:31 16:20	15:00 (WEA_G1)   07:43 15:16 (WEA_G1)   17:19	06:39 18:15	06:22 20:14	05:18 21:09	04:43 21:50
14   08:30 16:21	15:02 (WEA_G1)   07:41 15:15 (WEA_G1)   17:22	06:36 18:17	06:20 20:16	05:16 21:11	04:43 21:51
15   08:29 16:22	15:04 (WEA_G1)   07:39 15:14 (WEA_G1)   17:24	06:34 18:19	06:18 20:18	05:14 21:13	04:42 21:52
16   08:28 16:23	15:06 (WEA_G1)   07:37 15:11 (WEA_G1)   17:26	06:31 18:21	06:15 20:19	05:13 21:14	04:42 21:52
17   08:27 16:26	15:11 (WEA_G1)   07:35 17:28	06:29 18:23	06:13 20:21	05:11 21:16	04:42 21:53
18   08:26 16:28	17:30	06:26 18:25	06:10 20:23	05:09 21:18	04:42 21:53
19   08:25 16:30	17:33	06:24 18:27	06:08 20:25	05:08 21:19	04:42 21:54
20   08:24 16:32	17:36	06:21 18:28	06:06 20:27	05:06 21:21	04:42 21:54
21   08:23 16:34	17:39	06:19 18:30	06:04 20:29	05:05 21:23	04:42 21:54
22   08:21 16:35	17:42	06:16 18:32	06:01 20:31	05:03 21:24	04:43 21:54
23   08:20 16:37	17:45	06:14 18:34	05:59 20:33	05:02 21:26	04:43 21:54
24   08:19 16:39	17:48	06:11 18:36	05:57 20:34	05:00 21:27	04:43 21:55
25   08:17 16:41	17:51	06:09 18:38	05:54 20:36	04:59 21:29	04:43 21:55
26   08:16 16:43	17:54	06:07 18:40	05:52 20:38	04:58 21:30	04:44 21:55
27   08:14 16:45	17:57	06:04 18:42	05:50 20:40	04:57 21:32	04:44 21:56
28   08:13 16:47	18:00	06:02 18:44	05:48 20:42	04:55 21:33	04:45 21:56
29   08:11 16:49	18:03	06:00 18:46	05:46 20:44	04:54 21:35	04:45 21:56
30   08:09 16:51	18:06	05:57 18:48	05:44 20:46	04:53 21:36	04:46 21:57
31   08:08 16:53	18:08	05:54 19:49	05:42 20:48	04:52 21:37	04:46 21:58
Sommereinheiten   248	272	367	421	496	513
astr. max. mögl. Beschattung   394	270	166	38	60	334

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:** Gesamtbelastung: Vorbelastung und Projekt Großholz (3 x V150-6.0) **Schattenrezeptor:** IO 05 - IO 05 Bäderstraße 8 (Gosdorf)

### 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	08:37	15:05 (WEA_G1)	08:06	16:13 (WEA_08 (GRN))	07:08	16:55 (WEA_07 (GRN))	06:52	05:41	20:14 (WEA_41 (RW))	04:51	20:50 (WEA_42 (RW))				
1	16:03	15:25 (WEA_G1)	16:55	16:22 (WEA_09 (GRN))	17:52	17:00 (WEA_07 (GRN))	19:51	20:40	3	20:17 (WEA_41 (RW))	21:38	20:53 (WEA_42 (RW))			
2	08:37	15:06 (WEA_G1)	08:04	16:14 (WEA_08 (GRN))	07:05	16:54 (WEA_07 (GRN))	06:49	05:39			04:50				
3	16:04	15:26 (WEA_G1)	16:57	16:25 (WEA_08 (GRN))	17:54	17:53	19:53	20:49			21:40				
3	08:37	15:06 (WEA_G1)	08:03	16:15 (WEA_08 (GRN))	07:03	16:54 (WEA_07 (GRN))	06:47	05:37			04:49				
3	16:05	15:27 (WEA_G1)	16:59	16:24 (WEA_08 (GRN))	17:56	17:56	19:55	20:51			21:41				
4	08:36	15:07 (WEA_G1)	08:01	16:17 (WEA_08 (GRN))	07:01	16:54 (WEA_07 (GRN))	06:44	05:35			04:48	21:06 (WEA_K04)			
4	16:07	15:29 (WEA_G1)	17:01	16:22 (WEA_08 (GRN))	17:58	17:57	19:57	20:53			21:42	1	21:07 (WEA_K04)		
5	08:36	15:07 (WEA_G1)	07:58	16:50	06:50	17:34 (WEA_05 (GRN))	06:37	05:23	19:31 (WEA_43 (RW))	05:33	04:47	21:06 (WEA_K04)			
5	16:08	15:30 (WEA_G1)	17:03	18:00	18:00	17:34 (WEA_05 (GRN))	06:37	05:29	1	19:32 (WEA_43 (RW))	20:55	21:43	1	21:07 (WEA_K04)	
6	08:36	15:07 (WEA_G1)	07:57	06:56	06:56	17:34 (WEA_05 (GRN))	06:39	05:31	19:30 (WEA_43 (RW))	05:31	04:47	21:06 (WEA_K04)			
6	16:09	15:31 (WEA_G1)	17:05	18:02	18:02	17:42 (WEA_03 (GRN))	20:01	20:57	3	19:33 (WEA_43 (RW))	20:57	21:44	3	21:09 (WEA_K04)	
7	08:35	15:09 (WEA_G1)	07:51	06:49	06:49	17:35 (WEA_05 (GRN))	06:32	05:25	19:30 (WEA_43 (RW))	05:29	04:46	21:06 (WEA_K04)			
8	08:35	15:08 (WEA_G1)	07:53	06:51	06:51	17:34 (WEA_05 (GRN))	06:34	05:27	5	19:35 (WEA_43 (RW))	20:59	21:45	3	21:09 (WEA_K04)	
8	16:12	15:34 (WEA_G1)	17:09	18:05	18:05	17:38 (WEA_05 (GRN))	20:04	20:57	6	19:36 (WEA_43 (RW))	21:00	21:46	5	21:11 (WEA_K04)	
9	08:34	15:09 (WEA_G1)	07:51	06:49	06:49	17:35 (WEA_05 (GRN))	06:32	05:25	19:31 (WEA_43 (RW))	05:25	04:45	21:06 (WEA_K04)			
9	16:13	15:34 (WEA_G1)	17:11	18:07	18:07	17:41 (WEA_03 (GRN))	20:06	21:02	8	19:39 (WEA_43 (RW))	21:02	21:47	5	21:11 (WEA_K04)	
10	08:33	15:09 (WEA_G1)	07:49	06:46	06:46	17:34 (WEA_05 (GRN))	06:30	05:23			04:44	21:06 (WEA_K04)			
10	16:15	15:34 (WEA_G1)	17:13	18:09	18:09	17:42 (WEA_03 (GRN))	20:08	21:04			21:40	6	21:12 (WEA_K04)		
11	08:33	15:11 (WEA_G1)	07:43	06:44	06:44	17:34 (WEA_05 (GRN))	06:27	05:22			04:44	21:06 (WEA_K04)			
11	16:16	15:34 (WEA_G1)	17:15	18:11	18:11	17:45 (WEA_03 (GRN))	20:10	21:06			21:49	6	21:12 (WEA_K04)		
12	08:32	15:10 (WEA_G1)	07:45	06:41	06:41	17:33 (WEA_05 (GRN))	06:25	05:20			04:43	21:06 (WEA_K04)			
12	16:18	15:34 (WEA_G1)	17:17	18:13	18:13	17:46 (WEA_03 (GRN))	20:12	21:07			21:50	7	21:13 (WEA_K04)		
13	08:31	15:11 (WEA_G1)	07:43	06:44	06:44	17:34 (WEA_05 (GRN))	06:22	05:18			04:43	21:06 (WEA_K04)			
13	16:20	15:34 (WEA_G1)	17:19	18:15	18:15	17:48 (WEA_03 (GRN))	20:14	21:09			21:50	8	21:14 (WEA_K04)		
14	08:30	15:12 (WEA_G1)	07:41	06:36	06:36	17:34 (WEA_05 (GRN))	06:20	05:16			04:43	21:07 (WEA_K04)			
14	16:21	15:34 (WEA_G1)	17:22	18:17	18:17	17:46 (WEA_03 (GRN))	20:16	21:11			21:51	8	21:15 (WEA_K04)		
15	08:29	15:13 (WEA_G1)	07:39	06:34	06:34	17:36 (WEA_05 (GRN))	06:18	05:14			04:42	21:07 (WEA_K04)			
15	16:23	15:34 (WEA_G1)	17:24	18:19	18:19	17:45 (WEA_03 (GRN))	20:18	21:13			21:52	9	21:16 (WEA_K04)		
16	08:28	15:14 (WEA_G1)	07:37	16:54 (WEA_06 (GRN))	06:31	17:39 (WEA_05 (GRN))	06:15	05:13			04:42	21:06 (WEA_K04)			
16	16:25	15:34 (WEA_G1)	17:26	16:56 (WEA_06 (GRN))	18:21	17:41 (WEA_03 (GRN))	20:19	21:14			21:52	9	21:15 (WEA_K04)		
17	08:27	15:15 (WEA_G1)	07:35	16:54 (WEA_07 (GRN))	06:29	17:39 (WEA_05 (GRN))	06:13	05:11			04:42	21:06 (WEA_K04)			
17	16:26	15:34 (WEA_G1)	17:28	16:59 (WEA_07 (GRN))	18:23	17:41 (WEA_03 (GRN))	20:21	21:16			21:53	10	21:16 (WEA_K04)		
18	08:26	15:16 (WEA_G1)	07:33	16:51 (WEA_07 (GRN))	06:26	17:57 (WEA_04 (GRN))	06:10	05:09			04:42	21:07 (WEA_K04)			
18	16:28	15:33 (WEA_G1)	17:30	17:00 (WEA_07 (GRN))	18:25	17:58 (WEA_04 (GRN))	20:23	21:18	1	20:45 (WEA_42 (RW))	21:53	9	21:16 (WEA_K04)		
19	08:25	15:17 (WEA_G1)	07:30	16:51 (WEA_07 (GRN))	06:24	17:59 (WEA_04 (GRN))	06:08	05:08			04:42	21:08 (WEA_K04)			
19	16:30	15:33 (WEA_G1)	17:32	17:03 (WEA_07 (GRN))	18:27	18:00 (WEA_02 (GRN))	20:25	21:19	3	20:47 (WEA_42 (RW))	21:54	9	21:17 (WEA_K04)		
20	08:24	15:19 (WEA_G1)	07:28	16:50 (WEA_07 (GRN))	06:21	17:58 (WEA_04 (GRN))	06:06	05:06			04:42	21:08 (WEA_K04)			
20	16:32	15:31 (WEA_G1)	17:34	17:05 (WEA_07 (GRN))	18:28	18:01 (WEA_02 (GRN))	20:27	21:21	5	20:48 (WEA_42 (RW))	21:54	10	21:18 (WEA_K04)		
21	08:23	15:21 (WEA_G1)	07:26	16:50 (WEA_07 (GRN))	06:19	17:58 (WEA_04 (GRN))	06:04	05:05			04:42	21:08 (WEA_K04)			
21	16:34	15:34 (WEA_G1)	17:36	17:08 (WEA_07 (GRN))	18:30	18:04 (WEA_02 (GRN))	20:29	21:23	6	20:49 (WEA_42 (RW))	21:54	10	21:18 (WEA_K04)		
22	08:22	15:22 (WEA_G1)	07:24	16:49 (WEA_07 (GRN))	06:16	17:58 (WEA_04 (GRN))	06:01	05:03			04:43	21:08 (WEA_K04)			
22	16:35	15:33 (WEA_G1)	17:38	17:08 (WEA_07 (GRN))	18:32	18:05 (WEA_02 (GRN))	20:31	21:24	8	20:51 (WEA_42 (RW))	21:54	10	21:18 (WEA_K04)		
23	08:20	15:23 (WEA_G1)	07:22	16:49 (WEA_07 (GRN))	06:14	17:59 (WEA_04 (GRN))	05:59	05:02			04:43	21:08 (WEA_K04)			
23	16:37	15:34 (WEA_G1)	17:40	17:09 (WEA_07 (GRN))	18:34	18:08 (WEA_02 (GRN))	20:33	21:26	9	20:52 (WEA_42 (RW))	21:54	9	21:17 (WEA_K04)		
24	08:19	15:24 (WEA_G1)	07:19	16:48 (WEA_07 (GRN))	06:11	18:00 (WEA_02 (GRN))	05:57	05:00			04:43	21:09 (WEA_K04)			
24	16:39	15:34 (WEA_G1)	17:42	17:08 (WEA_07 (GRN))	18:36	18:05 (WEA_02 (GRN))	20:34	21:27	10	20:53 (WEA_42 (RW))	21:55	9	21:18 (WEA_K04)		
25	08:17	15:25 (WEA_G1)	07:17	16:49 (WEA_07 (GRN))	06:09	18:00 (WEA_02 (GRN))	05:54	04:59			04:43	21:09 (WEA_K04)			
25	16:41	15:34 (WEA_G1)	17:44	17:08 (WEA_07 (GRN))	18:38	18:05 (WEA_02 (GRN))	20:36	21:29	11	20:55 (WEA_42 (RW))	21:55	9	21:18 (WEA_K04)		
26	08:16	15:26 (WEA_G1)	07:15	16:50 (WEA_07 (GRN))	06:07	18:00 (WEA_02 (GRN))	05:52	04:58			04:44	21:09 (WEA_K04)			
26	16:43	15:34 (WEA_G1)	17:46	17:07 (WEA_07 (GRN))	18:40	18:14 (WEA_01 (GRN))	20:38	21:30	12	20:56 (WEA_42 (RW))	21:55	9	21:18 (WEA_K04)		
27	08:14	15:27 (WEA_G1)	07:12	16:50 (WEA_07 (GRN))	06:04	18:14 (WEA_01 (GRN))	05:50	04:57			04:44	21:09 (WEA_K04)			
27	16:45	15:34 (WEA_G1)	17:48	17:06 (WEA_07 (GRN))	18:42	18:15 (WEA_01 (GRN))	20:40	21:32	12	20:57 (WEA_42 (RW))	21:54	9	21:18 (WEA_K04)		
28	08:13	16:12 (WEA_08 (GRN))	07:10	16:52 (WEA_07 (GRN))	06:02	18:14 (WEA_01 (GRN))	05:48	04:55			04:45	21:10 (WEA_K04)			
28	16:47	2	16:14 (WEA_08 (GRN))	17:50	18:44	18:16 (WEA_01 (GRN))	20:42	21:33	12	20:57 (WEA_42 (RW))	21:54	8	21:18 (WEA_K04)		
29	08:11	16:12 (WEA_08 (GRN))		16:59	06:59	19:16 (WEA_01 (GRN))	05:46	04:54			04:45	21:09 (WEA_K04)			
29	16:49	4	16:16 (WEA_08 (GRN))		19:45	3	19:19 (WEA_01 (GRN))	20:44	2	20:14 (WEA_41 (RW))	21:35	10	21:18 (WEA_K04)		
30	08:09	16:12 (WEA_08 (GRN))		06:57	06:57		05:44	04:53			04:46	21:10 (WEA_K04)			
30	16:51	6	16:18 (WEA_08 (GRN))		19:47	2	20:13 (WEA_41 (RW))	21:36	9	20:56 (WEA_42 (RW))	21:54	8	21:18 (WEA_K04)		
31	08:08	16:12 (WEA_08 (GRN))		06:54	06:54		05:42	04:52			04:46	21:10 (WEA_K04)			
31	16:53	8	16:20 (WEA_08 (GRN))		19:49		20:46	21:37	7	20:55 (WEA_42 (RW))					
Sonnenscheinstunden		248		272		367		421		496		513		202	
astr. max. mögl. Beschattung		498		218		125		27		118					

### 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:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
 Sommerdeich 14 b  
 DE-25709 Kaiser-Wilhelm-Koog  
 (0 48 56)901-0

**DNV**

Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 05 - IO 05 Bäderstraße 8 (Gosdorf)

### 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

Jul	August	September	Oktober	November	Dezember
1   04:47	21:10 (WEA K04)   05:27	06:23	07:17	18:13 (WEA 03 (GRN))   07:16	08:12
2   04:47	21:11 (WEA K04)   05:29	06:24	07:19	18:22 (WEA 03 (GRN))   07:18	08:14
3   04:48	21:12 (WEA K04)   05:31	06:26	07:21	18:23 (WEA 03 (GRN))   07:20	08:16
4   04:49	21:11 (WEA K04)   05:32	06:28	07:22	18:21 (WEA 03 (GRN))   07:22	08:17
5   04:50	21:12 (WEA K04)   05:34	06:30	07:24	18:19 (WEA 03 (GRN))   07:24	08:18
6   04:51	21:11 (WEA K04)   05:36	06:32	07:26	18:18 (WEA 05 (GRN))   07:26	08:19
7   04:52	21:12 (WEA K04)   05:38	06:33	07:28	18:17 (WEA 05 (GRN))   07:28	08:20
8   04:53	21:14 (WEA K04)   05:39	06:35	07:30	18:14 (WEA 05 (GRN))   07:30	08:21
9   04:54	21:14 (WEA K04)   05:41	06:37	07:32	18:12 (WEA 05 (GRN))   07:32	08:22
10   04:55	21:15 (WEA K04)   05:43	06:39	07:34	18:11 (WEA 05 (GRN))   07:34	08:23
11   04:56	21:16 (WEA K04)   05:45	06:41	07:36	18:10 (WEA 05 (GRN))   07:36	08:24
12   04:57	20:57 (WEA 42 (RW))   05:47	06:42	07:37	18:09 (WEA 05 (GRN))   07:38	08:25
13   04:58	21:02 (WEA 42 (RW))   05:48	06:44	07:39	18:08 (WEA 05 (GRN))   07:40	08:26
14   05:00	21:04 (WEA 42 (RW))   05:50	06:46	07:41	18:07 (WEA 05 (GRN))   07:42	08:27
15   05:01	21:04 (WEA 42 (RW))   05:52	06:48	07:43	18:06 (WEA 05 (GRN))   07:44	08:28
16   05:03	21:05 (WEA 42 (RW))   05:54	06:50	07:45	18:05 (WEA 05 (GRN))   07:46	08:29
17   05:04	21:05 (WEA 42 (RW))   05:56	06:51	07:47	18:04 (WEA 05 (GRN))   07:48	08:30
18   05:05	21:07 (WEA 42 (RW))   05:57	06:53	07:49	18:03 (WEA 05 (GRN))   07:50	08:31
19   05:07	21:08 (WEA 42 (RW))   05:59	06:55	07:51	18:02 (WEA 05 (GRN))   07:52	08:32
20   05:08	21:09 (WEA 42 (RW))   06:01	06:57	07:53	18:01 (WEA 05 (GRN))   07:54	08:33
21   05:10	21:09 (WEA 42 (RW))   06:03	06:59	07:55	18:00 (WEA 05 (GRN))   07:56	08:34
22   05:11	21:09 (WEA 42 (RW))   06:05	07:00	07:57	18:00 (WEA 05 (GRN))   07:58	08:35
23   05:13	21:09 (WEA 42 (RW))   06:06	07:02	07:58	18:00 (WEA 05 (GRN))   07:59	08:36
24   05:14	21:09 (WEA 42 (RW))   06:08	07:04	08:00	18:00 (WEA 05 (GRN))   08:00	08:37
25   05:16	21:07 (WEA 42 (RW))   06:10	07:06	08:01	18:00 (WEA 05 (GRN))   08:02	08:38
26   05:17	21:07 (WEA 42 (RW))   06:12	07:08	08:02	18:00 (WEA 05 (GRN))   08:04	08:39
27   05:19	21:07 (WEA 42 (RW))   06:14	07:10	08:04	18:00 (WEA 05 (GRN))   08:06	08:40
28   05:21	21:07 (WEA 42 (RW))   06:15	07:11	08:05	18:00 (WEA 05 (GRN))   08:07	08:41
29   05:22	21:07 (WEA 42 (RW))   06:17	07:13	08:07	18:00 (WEA 05 (GRN))   08:09	08:42
30   05:24	21:07 (WEA 42 (RW))   06:19	07:15	08:09	18:00 (WEA 05 (GRN))   08:11	08:43
31   05:26	21:19 (WEA 42 (RW))   06:21	07:18	08:12	18:00 (WEA 05 (GRN))   08:14	08:44
1   05:28	21:19 (WEA 42 (RW))   06:22	07:20	08:14	18:00 (WEA 05 (GRN))   08:16	08:45
2   05:29	21:19 (WEA 42 (RW))   06:24	07:22	08:16	18:00 (WEA 05 (GRN))   08:18	08:46
3   05:30	21:19 (WEA 42 (RW))   06:26	07:24	08:18	18:00 (WEA 05 (GRN))   08:20	08:47
4   05:31	21:19 (WEA 42 (RW))   06:28	07:26	08:20	18:00 (WEA 05 (GRN))   08:22	08:48
5   05:32	21:19 (WEA 42 (RW))   06:30	07:28	08:22	18:00 (WEA 05 (GRN))   08:24	08:49
6   05:33	21:19 (WEA 42 (RW))   06:32	07:30	08:24	18:00 (WEA 05 (GRN))   08:26	08:50
7   05:34	21:19 (WEA 42 (RW))   06:34	07:32	08:26	18:00 (WEA 05 (GRN))   08:28	08:51
8   05:35	21:19 (WEA 42 (RW))   06:36	07:34	08:28	18:00 (WEA 05 (GRN))   08:30	08:52
9   05:36	21:19 (WEA 42 (RW))   06:38	07:36	08:30	18:00 (WEA 05 (GRN))   08:32	08:53
10   05:37	21:19 (WEA 42 (RW))   06:40	07:38	08:32	18:00 (WEA 05 (GRN))   08:34	08:54
11   05:38	21:19 (WEA 42 (RW))   06:42	07:40	08:34	18:00 (WEA 05 (GRN))   08:36	08:55
12   05:39	21:19 (WEA 42 (RW))   06:44	07:42	08:36	18:00 (WEA 05 (GRN))   08:38	08:56
13   05:40	21:19 (WEA 42 (RW))   06:46	07:44	08:38	18:00 (WEA 05 (GRN))   08:40	08:57
14   05:41	21:19 (WEA 42 (RW))   06:48	07:46	08:40	18:00 (WEA 05 (GRN))   08:42	08:58
15   05:42	21:19 (WEA 42 (RW))   06:50	07:48	08:42	18:00 (WEA 05 (GRN))   08:44	08:59
16   05:43	21:19 (WEA 42 (RW))   06:52	07:50	08:44	18:00 (WEA 05 (GRN))   08:46	09:00
17   05:44	21:19 (WEA 42 (RW))   06:54	07:52	08:46	18:00 (WEA 05 (GRN))   08:48	09:01
18   05:45	21:19 (WEA 42 (RW))   06:56	07:54	08:48	18:00 (WEA 05 (GRN))   08:50	09:02
19   05:46	21:19 (WEA 42 (RW))   06:58	07:56	08:50	18:00 (WEA 05 (GRN))   08:52	09:03
20   05:47	21:19 (WEA 42 (RW))   06:59	07:58	08:52	18:00 (WEA 05 (GRN))   08:54	09:04
21   05:48	21:19 (WEA 42 (RW))   07:01	08:00	08:54	18:00 (WEA 05 (GRN))   08:56	09:05
22   05:49	21:19 (WEA 42 (RW))   07:03	08:02	08:56	18:00 (WEA 05 (GRN))   08:58	09:06
23   05:50	21:19 (WEA 42 (RW))   07:05	08:04	08:58	18:00 (WEA 05 (GRN))   08:59	09:07
24   05:51	21:19 (WEA 42 (RW))   07:07	08:06	09:00	18:00 (WEA 05 (GRN))   09:01	09:08
25   05:52	21:19 (WEA 42 (RW))   07:09	08:08	09:02	18:00 (WEA 05 (GRN))   09:03	09:09
26   05:53	21:19 (WEA 42 (RW))   07:11	08:10	09:04	18:00 (WEA 05 (GRN))   09:05	09:10
27   05:54	21:19 (WEA 42 (RW))   07:13	08:12	09:06	18:00 (WEA 05 (GRN))   09:07	09:11
28   05:55	21:19 (WEA 42 (RW))   07:15	08:14	09:08	18:00 (WEA 05 (GRN))   09:09	09:12
29   05:56	21:19 (WEA 42 (RW))   07:17	08:16	09:10	18:00 (WEA 05 (GRN))   09:11	09:13
30   05:57	21:19 (WEA 42 (RW))   07:19	08:18	09:12	18:00 (WEA 05 (GRN))   09:13	09:14
31   05:58	21:19 (WEA 42 (RW))   07:21	08:20	09:14	18:00 (WEA 05 (GRN))   09:15	09:15
1   05:59	21:19 (WEA 42 (RW))   07:23	08:22	09:16	18:00 (WEA 05 (GRN))   09:17	09:16
2   06:00	21:19 (WEA 42 (RW))   07:25	08:24	09:18	18:00 (WEA 05 (GRN))   09:19	09:17
3   06:01	21:19 (WEA 42 (RW))   07:27	08:26	09:20	18:00 (WEA 05 (GRN))   09:21	09:18
4   06:02	21:19 (WEA 42 (RW))   07:29	08:28	09:22	18:00 (WEA 05 (GRN))   09:23	09:19
5   06:03	21:19 (WEA 42 (RW))   07:31	08:30	09:24	18:00 (WEA 05 (GRN))   09:25	09:20
6   06:04	21:19 (WEA 42 (RW))   07:33	08:32	09:26	18:00 (WEA 05 (GRN))   09:27	09:21
7   06:05	21:19 (WEA 42 (RW))   07:35	08:34	09:28	18:00 (WEA 05 (GRN))   09:29	09:22
8   06:06	21:19 (WEA 42 (RW))   07:37	08:36	09:30	18:00 (WEA 05 (GRN))   09:31	09:23
9   06:07	21:19 (WEA 42 (RW))   07:39	08:38	09:32	18:00 (WEA 05 (GRN))   09:33	09:24
10   06:08	21:19 (WEA 42 (RW))   07:41	08:40	09:34	18:00 (WEA 05 (GRN))   09:35	09:25
11   06:09	21:19 (WEA 42 (RW))   07:43	08:42	09:36	18:00 (WEA 05 (GRN))   09:37	09:26
12   06:10	21:19 (WEA 42 (RW))   07:45	08:44	09:38	18:00 (WEA 05 (GRN))   09:39	09:27
13   06:11	21:19 (WEA 42 (RW))   07:47	08:46	09:40	18:00 (WEA 05 (GRN))   09:41	09:28
14   06:12	21:19 (WEA 42 (RW))   07:49	08:48	09:42	18:00 (WEA 05 (GRN))   09:43	09:29
15   06:13	21:19 (WEA 42 (RW))   07:51	08:50	09:44	18:00 (WEA 05 (GRN))   09:45	09:30
16   06:14	21:19 (WEA 42 (RW))   07:53	08:52	09:46	18:00 (WEA 05 (GRN))   09:47	09:31
17   06:15	21:19 (WEA 42 (RW))   07:55	08:54	09:48	18:00 (WEA 05 (GRN))   09:49	09:32
18   06:16	21:19 (WEA 42 (RW))   07:57	08:56	09:50	18:00 (WEA 05 (GRN))   09:51	09:33
19   06:17	21:19 (WEA 42 (RW))   07:59	08:58	09:52	18:00 (WEA 05 (GRN))   09:53	09:34
20   06:18	21:19 (WEA 42 (RW))   08:01	09:00	09:54	18:00 (WEA 05 (GRN))   09:55	09:35
21   06:19	21:19 (WEA 42 (RW))   08:03	09:02	09:56	18:00 (WEA 05 (GRN))   09:57	09:36
22   06:20	21:19 (WEA 42 (RW))   08:05	09:04	09:58	18:00 (WEA 05 (GRN))   09:59	09:37
23   06:21	21:19 (WEA 42 (RW))   08:07	09:06	10:00	18:00 (WEA 05 (GRN))   10:01	09:38
24   06:22	21:19 (WEA 42 (RW))   08:09	09:08	10:02	18:00 (WEA 05 (GRN))   10:03	09:39
25   06:23	21:19 (WEA 42 (RW))   08:11	09:10	10:04	18:00 (WEA 05 (GRN))   10:05	09:40
26   06:24	21:19 (WEA 42 (RW))   08:13	09:12	10:06	18:00 (WEA 05 (GRN))   10:07	09:41
27   06:25	21:19 (WEA 42 (RW))   08:15	09:14	10:08	18:00 (WEA 05 (GRN))   10:09	09:42
28   06:26	21:19 (WEA 42 (RW))   08:17	09:16	10:10	18:00 (WEA 05 (GRN))   10:11	09:43
29   06:27	21:19 (WEA 42 (RW))   08:19	09:18	10:12	18:00 (WEA 05 (GRN))   10:13	09:44
30   06:28	21:19 (WEA 42 (RW))   08:21	09:20	10:14	18:00 (WEA 05 (GRN))   10:15	09:45
31   06:29	21:19 (WEA 42 (RW))   08:23	09:22	10:16	18:00 (WEA 05 (GRN))   10:17	09:46
1   06:30	21:19 (WEA 42 (RW))   08:25	09:24	10:18	18:00 (WEA 05 (GRN))   10:19	09:47
2   06:31	21:19 (WEA 42 (RW))   08:27	09:26	10:20	18:00 (WEA 05 (GRN))   10:21	09:48
3   06:32	21:19 (WEA 42 (RW))   08:29	09:28	10:22	18:00 (WEA 05 (GRN))   10:23	09:49
4   06:33	21:19 (WEA 42 (RW))   08:31	09:30	10:24	18:00 (WEA 05 (GRN))   10:25	09:50
5   06:34	21:19 (WEA 42 (RW))   08:33	09:32	10:26	18:00 (WEA 05 (GRN))   10:27	09:51
6   06:35	21:19 (WEA 42 (RW))   08:35	09:34	10:28	18:00 (WEA 05 (GRN))   10:29	09:52
7   06:36	21:19 (WEA 42 (RW))   08:37	09:36	10:30	18:00 (WEA 05 (GRN))   10:31	09:53
8   06:37	21:19 (WEA 42 (RW))   08:39	09:38	10:32	18:00 (WEA 05 (GRN))   10:33	09:54
9   06:38	21:19 (WEA 42 (RW))   08:41	09:40	10:34	18:00 (WEA 05 (GRN))   10:35	09:55
10   06:39	21:19 (WEA 42 (RW))   08:43	09:42	10:36	18:00 (WEA 05 (GRN))   10:37	09:56
11   06:40	21:19 (WEA 42 (RW))   08:45	09:44	10:38	18:00 (WEA 05 (GRN))   10:39	09:57
12   06:41	21:19 (WEA 42 (RW))   08:47	09:46	10:40	18:00 (WEA 05 (GRN))   10:41	09:58
13   06:42	21:19 (WEA 42 (RW))   08:49	09:48	10:42	18:00 (WEA 05 (GRN))   10:43	09:59
14   06:43	21:19 (WEA 42 (RW))   08:51	09:50	10:44	18:00 (WEA 05 (GRN))   10:45	10:00
15   06:44	21:19 (WEA 42 (RW))   08:53	09:52	10:46	18:00 (WEA 05 (GRN))   10:47	10:01
16   06:45	21:19 (WEA 42 (RW))   08:55	09:54	10:48	18:00 (WEA 05 (GRN))   10:49	10:02
17   06:46	21:19 (WEA 42 (RW))   08:57	09:56	10:50	18:00 (WEA 05 (GRN))   10:51	10:03
18   06:47	21:19 (WEA 42 (RW))   08:59	09:58	10:52	18:00 (WEA 05 (GRN))   10:53	10:04
19   06:48	21:19 (WEA 42 (RW))   09:01	10:00	10:54	18:00 (WEA 05 (GRN))   10:55	10:05
20   06:49	21:19 (WEA 42 (RW))   09:03	10:02	10:56	18:00 (WEA 05 (GRN))   10:57	10:06
21   06:50	21:19 (WEA 42 (RW))   09:05	10:04	10:58	18:00 (WEA 05 (GRN))   10:59	

Projekt:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0

**DNV**

Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 06 - IO 06 Bäderstraße 17 (Gosdorf)

### 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	08:37						06:52		05:41		04:51
16:03	9	15:16 (WEA_G1)   08:06	16:19 (WEA_08 (GRN))   07:08		19:51		20:48		21:38	10	21:38 (WEA_K04)
		15:26 (WEA_G1)   16:55	16:22 (WEA_08 (GRN))   17:52		06:49		05:39		04:50		20:53 (WEA_K04)
2	08:37	15:16 (WEA_G1)   08:04	16:19 (WEA_08 (GRN))   07:05		19:53		20:49		21:40	11	21:04 (WEA_K04)
16:04	10	15:26 (WEA_G1)   16:57	16:25 (WEA_08 (GRN))   17:54		06:47		05:37	19:25 (WEA_43 (RW))   20:37	04:49		20:54 (WEA_K04)
3	08:37	15:16 (WEA_G1)   08:03	16:20 (WEA_08 (GRN))   07:03		19:55	2	20:51		21:41	12	21:06 (WEA_K04)
16:05	11	15:27 (WEA_G1)   16:59	16:27 (WEA_08 (GRN))   17:56		06:44		05:35	19:27 (WEA_43 (RW))   20:51	04:48		20:54 (WEA_K04)
4	08:36	15:17 (WEA_G1)   08:01	16:21 (WEA_08 (GRN))   07:01		19:57		20:53		21:42	13	21:07 (WEA_K04)
16:06	12	15:29 (WEA_G1)   17:01	16:29 (WEA_08 (GRN))   17:58		06:42		05:33	19:30 (WEA_43 (RW))   20:53	04:47		20:54 (WEA_K04)
5	08:36	15:17 (WEA_G1)   07:59	16:22 (WEA_08 (GRN))   06:58		19:59	5	20:55		21:43	13	21:07 (WEA_K04)
16:08	13	15:30 (WEA_G1)   17:03	16:29 (WEA_08 (GRN))   18:00		06:39		05:31	19:32 (WEA_43 (RW))   20:57	04:47		20:55 (WEA_K04)
6	08:36	15:17 (WEA_G1)   07:57	16:56		17:33 (WEA_05 (GRN))   06:39		05:29		21:44	14	21:09 (WEA_K04)
16:09	14	15:31 (WEA_G1)   17:05	18:02	1	17:34 (WEA_05 (GRN))   20:01		05:27	19:33 (WEA_43 (RW))   20:57	04:45		20:55 (WEA_K04)
7	08:35	15:18 (WEA_G1)   07:55	16:53		17:35 (WEA_05 (GRN))   06:37		05:25		21:45	15	21:09 (WEA_K04)
16:10	15	15:33 (WEA_G1)   17:07	18:03	2	17:37 (WEA_05 (GRN))   20:02		05:23		21:46	16	21:11 (WEA_K04)
8	08:35	15:18 (WEA_G1)   07:53	16:51		17:34 (WEA_03 (GRN))   06:34		05:21		21:47	17	21:12 (WEA_K04)
16:12	17	15:35 (WEA_G1)   17:09	18:05	4	17:38 (WEA_05 (GRN))   20:04		05:19		21:48	18	21:13 (WEA_K04)
9	08:34	15:19 (WEA_G1)   07:51	16:49		17:34 (WEA_03 (GRN))   06:32		05:17		21:49	19	21:14 (WEA_K04)
16:13	18	15:36 (WEA_G1)   17:11	18:07	7	17:41 (WEA_03 (GRN))   20:06		05:15		21:50	20	21:15 (WEA_K04)
10	08:33	15:18 (WEA_G1)   07:49	16:46		17:33 (WEA_03 (GRN))   06:30		05:13		21:51	21	21:16 (WEA_K04)
16:15	20	15:38 (WEA_G1)   17:13	18:09	9	17:42 (WEA_03 (GRN))   20:08		05:11		21:52	22	21:17 (WEA_K04)
11	08:33	15:19 (WEA_G1)   07:47	16:44		17:34 (WEA_03 (GRN))   06:27		05:09		21:53	23	21:18 (WEA_K04)
16:16	20	15:39 (WEA_G1)   17:15	18:11	11	17:45 (WEA_03 (GRN))   20:10		05:07		21:54	24	21:19 (WEA_K04)
12	08:32	15:19 (WEA_G1)   07:45	16:41		17:34 (WEA_03 (GRN))   06:25		05:05		21:55	25	21:20 (WEA_K04)
16:18	22	15:41 (WEA_G1)   17:17	18:13	11	17:45 (WEA_03 (GRN))   20:12		05:03		21:56	26	21:21 (WEA_K04)
13	08:31	15:20 (WEA_G1)   07:43	16:39		17:35 (WEA_03 (GRN))   06:22		05:01		21:57	27	21:22 (WEA_K04)
16:20	23	15:43 (WEA_G1)   17:19	18:15	9	17:44 (WEA_03 (GRN))   20:14		04:59		21:58	28	21:23 (WEA_K04)
14	08:30	15:20 (WEA_G1)   07:41	16:36		17:36 (WEA_03 (GRN))   06:20		04:57		21:59	29	21:24 (WEA_K04)
16:21	23	15:43 (WEA_G1)   17:21	18:17		17:36 (WEA_03 (GRN))   06:18		04:55		22:00	30	21:25 (WEA_K04)
15	08:29	15:21 (WEA_G1)   07:39	16:34		17:37 (WEA_03 (GRN))   06:16		04:53		22:01	31	21:26 (WEA_K04)
16:23	23	15:44 (WEA_G1)   17:24	18:19		17:38 (WEA_03 (GRN))   06:15		04:51		22:02		21:27 (WEA_K04)
16	08:28	15:22 (WEA_G1)   07:37	16:31		17:39 (WEA_03 (GRN))   06:13		04:49		22:03		21:28 (WEA_K04)
16:25	22	15:44 (WEA_G1)   17:26	18:21		17:40 (WEA_03 (GRN))   06:11		04:47		22:04		21:29 (WEA_K04)
17	08:27	15:23 (WEA_G1)   07:35	16:57 (WEA_06 (GRN))   06:29		17:41 (WEA_03 (GRN))   06:10		04:45		22:05		21:30 (WEA_K04)
16:26	21	15:44 (WEA_G1)   17:28	18:23	2	16:59 (WEA_06 (GRN))   06:26		04:43		22:06		21:31 (WEA_K04)
18	08:26	15:23 (WEA_G1)   07:33	16:56 (WEA_06 (GRN))   06:26		17:56 (WEA_02 (GRN))   06:10		04:41		22:07		21:32 (WEA_K04)
16:28	20	15:43 (WEA_G1)   17:30	18:25	2	17:58 (WEA_02 (GRN))   06:10		04:39		22:08		21:33 (WEA_K04)
19	08:25	15:24 (WEA_G1)   07:30	16:55 (WEA_07 (GRN))   06:24		17:56 (WEA_02 (GRN))   06:08		04:37		22:09		21:34 (WEA_K04)
16:30	19	15:43 (WEA_G1)   17:32	18:27	4	18:00 (WEA_02 (GRN))   06:06		04:35		22:10		21:35 (WEA_K04)
20	08:24	15:25 (WEA_G1)   07:28	16:55 (WEA_07 (GRN))   06:21		17:57 (WEA_02 (GRN))   06:06		04:33		22:11		21:36 (WEA_K04)
16:32	17	15:42 (WEA_G1)   17:34	18:28	5	18:01 (WEA_02 (GRN))   06:06		04:31		22:12		21:37 (WEA_K04)
21	08:23	15:27 (WEA_G1)   07:26	16:55 (WEA_07 (GRN))   06:19		17:57 (WEA_02 (GRN))   06:04		04:29		22:13		21:38 (WEA_K04)
16:34	15	15:42 (WEA_G1)   17:36	18:30	7	18:04 (WEA_02 (GRN))   06:04		04:27		22:14		21:39 (WEA_K04)
22	08:21	15:29 (WEA_G1)   07:24	16:54 (WEA_07 (GRN))   06:16		18:00 (WEA_02 (GRN))   06:01		04:25		22:15		21:40 (WEA_K04)
16:35	13	15:42 (WEA_G1)   17:38	18:32	1	18:00 (WEA_02 (GRN))   06:01		04:23		22:16		21:41 (WEA_K04)
23	08:20	15:31 (WEA_G1)   07:22	16:54 (WEA_07 (GRN))   06:14		18:01 (WEA_02 (GRN))   05:59		04:21		22:17		21:42 (WEA_K04)
16:37	9	15:40 (WEA_G1)   17:40	18:34		18:02 (WEA_02 (GRN))   05:57		04:19		22:18		21:43 (WEA_K04)
24	08:19	15:31 (WEA_G1)   07:19	16:53 (WEA_07 (GRN))   06:11		18:03 (WEA_02 (GRN))   05:55		04:17		22:19		21:44 (WEA_K04)
16:39		17:42	18:36		18:04 (WEA_02 (GRN))   05:54		04:15		22:20		21:45 (WEA_K04)
25	08:17	15:33 (WEA_G1)   07:17	16:54 (WEA_07 (GRN))   06:09		18:05 (WEA_02 (GRN))   05:52		04:13		22:21		21:46 (WEA_K04)
16:41		17:44	18:38		18:06 (WEA_02 (GRN))   05:51		04:11		22:22		21:47 (WEA_K04)
26	08:16	15:34 (WEA_G1)   07:15	16:55 (WEA_07 (GRN))   06:07		18:07 (WEA_02 (GRN))   05:50		04:09		22:23		21:48 (WEA_K04)
16:43		17:46	18:40	1	18:12 (WEA_01 (GRN))   05:52		04:07		22:24		21:49 (WEA_K04)
27	08:14	15:35 (WEA_G1)   07:12	16:56 (WEA_07 (GRN))   06:04		18:13 (WEA_01 (GRN))   05:51		04:05		22:25		21:50 (WEA_K04)
16:45		17:48	18:42	1	18:14 (WEA_01 (GRN))   05:50		04:03		22:26		21:51 (WEA_K04)
28	08:13	15:36 (WEA_G1)   07:10	16:57 (WEA_07 (GRN))   06:02		18:15 (WEA_01 (GRN))   05:49		04:01		22:27		21:52 (WEA_K04)
16:47		17:50	18:44		18:16 (WEA_01 (GRN))   05:48		03:59		22:28		21:53 (WEA_K04)
29	08:11		16:59		18:17 (WEA_01 (GRN))   05:46		03:57		22:29		21:54 (WEA_K04)
16:49			19:45		18:18 (WEA_01 (GRN))   05:45		03:55		22:30		21:55 (WEA_K04)
30	08:09		16:57		18:19 (WEA_01 (GRN))   05:44		03:53		22:31		21:56 (WEA_K04)
16:51			19:47		18:20 (WEA_01 (GRN))   05:43		03:51		22:32		21:57 (WEA_K04)
31	08:08	16:19 (WEA_08 (GRN))	16:54		18:21 (WEA_01 (GRN))   05:42		03:49		22:33		21:58 (WEA_K04)
16:53	1	16:20 (WEA_08 (GRN))	19:49		18:22 (WEA_01 (GRN))   05:41		03:47		22:34		21:59 (WEA_K04)
Sonneneinstrahlung	248		272		421		496		513		574
astr. max. mögl. Beschattung	387		164		75		18		107		374

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:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
 Sommerdeich 14 b  
 DE-25709 Kaiser-Wilhelm-Koog  
 (0 48 56)901-0



Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 06 - IO 06 Bäderstraße 17 (Gosdorf)

### 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

Jul	August	September	Oktober	November	Dezember
1   04:47 2   21:54 14 3   04:48 4   04:49 5   04:50 6   04:51 7   04:52 8   04:53 9   04:54 10   04:55 11   04:56 12   04:57 13   04:58 14   05:00 15   05:01 16   05:03 17   05:04 18   05:05 19   05:07 20   05:08 21   05:10 22   05:11 23   05:13 24   05:14 25   05:16 26   05:17 27   05:19 28   05:21 29   05:22 30   05:24 31   05:26   21:19	21:00 (WEA K04) 05:27 21:14 (WEA K04) 21:17 21:00 (WEA K04) 05:29 21:15 (WEA K04) 21:16 21:00 (WEA K04) 05:31 21:01 (WEA K04) 05:32 21:16 (WEA K04) 21:12 21:00 (WEA K04) 05:34 21:16 (WEA K04) 21:10 21:00 (WEA K04) 05:36 21:15 (WEA K04) 21:08 21:00 (WEA K04) 05:38 21:14 (WEA K04) 21:06 21:00 (WEA K04) 05:39 21:14 (WEA K04) 21:04 21:00 (WEA K04) 05:41 21:13 (WEA K04) 21:02 21:00 (WEA K04) 05:43 21:12 (WEA K04) 21:00 21:00 (WEA K04) 05:45 21:11 (WEA K04) 20:58 21:01 (WEA K04) 05:47 21:11 (WEA K04) 20:56 21:00 (WEA K04) 05:48 21:10 (WEA K04) 20:54 21:01 (WEA K04) 05:50 21:09 (WEA K04) 20:51 21:00 (WEA K04) 05:52 21:08 (WEA K04) 20:49 21:01 (WEA K04) 05:54 21:07 (WEA K04) 20:47 21:02 (WEA K04) 05:56 21:07 (WEA K04) 20:45 21:02 (WEA K04) 05:57 21:05 (WEA K04) 20:43 21:02 (WEA K04) 05:59 21:04 (WEA K04) 20:40   06:01 21:37 21:35 21:33 21:32 21:32 20:45 (WEA 42 (RW)) 20:29 20:50 (WEA 42 (RW)) 20:27 20:43 (WEA 42 (RW)) 06:12 20:31 (WEA 42 (RW)) 06:14 20:53 (WEA 42 (RW)) 20:22 20:41 (WEA 42 (RW)) 06:15 20:52 (WEA 42 (RW)) 20:20 20:41 (WEA 42 (RW)) 06:17 20:51 (WEA 42 (RW)) 20:17 20:41 (WEA 42 (RW)) 06:19 20:48 (WEA 42 (RW)) 20:15 20:41 (WEA 42 (RW)) 06:21 20:47 (WEA 42 (RW)) 20:12   515	20:40 (WEA 42 (RW)) 06:23 20:45 (WEA 42 (RW)) 20:10 20:41 (WEA 42 (RW)) 06:24 20:44 (WEA 42 (RW)) 20:07   06:28   06:28 19:24 (WEA 43 (RW)) 07:26 19:22 (WEA 43 (RW)) 07:20 19:27 (WEA 43 (RW)) 07:40 19:20 (WEA 43 (RW)) 07:30 19:24 (WEA 43 (RW)) 07:38 19:20 (WEA 43 (RW)) 07:32 19:22 (WEA 43 (RW)) 07:36   19:45   06:42 19:43 06:44 19:40 06:46 19:38 06:48 19:35 06:50 19:33 20:14 (WEA 41 (RW)) 06:51 20:15 (WEA 41 (RW)) 19:30 20:12 (WEA 41 (RW)) 06:53 19:28 06:55 19:25 06:57 19:23 06:59 19:20 06:00 19:15 19:13 19:12 19:10 07:08 19:08 07:10 19:05 07:11 19:03 07:13 19:00 07:15 18:58   383	06:23 20:10 06:24 20:07   06:28   06:28 07:26 07:20 07:40 07:30 07:38 07:32 07:36   07:26 18:43 18:40 18:38 18:36   18:31   07:37 18:28 18:26 07:41 18:24 07:43 18:21 07:45 18:19 17:26 (WEA 01 (GRN)) 07:47 19:02 (WEA 01 (GRN)) 18:17 07:49 18:14 07:51 18:12 07:53 18:10 07:55 18:07 07:56 18:49 (WEA 02 (GRN)) 18:05 18:41 (WEA 02 (GRN)) 07:50 18:47 (WEA 02 (GRN)) 18:03 18:40 (WEA 02 (GRN)) 08:00 18:44 (WEA 02 (GRN)) 18:01 18:40 (WEA 02 (GRN)) 07:02 16:58 07:04 16:56 07:06 16:54 07:08 16:52 07:10 16:50 18:16 (WEA 03 (GRN)) 07:12 18:23 (WEA 03 (GRN)) 16:48   07:14   16:46   328	07:17 18:14 (WEA 03 (GRN)) 07:16 18:25 (WEA 03 (GRN)) 16:44 18:12 (WEA 03 (GRN)) 07:18 18:53 18:11 (WEA 03 (GRN)) 07:20 18:50 18:21 (WEA 03 (GRN)) 16:40 18:11 (WEA 03 (GRN)) 07:22 18:19 (WEA 03 (GRN)) 16:38 18:11 (WEA 03 (GRN)) 07:24 18:45 18:16 (WEA 03 (GRN)) 16:36 18:11 (WEA 05 (GRN)) 07:26 18:14 (WEA 05 (GRN)) 16:34 18:10 (WEA 05 (GRN)) 07:20 18:11 (WEA 05 (GRN)) 16:32 18:10 (WEA 05 (GRN)) 07:30 19:24 (WEA 43 (RW)) 18:38 19:22 (WEA 43 (RW)) 07:32 19:20 (WEA 43 (RW)) 18:40 19:24 (WEA 43 (RW)) 18:38 19:20 (WEA 43 (RW)) 07:32 19:22 (WEA 43 (RW)) 07:36   18:31   07:35 18:31 07:37 18:28 18:26 17:31 (WEA 07 (GRN)) 07:42 17:39 (WEA 07 (GRN)) 16:20 17:29 (WEA 07 (GRN)) 07:44 17:41 (WEA 07 (GRN)) 16:18 17:27 (WEA 07 (GRN)) 07:45 17:42 (WEA 07 (GRN)) 16:16 17:26 (WEA 07 (GRN)) 07:47 17:42 (WEA 07 (GRN)) 16:15 17:25 (WEA 07 (GRN)) 07:49 17:43 (WEA 07 (GRN)) 16:13 17:25 (WEA 07 (GRN)) 07:51 17:42 (WEA 07 (GRN)) 16:12 17:25 (WEA 07 (GRN)) 07:53 17:40 (WEA 07 (GRN)) 16:11 17:25 (WEA 07 (GRN)) 07:55 17:37 (WEA 07 (GRN)) 16:09 17:25 (WEA 07 (GRN)) 07:57 17:35 (WEA 07 (GRN)) 16:08 17:25 (WEA 07 (GRN)) 07:50 17:32 (WEA 07 (GRN)) 16:07 17:28 (WEA 06 (GRN)) 08:00 17:30 (WEA 07 (GRN)) 16:05 16:26 (WEA 06 (GRN)) 08:02 16:28 (WEA 06 (GRN)) 16:04   08:04 16:03 08:05 16:02 08:07 16:01 08:09 16:00 08:10 15:59   257	08:12 15:58 08:14 15:58 08:15 15:57 08:17 15:56 08:18 15:57 08:19 15:55 08:21 15:54 08:22 15:54 08:23 15:54 08:25 15:53 08:26 15:53 08:27 15:53 08:28 15:53 08:29 15:53 08:30 15:53 08:31 15:53 08:32 15:53 08:33 15:11 (WEA G1) 08:34 15:16 (WEA G1) 15:54 15:12 (WEA G1) 08:34 15:16 (WEA G1) 15:54 15:12 (WEA G1) 08:35 15:16 (WEA G1) 15:55 15:13 (WEA G1) 08:36 15:16 (WEA G1) 15:54 15:12 (WEA G1) 08:35 15:16 (WEA G1) 15:56 15:13 (WEA G1) 08:36 15:16 (WEA G1) 15:56 15:13 (WEA G1) 08:37 15:16 (WEA G1) 15:57 15:14 (WEA G1) 08:37 15:16 (WEA G1) 15:58 15:15 (WEA G1) 08:37 15:16 (WEA G1) 15:59 15:15 (WEA G1) 08:37 15:16 (WEA G1) 16:00 15:16 (WEA G1) 08:37 15:16 (WEA G1) 16:01 15:15 (WEA G1) 08:37 15:16 (WEA G1) 16:02   231
Sommerstundenzahl   515					
astr. max. mögl. Beschattung   259   10   44   104   257   272					

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

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 07 - IO 07 Bäderstraße 25 (Gosdorf)

### 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	08:37 16:03 16:04	15:19 (WEA_G1)   08:06 15:25 (WEA_G1)   16:55 15:26 (WEA_G1)   16:57	07:08 17:52 17:54	06:52 19:51 19:53	05:41 20:47 20:49	20:11 (WEA 42 (RW))   04:51 20:17 (WEA 42 (RW))   21:38 20:19 (WEA 42 (RW))   21:40
2	08:37 16:05	15:19 (WEA_G1)   08:03 15:27 (WEA_G1)   16:59	07:03 17:56	06:47 19:55	05:37 20:51	20:12 (WEA 42 (RW))   04:49 20:20 (WEA 42 (RW))   21:41
3	08:37 16:06	15:20 (WEA_G1)   08:01 15:29 (WEA_G1)   17:01	07:01 17:58	06:44 19:57	05:35 20:53	20:14 (WEA 42 (RW))   04:48 20:23 (WEA 42 (RW))   21:42
4	08:36 16:06	15:20 (WEA_G1)   07:59 15:30 (WEA_G1)   17:03	06:58 18:00	06:42 19:59	05:33 20:55	20:15 (WEA 42 (RW))   04:47 20:21 (WEA 42 (RW))   21:43
5	08:36 16:09	15:21 (WEA_G1)   07:57 15:31 (WEA_G1)   17:05	06:56 18:02	06:39 20:01	05:31 20:57	20:16 (WEA 42 (RW))   04:47 20:22 (WEA 42 (RW))   21:44
6	08:35 16:10	15:21 (WEA_G1)   07:55 15:33 (WEA_G1)   17:07	06:53 18:03	06:37 20:02	05:29 20:59	20:17 (WEA 42 (RW))   04:46 20:23 (WEA 42 (RW))   21:45
7	08:35 16:12	15:21 (WEA_G1)   07:53 15:35 (WEA_G1)   17:09	06:51 18:05	06:34 20:04	05:27 21:00	20:18 (WEA 42 (RW))   04:45 20:24 (WEA 42 (RW))   21:46
8	08:34 16:13	15:21 (WEA_G1)   07:51 15:36 (WEA_G1)   17:11	06:49 18:07	06:32 20:06	05:25 21:02	20:19 (WEA 42 (RW))   04:45 20:25 (WEA 42 (RW))   21:47
9	08:33 16:13	15:21 (WEA_G1)   07:49 15:38 (WEA_G1)   17:13	06:46 18:09	06:30 20:08	05:23 21:04	20:20 (WEA 42 (RW))   04:44 20:26 (WEA 42 (RW))   21:48
10	08:33 16:16	15:22 (WEA_G1)   07:47 15:39 (WEA_G1)   17:15	06:44 18:11	06:27 20:10	05:22 21:06	20:21 (WEA 42 (RW))   04:44 20:27 (WEA 42 (RW))   21:49
11	08:32 16:18	15:22 (WEA_G1)   07:45 15:41 (WEA_G1)   17:17	06:41 18:13	06:25 20:12	05:20 21:07	20:22 (WEA 42 (RW))   04:43 20:28 (WEA 42 (RW))   21:50
12	08:31 16:20	15:23 (WEA_G1)   07:43 15:43 (WEA_G1)   17:19	06:39 18:15	06:22 20:14	05:18 21:09	20:29 (WEA 42 (RW))   04:43 20:35 (WEA 42 (RW))   21:51
13	08:30 16:21	15:24 (WEA_G1)   07:41 15:44 (WEA_G1)   17:21	06:36 18:17	06:20 20:16	05:16 21:11	20:36 (WEA 42 (RW))   04:43 20:41 (WEA 42 (RW))   21:52
14	08:29 16:23	15:24 (WEA_G1)   07:39 15:45 (WEA_G1)   17:24	06:34 18:19	06:18 20:18	05:14 21:13	20:48 (WEA 42 (RW))   04:42 20:47 (WEA 42 (RW))   21:53
15	08:28 16:25	15:25 (WEA_G1)   07:37 15:46 (WEA_G1)   17:26	06:31 18:21	06:15 20:19	05:13 21:14	20:54 (WEA 42 (RW))   04:42 20:53 (WEA 42 (RW))   21:54
16	08:27 16:26	15:25 (WEA_G1)   07:35 15:47 (WEA_G1)   17:28	06:29 18:23	06:13 20:21	05:11 21:16	21:00 (WEA 42 (RW))   04:42 21:00 (WEA 42 (RW))   21:55
17	08:26 16:28	15:26 (WEA_G1)   07:33 15:48 (WEA_G1)   17:30	06:26 18:25	06:10 20:23	05:09 21:18	21:07 (WEA 42 (RW))   04:42 21:07 (WEA 42 (RW))   21:56
18	08:25 16:30	15:28 (WEA_G1)   07:30 15:49 (WEA_G1)   17:32	06:24 18:27	06:08 20:25	05:08 21:19	21:14 (WEA 42 (RW))   04:42 21:14 (WEA 42 (RW))   21:57
19	08:24 16:32	15:29 (WEA_G1)   07:28 15:51 (WEA_G1)   17:34	06:21 18:28	06:06 20:27	05:06 21:21	21:21 (WEA 42 (RW))   04:42 21:21 (WEA 42 (RW))   21:58
20	08:23 16:34	15:31 (WEA_G1)   07:26 15:52 (WEA_G1)   17:36	06:19 18:30	06:04 20:29	05:05 21:23	21:28 (WEA 42 (RW))   04:42 21:28 (WEA 42 (RW))   21:59
21	08:22 16:35	15:32 (WEA_G1)   07:24 15:53 (WEA_G1)   17:38	06:16 18:32	06:01 20:31	05:03 21:24	21:35 (WEA 42 (RW))   04:42 21:35 (WEA 42 (RW))   22:00
22	08:20 16:37	15:40 (WEA_G1)   07:22 17:40	06:14 18:34	05:59 20:33	05:02 21:26	21:42 (WEA 42 (RW))   04:43 21:42 (WEA 42 (RW))   22:01
23	08:19 16:39	17:42	06:11 18:36	05:57 20:34	05:00 21:27	21:49 (WEA 42 (RW))   04:43 21:49 (WEA 42 (RW))   22:02
24	08:17 16:41	17:44	06:09 18:38	05:54 20:36	04:59 21:29	21:56 (WEA 42 (RW))   04:43 21:56 (WEA 42 (RW))   22:03
25	08:16 16:43	17:46	06:06 18:40	05:52 20:38	04:58 21:30	22:03 (WEA 42 (RW))   04:43 22:03 (WEA 42 (RW))   22:04
26	08:14 16:45	17:48	06:04 18:42	05:50 20:40	04:56 21:32	22:10 (WEA 42 (RW))   04:44 22:10 (WEA 42 (RW))   22:05
27	08:13 16:47	17:50	06:02 18:44	05:48 20:42	04:55 21:33	22:17 (WEA 42 (RW))   04:44 22:17 (WEA 42 (RW))   22:06
28	08:11 16:49		06:59 19:45	05:46 20:44	04:54 21:35	22:24 (WEA 42 (RW))   04:44 22:24 (WEA 42 (RW))   22:07
29	08:09 16:51		06:57 19:47	05:44 20:46	04:53 21:36	22:31 (WEA 42 (RW))   04:44 22:31 (WEA 42 (RW))   22:08
30	08:06 16:53		06:54 19:49	05:42 20:48	04:52 21:37	22:38 (WEA 42 (RW))   04:44 22:38 (WEA 42 (RW))   22:09
31	08:06 16:53		06:54 19:49	05:42 20:48	04:52 21:37	22:45 (WEA 42 (RW))   04:44 22:45 (WEA 42 (RW))   22:10
	Sonnenscheinstunden   248 astr.max.mögl.Beschattung   307	272 88	367 57	421 6	496 165	513 87

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:

SWP Windpark Großenholz

Lizenzierter Anwender:

GL Garrad Hassan Deutschland GmbH  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0

Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 07 - IO 07 Bäderstraße 25 (Gosdorf)

### 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

	July	August	September	Oktober	November	Dezember
1	04:47	05:27	06:23	07:17	07:56	08:12
	21:54	21:17	20:10	18:55	16:44	15:04 (WEA_G1)
2	04:47	05:29	06:24	07:19	07:58	08:14
	21:53	21:16	20:07	18:53	16:42	15:08 17
3	04:48	05:31	06:26	07:21	07:20	08:15
	21:53	21:14	20:05	18:50	16:40	15:05 (WEA_G1)
4	04:49	05:32	06:28	07:22	07:22	08:17
	21:52	21:12	20:03	18:48	16:38	15:05 (WEA_G1)
5	04:50	05:34	06:30	07:24	07:24	08:18
	21:52	21:10	20:00	18:45	16:36	15:06 (WEA_G1)
6	04:51	05:36	06:32	07:26	07:26	08:19
	21:51	21:08	19:58	18:43	16:34	15:06 (WEA_G1)
7	04:52	05:38	06:33	07:28	07:28	08:21
	21:50	21:06	19:55	18:40	16:32	15:07 (WEA_G1)
8	04:53	05:39	06:35	07:30	07:30	08:22
	21:50	21:04	19:53	18:38	16:30	15:07 (WEA_G1)
9	04:54	05:41	06:37	07:32	07:32	08:23
	21:49	21:02	19:50	18:36	16:28	15:08 (WEA_G1)
10	04:55	05:43	06:39	07:34	07:34	08:25
	21:48	21:00	19:48	18:33	16:26	15:08 (WEA_G1)
11	04:56	05:45	06:41	07:35	07:35	08:26
	21:47	20:58	19:45	18:31	16:25	15:09 (WEA_G1)
12	04:57	05:47	06:42	07:37	07:38	08:27
	21:46	20:56	19:43	18:28	16:23	15:09 (WEA_G1)
13	04:59	05:48	06:44	07:39	07:40	08:28
	21:45	20:54	19:40	18:26	16:21	15:10 (WEA_G1)
14	05:00	05:50	06:46	07:41	07:42	08:29
	21:44	20:51	19:38	18:24	16:20	15:10 (WEA_G1)
15	05:01	05:52	06:48	07:43	07:44	08:30
	21:43	20:49	19:35	18:21	16:18	15:11 (WEA_G1)
16	05:03	05:54	06:50	07:45	07:45	08:31
	21:42	20:47	19:33	18:19	16:16	15:12 (WEA_G1)
17	05:04	05:56	06:51	07:47	07:47	08:32
	21:41	20:45	19:30	18:17	16:15	15:13 (WEA_G1)
18	05:05	05:57	06:53	07:49	07:49	08:33
	21:39	20:43	19:28	18:14	16:13	15:14 (WEA_G1)
19	05:07	05:59	06:55	07:51	07:51	08:34
	21:38	20:40	19:25	18:12	16:12	15:15 (WEA_G1)
20	05:08	06:01	06:57	07:53	07:53	08:35
	21:37	20:38	19:23	18:10	16:11	15:16 (WEA_G1)
21	05:10	06:03	06:59	07:55	07:55	08:36
	21:35	20:36	19:20	18:07	16:09	15:17 (WEA_G1)
22	05:11	06:05	07:00	07:56	07:56	08:37
	21:34	20:34	19:18	18:05	16:08	15:18 (WEA_G1)
23	05:13	06:06	07:02	07:58	07:58	08:38
	21:32	20:31	19:15	18:03	16:07	15:19 (WEA_G1)
24	05:14	06:08	07:04	08:00	08:00	08:39
	21:31	20:29	19:13	18:01	16:05	15:20 (WEA_G1)
25	05:16	06:10	07:06	08:02	08:02	08:40
	21:29	20:27	19:10	17:58	16:04	15:21 (WEA_G1)
26	05:17	06:12	07:08	08:04	08:04	08:41
	21:28	20:24	19:08	17:56	16:03	15:22 (WEA_G1)
27	05:19	06:14	07:10	08:06	08:06	08:42
	21:26	20:22	19:05	17:54	16:02	15:23 (WEA_G1)
28	05:21	06:15	07:11	08:08	08:08	08:43
	21:24	20:20	19:03	17:52	16:01	15:24 (WEA_G1)
29	05:22	06:17	07:13	08:10	08:10	08:44
	21:23	20:17	19:00	17:50	16:00	15:25 (WEA_G1)
30	05:24	06:19	07:15	08:12	08:12	08:45
	21:21	20:15	18:58	17:48	15:59	15:26 (WEA_G1)
31	05:26	06:21	07:17	08:14	08:14	08:46
	21:19	20:12	18:56	17:46	15:58	15:27 (WEA_G1)
Sonnenscheinstunden	515	461	383	328	257	231
estr.max.mögl.Beschattung	129	40	22	120	180	177

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:

SWP Windpark Großenholz

Lizenzierter Anwender:

GL Garrad Hassan Deutschland GmbH  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0

Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 08 - IO 08 Bäderstraße 34 (Gosdorf)

### 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   08:37 16:03	14:45 (WEA_G2)   08:06 15:01 (WEA_G2)   16:55	07:08 17:52	06:52 19:51	19:21 (WEA_43 (RW))   05:41 20:15 (WEA_42 (RW))   04:50	20:15 (WEA_42 (RW))   04:50
2   08:37 16:04	15:01 (WEA_G2)   16:57 14:46 (WEA_G2)   08:03	07:05 17:54	3   19:24 (WEA_43 (RW))   20:47 19:53   20:49	2   20:17 (WEA_42 (RW))   21:38 20:19 (WEA_42 (RW))   21:40	20:17 (WEA_42 (RW))   21:38
3   08:37 16:05	14:46 (WEA_G2)   08:03 15:00 (WEA_G2)   16:59	07:03 17:56	3   19:26 (WEA_43 (RW))   20:49 06:47   05:37	3   20:19 (WEA_42 (RW))   21:43 20:15 (WEA_42 (RW))   21:41	20:19 (WEA_42 (RW))   21:43
4   08:36 16:06	14:48 (WEA_G2)   08:01 15:00 (WEA_G2)   17:01	07:01 17:58	06:44   05:35 19:57   20:53	5   20:20 (WEA_42 (RW))   21:41 20:16 (WEA_42 (RW))   21:42	20:20 (WEA_42 (RW))   21:41
5   08:36 16:06	14:49 (WEA_G2)   07:59 14:59 (WEA_G2)   17:03	06:58 18:00	06:42   05:33 19:59   20:55	7   20:23 (WEA_42 (RW))   21:42 20:17 (WEA_42 (RW))   21:43	20:23 (WEA_42 (RW))   21:42
6   08:36 16:09	14:51 (WEA_G2)   07:57 14:58 (WEA_G2)   17:05	06:56 18:02	06:39   05:31 20:01   20:57	7   20:24 (WEA_42 (RW))   21:43 3   20:22 (WEA_42 (RW))   21:44	20:24 (WEA_42 (RW))   21:43
7   08:35 16:10	14:54 (WEA_G2)   07:55 14:57 (WEA_G2)   17:07	06:53 18:03	17:36 (WEA_03 (GRN))   06:37 17:37 (WEA_03 (GRN))   20:02	05:29   20:59 05:27   21:00	04:46   21:45 21:45   21:46
8   08:35 16:12	07:53 15:35 (WEA_G1)   17:09	06:51 18:05	1   17:35 (WEA_03 (GRN))   06:34 17:38 (WEA_03 (GRN))   20:04	20:59   21:07 21:00   21:07	21:45   21:46 21:46   21:47
9   08:34 16:13	1   15:36 (WEA_G1)   17:11 15:35 (WEA_G1)   17:49	06:49 18:07	6   17:41 (WEA_03 (GRN))   20:06 17:35 (WEA_03 (GRN))   06:30	21:02   05:23 21:04   04:44	21:47   21:48 21:48   21:49
10   08:33 16:15	3   15:38 (WEA_G1)   17:13 15:35 (WEA_G1)   17:47	06:46 18:09	7   17:42 (WEA_03 (GRN))   20:08 17:36 (WEA_03 (GRN))   06:27	05:23   21:06 21:04   21:07	21:48   21:49 21:49   21:50
11   08:33 16:16	4   15:39 (WEA_G1)   17:15 15:35 (WEA_G1)   17:45	06:44 18:11	9   17:45 (WEA_03 (GRN))   20:10 17:38 (WEA_03 (GRN))   06:25	05:22   21:06 21:07   21:10	21:49   21:50 21:50   21:51
12   08:32 16:18	6   15:41 (WEA_G1)   17:17 15:36 (WEA_G1)   17:43	06:41 18:39	17:41 (WEA_03 (GRN))   20:12 17:55 (WEA_02 (GRN))   06:13	21:07   21:18 05:18   20:37 (WEA_K04)   21:50	21:50   21:51 21:51   21:52
13   08:31 16:20	7   15:43 (WEA_G1)   17:19 15:36 (WEA_G1)   17:41	06:39 18:15	06:22   20:14 17:56 (WEA_02 (GRN))   20:21	20:37 (WEA_K04)   21:50 20:36 (WEA_K04)   21:49	21:52   21:53 21:53   21:54
14   08:30 16:21	9   15:45 (WEA_G1)   17:21 15:36 (WEA_G1)   17:39	06:36 18:17	06:20   20:16 18:19   20:17	1   20:36 (WEA_K04)   21:50 21:11   21:13	21:51   21:52 21:52   21:53
15   08:29 16:23	11   15:47 (WEA_G1)   17:24 15:37 (WEA_G1)   17:37	06:34 18:19	06:18   20:19 18:21   20:19	3   20:39 (WEA_K04)   21:51 21:13   21:14	21:52   21:53 21:53   21:54
16   08:28 16:25	12   15:49 (WEA_G1)   17:26 15:37 (WEA_G1)   17:35	06:31 18:21	06:15   20:19 18:23   20:13	4   20:40 (WEA_K04)   21:52 05:11   20:36 (WEA_K04)   21:49	21:52   21:53 21:53   21:54
17   08:27 16:26	14   15:51 (WEA_G1)   17:28 15:37 (WEA_G1)   17:33	06:29 18:23	17:55 (WEA_02 (GRN))   06:13 17:56 (WEA_02 (GRN))   20:21	6   20:42 (WEA_K04)   21:52 05:11   20:36 (WEA_K04)   21:49	21:53   21:54 21:54   21:55
18   08:26 16:28	15   15:52 (WEA_G1)   17:30 15:38 (WEA_G1)   17:30	06:26 18:25	3   17:58 (WEA_02 (GRN))   20:23 17:57 (WEA_02 (GRN))   06:08	7   20:43 (WEA_K04)   21:53 05:09   20:36 (WEA_K04)   21:49	21:54   21:55 21:55   21:56
19   08:25 16:30	17   15:53 (WEA_G1)   17:32 15:38 (WEA_G1)   17:28	06:24 18:27	3   18:00 (WEA_02 (GRN))   20:25 18:00 (WEA_02 (GRN))   06:06	9   20:45 (WEA_K04)   21:53 05:08   20:37 (WEA_K04)   21:49	21:55   21:56 21:56   21:57
20   08:24 16:32	18   15:56 (WEA_G1)   17:34 15:39 (WEA_G1)   17:26	06:21 18:28	06:06   20:27 17:03 (WEA_07 (GRN))   06:19	10   20:47 (WEA_K04)   21:54 21:21   20:37 (WEA_K04)   21:49	21:56   21:57 21:57   21:58
21   08:23 16:34	20   15:59 (WEA_G1)   17:36 15:40 (WEA_G1)   17:24	06:19 18:30	1   17:56 (WEA_02 (GRN))   20:21 17:03 (WEA_07 (GRN))   06:16	11   20:48 (WEA_K04)   21:54 21:23   20:36 (WEA_K04)   21:49	21:57   21:58 21:58   21:59
22   08:21 16:35	19   15:59 (WEA_G1)   17:38 15:40 (WEA_G1)   17:22	06:16 18:32	6   17:09 (WEA_07 (GRN))   18:32 17:03 (WEA_07 (GRN))   06:14	12   20:49 (WEA_K04)   21:54 21:24   20:38 (WEA_K04)   21:49	21:58   21:59 21:59   22:00
23   08:20 16:37	19   15:59 (WEA_G1)   17:40 15:41 (WEA_G1)   17:19	06:14 18:34	9   17:12 (WEA_07 (GRN))   18:34 17:02 (WEA_07 (GRN))   06:11	13   20:50 (WEA_K04)   21:54 05:02   20:40 (WEA_K04)   21:49	22:00   22:01 22:01   22:02
24   08:19 16:39	17   15:58 (WEA_G1)   17:42 15:43 (WEA_G1)   17:17	06:11 18:36	11   17:13 (WEA_07 (GRN))   18:36 17:03 (WEA_07 (GRN))   06:09	14   20:51 (WEA_K04)   21:54 05:00   20:49 (WEA_K04)   21:49	22:02   22:03 22:03   22:04
25   08:17 16:41	15   15:58 (WEA_G1)   17:44 15:44 (WEA_G1)   17:15	06:09 18:38	13   17:16 (WEA_07 (GRN))   18:38 17:04 (WEA_07 (GRN))   06:06	7   20:52 (WEA_K04)   21:54 04:59   20:48 (WEA_K04)   21:49	22:04   22:05 22:05   22:06
26   08:16 16:43	12   15:56 (WEA_G1)   17:46 15:46 (WEA_G1)   17:12	06:06 18:40	12   17:16 (WEA_07 (GRN))   18:40 17:04 (WEA_07 (GRN))   06:04	20:53   20:38 (WEA_K04)   21:49 05:50   20:50 (WEA_K04)   21:54	22:06   22:07 22:07   22:08
27   08:14 16:45	8   15:54 (WEA_G1)   17:48 15:44 (WEA_G1)   17:10	06:04 18:42	10   17:14 (WEA_07 (GRN))   18:42 17:07 (WEA_07 (GRN))   06:02	20:46   21:32 05:48   21:36 (WEA_K04)   21:49	22:08   22:09 22:09   22:10
28   08:13 16:47	17:50 15:49 (WEA_G1)   17:49	06:02 18:44	5   17:12 (WEA_07 (GRN))   18:44 15:49 (WEA_G1)   17:50	21:37   21:33 04:55   20:44 (WEA_K04)   21:49	22:10   22:11 22:11   22:12
29   08:11 16:49	17:50 15:49 (WEA_G1)   17:49	06:01 18:45	18:45 15:44 (WEA_G1)   17:50	04:54   21:35 20:44   21:35	22:12   22:13 22:13   22:14
30   08:09 16:51	17:50 15:49 (WEA_G1)   17:49	06:01 18:46	18:46 15:44 (WEA_G1)   17:50	04:53   21:36 (WEA_K04)   21:49 20:46   21:36 (WEA_K04)   21:49	22:14   22:15 22:15   22:16
31   08:06 16:53	17:50 15:49 (WEA_G1)   17:49	06:00 18:47	18:47 15:44 (WEA_G1)   17:50	04:52   21:37 (WEA_K04)   21:49 21:37   21:37	22:16   22:17 22:17   22:18
Sonnenscheinstunden   248		367		496	513
astr.max.mögl.Beschattung   304	272	70	36	6	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	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0

Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 08 - IO 08 Bäderstraße 34 (Gosdorf)

### 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

Juli		August		September		Oktober		November		Dezember	
1	04:47	05:27		06:23		07:17		07:15		08:12	15:17 (WEA_G1)
	21:54	21:17		20:10		18:55		16:44		15:58	15:21 (WEA_G1)
2	04:47	05:29		06:24		07:19	18:15 (WEA 03 (GRN))	07:18		08:14	15:18 (WEA_G1)
	21:53	21:16		20:07		18:53	7 18:22 (WEA 03 (GRN))	16:42		15:58	3 15:21 (WEA_G1)
3	04:48	05:31		06:26		07:21	18:13 (WEA 03 (GRN))	07:20		08:15	15:19 (WEA_G1)
	21:53	21:14		20:05		18:50	8 18:21 (WEA 03 (GRN))	16:40		15:57	1 15:20 (WEA_G1)
4	04:49	05:32		06:28		07:22	18:12 (WEA 03 (GRN))	07:22		08:17	
	21:52	21:12		20:03		18:48	7 18:19 (WEA 03 (GRN))	16:38		15:56	
5	04:50	05:34		06:30		07:24	18:12 (WEA 03 (GRN))	07:24		08:18	
	21:52	21:10		20:00		18:45	4 18:16 (WEA 03 (GRN))	16:36		15:56	
6	04:51	05:36		06:32		07:26	18:12 (WEA 03 (GRN))	07:26		08:19	
	21:51	21:08		19:58		18:43	2 18:14 (WEA 03 (GRN))	16:34		15:55	7 14:44 (WEA_G2)
7	04:52	05:38	20:28 (WEA 42 (RW))	06:33		07:28		07:28		08:21	14:36 (WEA_G2)
	21:50	21:06	4 20:32 (WEA 42 (RW))	19:55		18:40		16:32		15:54	10 14:46 (WEA_G2)
8	04:53	05:39	20:36 (WEA 42 (RW))	06:35		07:30		07:30		08:22	14:35 (WEA_G2)
	21:50	21:04	7 20:33 (WEA 42 (RW))	19:53		18:39		16:30		15:54	12 14:47 (WEA_G2)
9	04:54	05:41	20:24 (WEA 42 (RW))	06:37		07:32		07:32		08:23	14:36 (WEA_G2)
	21:49	21:02	7 20:31 (WEA 42 (RW))	19:50		18:36		16:28		15:54	13 14:49 (WEA_G2)
10	04:55	05:43	20:24 (WEA 42 (RW))	06:39	19:17 (WEA 43 (RW))	07:34		07:34		08:25	14:35 (WEA_G2)
	21:48	21:00	5 20:29 (WEA 42 (RW))	19:48	2 19:19 (WEA 43 (RW))	18:33		16:26		15:53	15 14:50 (WEA_G2)
11	04:56	05:45	20:24 (WEA 42 (RW))	06:41	19:15 (WEA 43 (RW))	07:35		07:35		08:26	14:35 (WEA_G2)
	21:47	20:58	4 20:28 (WEA 42 (RW))	19:45	2 19:17 (WEA 43 (RW))	18:31		16:25		15:53	16 14:51 (WEA_G2)
12	04:57	05:47	20:23 (WEA 42 (RW))	06:42	19:13 (WEA 43 (RW))	07:37		07:37		08:27	14:35 (WEA_G2)
	21:46	20:56	2 20:25 (WEA 42 (RW))	19:43	1 19:14 (WEA 43 (RW))	18:28		16:23		15:53	16 14:51 (WEA_G2)
13	04:59	05:48		06:44		07:39		07:40		08:28	14:35 (WEA_G2)
	21:45	20:54		19:40		18:26		16:21		15:53	17 14:52 (WEA_G2)
14	05:00	05:50		06:46		07:41		17:39 (WEA 07 (GRN))	07:42	08:29	14:35 (WEA_G2)
	21:44	20:51		19:38		18:24	7 17:46 (WEA 07 (GRN))	16:20		15:53	18 14:53 (WEA_G2)
15	05:01	05:52		06:48		07:43		17:37 (WEA 07 (GRN))	07:44	15:19 (WEA_G1)	08:30
	21:43	20:49		19:35		18:21	11 17:48 (WEA 07 (GRN))	16:18	8 15:27 (WEA_G1)	15:53	18 14:53 (WEA_G2)
16	05:03	05:54		06:50		07:45		17:35 (WEA 07 (GRN))	07:45	15:17 (WEA_G1)	08:31
	21:42	20:47		19:33		18:19	13 17:48 (WEA 07 (GRN))	16:16	12 15:26 (WEA_G1)	15:53	19 14:54 (WEA_G2)
17	05:04	05:56		06:51		07:47		17:35 (WEA 07 (GRN))	07:47	15:16 (WEA_G1)	08:32
	21:41	20:45		19:30		18:17	12 17:47 (WEA 07 (GRN))	16:15	15 15:33 (WEA_G1)	15:53	19 14:55 (WEA_G2)
18	05:05	20:52 (WEA K04)	05:57	06:53		07:49		17:34 (WEA 07 (GRN))	07:49	15:15 (WEA_G1)	08:32
	21:39	4 20:56 (WEA K04)	20:43	19:28		18:14	11 17:45 (WEA 07 (GRN))	16:13	17 15:32 (WEA_G1)	15:53	20 14:56 (WEA_G2)
19	05:07	20:50 (WEA K04)	05:59	06:55		07:51		17:34 (WEA 07 (GRN))	07:51	15:14 (WEA_G1)	08:33
	21:38	8 20:58 (WEA K04)	20:40	19:25		18:12	8 17:42 (WEA 07 (GRN))	16:12	19 15:33 (WEA_G1)	15:53	20 14:57 (WEA_G2)
20	05:08	20:50 (WEA K04)	06:01	06:57		07:53		17:34 (WEA 07 (GRN))	07:53	15:14 (WEA_G1)	08:34
	21:37	10 21:00 (WEA K04)	20:38	19:23		18:10	6 17:40 (WEA 07 (GRN))	16:11	19 15:32 (WEA_G1)	15:54	20 14:57 (WEA_G2)
21	05:10	20:48 (WEA K04)	06:03	06:59		07:55		17:35 (WEA 07 (GRN))	07:55	15:15 (WEA_G1)	08:34
	21:35	12 21:00 (WEA K04)	20:36	19:20		18:07	2 17:37 (WEA 07 (GRN))	16:09	20 15:35 (WEA_G1)	15:54	19 14:57 (WEA_G2)
22	05:11	20:47 (WEA K04)	06:05	07:00		07:56		17:37 (WEA 07 (GRN))	07:57	15:15 (WEA_G1)	08:35
	21:34	13 21:00 (WEA K04)	20:34	19:18		18:05		16:08	18 15:33 (WEA_G1)	15:55	19 14:57 (WEA_G2)
23	05:13	20:48 (WEA K04)	06:06	07:02		07:58		17:38 (WEA 07 (GRN))	07:58	15:15 (WEA_G1)	08:36
	21:32	11 20:59 (WEA K04)	20:31	19:15		18:03		16:07	17 15:32 (WEA_G1)	15:55	20 14:59 (WEA_G2)
24	05:14	20:47 (WEA K04)	06:08	07:04	18:41 (WEA 02 (GRN))	08:00		16:06	15:14 (WEA_G1)	15:56	14:39 (WEA_G2)
	21:31	10 20:57 (WEA K04)	20:29	19:13	3 18:44 (WEA 02 (GRN))	18:01		16:05	16 15:30 (WEA_G1)	15:56	20 14:59 (WEA_G2)
25	05:16	20:47 (WEA K04)	06:10	07:06	18:38 (WEA 02 (GRN))	07:02		16:02	12 15:14 (WEA_G1)	15:56	14:39 (WEA_G2)
	21:29	10 20:57 (WEA K04)	20:27	19:10	3 18:41 (WEA 02 (GRN))	16:58		16:04	14 15:28 (WEA_G1)	15:56	20 14:59 (WEA_G2)
26	05:17	20:46 (WEA K04)	06:12	07:08	18:37 (WEA 02 (GRN))	07:04		16:04	14 15:15 (WEA_G1)	15:57	14:40 (WEA_G2)
	21:28	9 20:55 (WEA K04)	20:24	19:08	2 18:39 (WEA 02 (GRN))	16:56		16:03	12 15:27 (WEA_G1)	15:57	19 14:59 (WEA_G2)
27	05:19	20:47 (WEA K04)	06:14	07:10		07:06		16:05	11 15:15 (WEA_G1)	15:57	14:41 (WEA_G2)
	21:26	7 20:54 (WEA K04)	20:22	19:05		16:54		16:02	11 15:26 (WEA_G1)	15:58	19 15:00 (WEA_G2)
28	05:21	20:47 (WEA K04)	06:15	07:11		07:08		16:07	10 15:16 (WEA_G1)	15:57	14:42 (WEA_G2)
	21:24	5 20:52 (WEA K04)	20:19	19:03		16:52		16:01	9 15:25 (WEA_G1)	15:59	18 15:00 (WEA_G2)
29	05:22	20:47 (WEA K04)	06:17	07:13		07:10		16:09	9 15:17 (WEA_G1)	15:58	14:43 (WEA_G2)
	21:23	4 20:51 (WEA K04)	20:17	19:00		16:50		16:00	7 15:24 (WEA_G1)	16:00	18 15:01 (WEA_G2)
30	05:24	20:47 (WEA K04)	06:19	07:15		07:12		16:10	7 15:17 (WEA_G1)	16:00	14:42 (WEA_G2)
	21:21	1 20:48 (WEA K04)	20:15	18:58		16:48		15:59	6 15:23 (WEA_G1)	16:01	18 15:00 (WEA_G2)
31	05:26		06:21			07:14				08:37	14:43 (WEA_G2)
	21:19		20:12			16:46				16:02	17 15:00 (WEA_G2)
Sonnenscheinstunden	515	461		383		328		257	220	231	455
astr.max.mögl.Beschattung	104	29		13		98					

**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) Schatteneende		(WEA mit letztem Schatten)	

### SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 09 - IO 09 Bäderstraße 35 (Gosdorf)

**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   08:37   14:53 (WEA_G2)   08:06		07:08	06:52	05:41	20:12 (WEA 42 (RW))   04:51
16:03	20   15:13 (WEA_G2)   16:55	17:52	19:51	20:47	20:14 (WEA 42 (RW))   21:38
2   08:37   14:54 (WEA_G2)   08:04		07:05	06:49	05:39	04:50
16:04	20   15:14 (WEA_G2)   16:57	17:54	19:53	20:40	21:40
3   08:37   14:54 (WEA_G2)   08:03		07:03	06:47	05:37	04:49
16:05	19   15:13 (WEA_G2)   16:59	17:56	19:55	20:51	21:41
4   08:36   14:55 (WEA_G2)   08:01		07:01	06:44	05:35	04:48
16:06	19   15:14 (WEA_G2)   17:01	17:58	19:57	20:53	21:42
5   08:36   14:56 (WEA_G2)   07:59		06:58	06:42	05:33	04:47
16:06	17   15:13 (WEA_G2)   17:03	18:00	19:59	20:55	21:43
6   08:36   14:56 (WEA_G2)   07:57		06:56	06:39	05:31	04:47
16:09	17   15:13 (WEA_G2)   17:05	18:01	20:01	20:57	21:44
7   08:35   14:58 (WEA_G2)   07:55		06:53	17:36 (WEA 03 (GRN))   06:37	05:29	04:46
16:10	15   15:13 (WEA_G2)   17:07	18:03	17:37 (WEA 03 (GRN))   20:02	20:59	21:45
8   08:35   14:59 (WEA_G2)   07:53		06:51	17:35 (WEA 03 (GRN))   06:34	05:27	04:45
16:12	14   15:13 (WEA_G2)   17:09	18:05	3   17:38 (WEA 03 (GRN))   20:04	21:00	21:46
9   08:34   15:00 (WEA_G2)   07:51		06:49	17:36 (WEA 03 (GRN))   06:32	05:25	20:25 (WEA K04)   04:45
16:13	12   15:12 (WEA_G2)   17:11	18:07	5   17:41 (WEA 03 (GRN))   20:06	21:02	1   20:30 (WEA K04)   21:47
10   08:33   15:02 (WEA_G2)   07:49		06:46	17:36 (WEA 03 (GRN))   06:30	05:23	20:30 (WEA K04)   04:44
16:15	9   15:11 (WEA_G2)   17:13	18:09	6   17:42 (WEA 03 (GRN))   20:08	21:04	3   20:33 (WEA K04)   21:48
11   08:33   15:05 (WEA_G2)   07:47		06:44	17:36 (WEA 03 (GRN))   06:27	05:22	20:29 (WEA K04)   04:44
16:16	4   15:09 (WEA_G2)   17:15	18:11	5   17:43 (WEA 03 (GRN))   20:10	21:06	5   20:34 (WEA K04)   21:49
12   08:32   15:08 (WEA_G2)   07:45		06:41	06:25	05:20	20:29 (WEA K04)   04:43
16:18	11   15:17 (WEA_G2)   17:17	18:13	20:12	21:07	6   20:35 (WEA K04)   21:50
13   08:31   15:11 (WEA_G2)   07:43		06:39	06:22	05:18	20:30 (WEA K04)   04:43
16:20	17   15:19 (WEA_G2)   17:19	18:15	20:14	21:09	8   20:38 (WEA K04)   21:50
14   08:30   15:14 (WEA_G1)   07:41		06:36	06:20	05:16	20:30 (WEA K04)   04:43
16:21	1   15:45 (WEA_G1)   17:21	18:17	20:16	21:11	9   20:39 (WEA K04)   21:51
15   08:29   15:44 (WEA_G1)   07:39		06:34	06:18	05:14	20:30 (WEA K04)   04:42
16:23	3   15:47 (WEA_G1)   17:24	18:19	20:17	21:13	10   20:40 (WEA K04)   21:52
16   08:28   15:44 (WEA_G1)   07:37		06:31	06:15	05:13	20:31 (WEA K04)   04:42
16:25	5   15:49 (WEA_G1)   17:26	18:21	20:19	21:14	11   20:42 (WEA K04)   21:52
17   08:27   15:44 (WEA_G1)   07:35		06:29	17:55 (WEA 02 (GRN))   06:13	05:11	20:31 (WEA K04)   04:42
16:26	7   15:51 (WEA_G1)   17:28	18:23	1   17:56 (WEA 02 (GRN))   20:21	21:16	10   20:41 (WEA K04)   21:53
18   08:26   15:44 (WEA_G1)   07:33		06:26	17:56 (WEA 02 (GRN))   06:10	05:09	20:33 (WEA K04)   04:42
16:28	8   15:52 (WEA_G1)   17:30	18:25	2   17:58 (WEA 02 (GRN))   20:23	21:18	7   20:40 (WEA K04)   21:53
19   08:25   15:45 (WEA_G1)   07:30		06:24	06:08	05:08	20:36 (WEA K04)   04:42
16:30	10   15:55 (WEA_G1)   17:32	18:27	20:25	21:19	2   20:38 (WEA K04)   21:54
20   08:24   15:44 (WEA_G1)   07:28		06:21	06:06	05:06	04:42
16:32	12   15:56 (WEA_G1)   17:34	18:28	20:27	21:21	21:54
21   08:23   15:45 (WEA_G1)   07:26		06:19	06:03	05:05	04:42
16:34	14   15:59 (WEA_G1)   17:36	18:30	20:29	21:23	21:54
22   08:21   15:46 (WEA_G1)   07:24		06:16	06:01	05:03	04:42
16:35	15   16:01 (WEA_G1)   17:38	3   17:09 (WEA 07 (GRN))   18:32	20:31	21:24	21:54
23   08:20   15:46 (WEA_G1)   07:22		06:14	05:59	05:02	04:43
16:37	17   16:03 (WEA_G1)   17:40	6   17:12 (WEA 07 (GRN))   18:34	20:33	21:26	21:54
24   08:19   15:46 (WEA_G1)   07:19		06:11	05:57	05:00	04:43
16:39	19   16:05 (WEA_G1)   17:42	8   17:13 (WEA 07 (GRN))   18:36	20:34	21:27	21:55
25   08:17   15:48 (WEA_G1)   07:17		06:09	05:54	04:59	04:43
16:41	17   16:05 (WEA_G1)   17:44	10   17:16 (WEA 07 (GRN))   18:38	20:36	21:29	21:55
26   08:16   15:48 (WEA_G1)   07:15		06:06	05:52	04:58	04:44
16:43	17   16:05 (WEA_G1)   17:46	11   17:18 (WEA 07 (GRN))   18:40	20:38	21:30	21:55
27   08:14   15:49 (WEA_G1)   07:12		06:04	05:50	04:56	04:44
16:45	15   16:04 (WEA_G1)   17:48	10   17:17 (WEA 07 (GRN))   18:42	20:40	20:08 (WEA 42 (RW))   04:56	21:54
28   08:13   15:52 (WEA_G1)   07:10		06:02	05:48	20:10 (WEA 42 (RW))   21:32	04:45
16:47	11   16:03 (WEA_G1)   17:50	5   17:15 (WEA 07 (GRN))   18:44	20:42	4   20:12 (WEA 42 (RW))   21:33	21:54
29   08:11   15:54 (WEA_G1)   07:08		06:59	05:46	20:09 (WEA 42 (RW))   04:54	04:45
16:49	7   16:01 (WEA_G1)   17:51	19:45	20:44	5   20:14 (WEA 42 (RW))   21:35	21:54
30   08:09   15:57 (WEA_G1)   07:06		06:57	05:44	20:10 (WEA 42 (RW))   04:53	04:46
16:51		19:47	1   19:20 (WEA 43 (RW))   20:46	5   20:15 (WEA 42 (RW))   21:36	21:54
31   08:06   15:59 (WEA_G1)   07:04		06:54	19:21 (WEA 43 (RW))   20:46	04:52	
16:53		19:49	1   19:22 (WEA 43 (RW))   21:37	21:37	
Sonnenscheinstunden   248		367	421	495	513
astr.max.mögl.Beschattung   344	272	53	25	16	74

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) Schattende	(WEA mit letztem Schatten)



Projekt:

SWP Windpark Großenholz

Lizenzierter Anwender:

GL Garrad Hassan Deutschland GmbH  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

Berechnung: Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) Schattenrezeptor: IO 09 - IO 09 Bäderstraße 35 (Gosdorf)

### 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

Jul	August	September	Oktober	November	Dezember	
1 04:47	05:27	20:39 (WEA K04)	06:23	07:17	08:12	
21:53	21:17	6 20:45 (WEA K04)	20:10	18:55	15:58	
2 04:47	05:29	20:40 (WEA K04)	06:24	07:19	08:14	
21:53	21:16	4 20:44 (WEA K04)	20:07	18:53	15:58	
3 04:48	05:31	20:40 (WEA K04)	06:26	07:21	08:15	
21:53	21:14	3 20:43 (WEA K04)	20:05	18:50	15:57	
4 04:49	05:32	20:03	06:28	07:22	08:17	
21:52	21:12	20:03	18:48	6 18:19 (WEA 03 (GRN))	15:56	
5 04:50	05:34	06:30	07:24	18:13 (WEA 03 (GRN))	08:18	
21:52	21:10	20:00	18:45	3 18:16 (WEA 03 (GRN))	15:56	
6 04:51	05:36	06:32	07:26	18:12 (WEA 03 (GRN))	08:19	
21:51	21:08	19:58	18:43	2 18:14 (WEA 03 (GRN))	15:55	
7 04:52	05:38	06:33	07:28	18:10	08:21	
21:50	21:06	19:55	18:40	16:32	15:54	
8 04:53	05:39	06:35	07:30	18:07	08:22	
21:50	21:04	19:53	18:38	16:30	15:54	
9 04:54	05:41	06:37	07:32	18:05	08:23	
21:49	21:02	19:50	18:36	16:28	15:54	
10 04:55	05:43	06:39	07:34	18:03	08:25	
21:48	21:00	19:48	18:33	16:26	15:53	
11 04:56	05:45	06:41	07:35	18:01	08:26	
21:47	20:58	19:45	18:31	16:25	15:53	
12 04:57	05:47	20:19 (WEA 42 (RW))	06:42	17:59	08:27	
21:46	20:56	5 20:24 (WEA 42 (RW))	19:43	1 19:14 (WEA 43 (RW))	15:53	
13 04:59	05:48	20:18 (WEA 42 (RW))	06:44	19:11 (WEA 43 (RW))	08:28	
21:45	20:54	5 20:23 (WEA 42 (RW))	19:40	1 19:12 (WEA 43 (RW))	15:53	
14 05:00	05:50	20:17 (WEA 42 (RW))	06:46	19:09	7 15:28 (WEA G1)	
21:44	20:51	5 20:22 (WEA 42 (RW))	19:38	17:42 (WEA 07 (GRN))	15:53	
15 05:01	05:52	20:16 (WEA 42 (RW))	06:48	18:24	7 17:49 (WEA 07 (GRN))	15:53
21:43	20:49	3 20:19 (WEA 42 (RW))	19:35	18:24	7 17:40 (WEA 07 (GRN))	15:53
16 05:03	05:54	20:16 (WEA 42 (RW))	06:50	18:21	10 17:50 (WEA 07 (GRN))	15:53
21:42	20:47	1 20:17 (WEA 42 (RW))	19:33	18:19	10 17:39 (WEA 07 (GRN))	15:53
17 05:04	05:56	06:51	19:33	18:17	10 17:49 (WEA 07 (GRN))	15:53
21:41	20:45	19:30	18:17	18:17	9 17:47 (WEA 07 (GRN))	15:53
18 05:05	05:57	06:53	07:49	18:15	9 17:38 (WEA 07 (GRN))	15:53
21:39	20:43	19:28	18:14	18:14	7 17:45 (WEA 07 (GRN))	15:53
19 05:07	05:59	06:55	07:51	18:12	7 17:38 (WEA 07 (GRN))	15:53
21:38	20:40	19:25	18:12	18:12	4 17:42 (WEA 07 (GRN))	15:53
20 05:08	06:01	06:57	07:53	18:10	4 17:38 (WEA 07 (GRN))	15:53
21:37	20:38	19:23	18:10	18:09	2 17:40 (WEA 07 (GRN))	15:53
21 05:10	06:03	06:59	07:55	18:07	16:11	15 15:35 (WEA G1)
21:35	20:36	19:20	18:07	18:07	14 15:34 (WEA G1)	15:54
22 05:11	06:05	07:00	07:56	18:05	14 15:27 (WEA G1)	15:54
21:34	20:34	19:18	18:05	18:05	12 15:33 (WEA G1)	15:55
23 05:13	06:06	07:02	07:58	18:03	12 15:28 (WEA G1)	15:54
21:32	20:31	19:15	18:03	18:03	10 15:31 (WEA G1)	15:55
24 05:14	06:08	07:04	08:00	18:01	10 15:21 (WEA G1)	15:54
21:31	20:29	19:13	18:01	18:01	9 15:30 (WEA G1)	15:56
25 05:16	20:45 (WEA K04)	06:30	07:56	18:00	9 15:22 (WEA G1)	15:56
21:29	5 20:50 (WEA K04)	20:27	19:10	1 18:40 (WEA 02 (GRN))	6 15:38 (WEA G1)	15:56
26 05:17	20:43 (WEA K04)	06:12	07:08	1 18:37 (WEA 02 (GRN))	6 15:22 (WEA G1)	15:57
21:28	8 20:51 (WEA K04)	20:24	19:08	2 18:39 (WEA 02 (GRN))	5 15:27 (WEA G1)	15:57
27 05:19	20:42 (WEA K04)	06:14	07:10	18:36	5 15:20 (WEA G1)	15:57
21:26	11 20:53 (WEA K04)	20:22	19:05	18:35	3 15:23 (WEA G1)	15:57
28 05:21	20:41 (WEA K04)	06:15	07:11	18:34	3 15:26 (WEA G1)	15:58
21:24	11 20:52 (WEA K04)	20:19	19:03	18:33	1 15:24 (WEA G1)	15:57
29 05:22	20:41 (WEA K04)	06:17	07:13	18:32	16:01 1 15:25 (WEA G1)	15:59
21:23	10 20:51 (WEA K04)	20:17	19:00	18:31	08:09	15:59
30 05:24	20:40 (WEA K04)	06:19	07:15	18:30	16:00	16:00
21:21	8 20:48 (WEA K04)	20:15	18:58	18:10	15:59	16:01
31 05:26	20:40 (WEA K04)	06:21	19:00	18:09	15:59	16:01
21:19	7 20:47 (WEA K04)	20:12	18:56	17:14	16:02	16:02
Sonnenscheinstunden	515	461	383	328	257	231
str.max.mögl.Beschattung	60	32	5	66	176	596

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) Schattende	(WEA mit letztem Schatten)

Projekt:

SWP Windpark Großholz

Lizenzierter Anwender:

GL Garrad Hassan Deutschland GmbH  
 Sommerdeich 14 b  
 DE-25709 Kaiser-Wilhelm-Koog  
 (0 48 56)901-0

Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großholz (3 x V150-6.0) **Schattenrezeptor:** IO 10 - IO 10 Poggenpohler Weg 2 (Gosdorf)

### 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 Sonneneinfallrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni				
1	08:37	14:40 (WEA_G2)	08:06	07:08	17:06 (WEA 07 (GRN))	06:52		05:41		04:51	20:49 (WEA K04)			
	116:03	17	14:57 (WEA_G2)	14:55	17:52	17:20 (WEA 07 (GRN))	19:51	20:47		12:38	13	21:02 (WEA K04)		
2	08:37	14:41 (WEA_G2)	08:04	07:05	17:08 (WEA 07 (GRN))	06:49		05:39		04:50	20:50 (WEA K04)			
	116:04	16	14:57 (WEA_G2)	14:57	17:54	17:20 (WEA 07 (GRN))	19:53	20:49		12:40	11	21:01 (WEA K04)		
3	08:37	14:41 (WEA_G2)	08:03	07:03	17:10 (WEA 07 (GRN))	06:47		05:37		04:49	20:51 (WEA K04)			
	116:05	15	14:56 (WEA_G2)	14:59	17:56	17:18 (WEA 07 (GRN))	19:55	20:51		12:41	10	21:01 (WEA K04)		
4	08:36	14:43 (WEA_G2)	08:01	07:01		06:44		20:01	19:27 (WEA 43 (RW))	05:35	04:48	20:52 (WEA K04)		
	116:06	14	14:57 (WEA_G2)	17:01	17:58	17:57	19:57	3	19:30 (WEA 43 (RW))	20:53	12:42	8	21:00 (WEA K04)	
5	08:36	14:44 (WEA_G2)	07:59	06:58		06:42		19:28 (WEA 43 (RW))	05:33	04:47	20:53 (WEA K04)			
	116:08	12	14:56 (WEA_G2)	17:03	18:00	17:40 (WEA 03 (GRN))	06:39	4	19:32 (WEA 43 (RW))	20:55	12:43	6	20:59 (WEA K04)	
6	08:36	14:45 (WEA_G2)	07:57		16:31 (WEA 08 (GRN))	06:56		19:30 (WEA 43 (RW))	05:31	04:47	20:55 (WEA K04)			
	116:09	9	14:54 (WEA_G2)	17:05	2	16:33 (WEA 08 (GRN))	18:02	2	19:32 (WEA 43 (RW))	20:57	12:44	3	20:58 (WEA K04)	
7	08:35	14:48 (WEA_G2)	07:55		16:32 (WEA 08 (GRN))	06:53		06:37		05:29	20:26 (WEA 42 (RW))	04:46		
	116:10	6	14:54 (WEA_G2)	17:07	4	16:36 (WEA 08 (GRN))	18:03	20:02		20:59	2	20:28 (WEA 42 (RW))	21:45	
8	08:35	15:34 (WEA_G1)	07:53		16:33 (WEA 08 (GRN))	06:51		06:34		05:27	20:25 (WEA 42 (RW))	04:45		
	116:12	1	15:35 (WEA_G1)	17:09	5	16:38 (WEA 08 (GRN))	18:05	20:04		21:00	4	20:29 (WEA 42 (RW))	21:46	
9	08:34	15:34 (WEA_G1)	07:51		16:34 (WEA 08 (GRN))	06:49		17:40 (WEA 05 (GRN))	06:32	05:25	20:25 (WEA 42 (RW))	04:45		
	116:13	2	15:36 (WEA_G1)	17:11	6	16:40 (WEA 08 (GRN))	18:07	1	17:41 (WEA 05 (GRN))	20:06	21:02	5	20:30 (WEA 42 (RW))	21:47
10	08:33	15:34 (WEA_G1)	07:49		16:37 (WEA 08 (GRN))	06:46		17:40 (WEA 03 (GRN))	06:30	05:23	20:26 (WEA 42 (RW))	04:44		
	116:15	4	15:38 (WEA_G1)	17:13	2	16:39 (WEA 08 (GRN))	18:09	2	17:42 (WEA 03 (GRN))	20:08	21:04	7	20:33 (WEA 42 (RW))	21:48
11	08:33	15:34 (WEA_G1)	07:47		16:44	17:40 (WEA 03 (GRN))	06:27		05:22	20:26 (WEA 42 (RW))	04:44			
	116:16	5	15:39 (WEA_G1)	17:15	18:11	5	17:45 (WEA 03 (GRN))	20:10		21:06	8	20:34 (WEA 42 (RW))	21:49	
12	08:32	15:34 (WEA_G1)	07:45		18:41	17:39 (WEA 03 (GRN))	06:25		05:20	20:27 (WEA 42 (RW))	04:43			
	116:18	7	15:41 (WEA_G1)	17:17	18:13	7	17:46 (WEA 03 (GRN))	20:12		21:07	8	20:35 (WEA 42 (RW))	21:50	
13	08:31	15:34 (WEA_G1)	07:43		18:39	17:40 (WEA 03 (GRN))	06:22		05:18	20:29 (WEA 42 (RW))	04:43			
	116:20	9	15:43 (WEA_G1)	17:19	18:15	8	17:48 (WEA 03 (GRN))	20:14		21:09	6	20:35 (WEA 42 (RW))	21:50	
14	08:30	15:34 (WEA_G1)	07:41		18:36	17:40 (WEA 03 (GRN))	06:20		05:16	20:43	04:43			
	116:21	11	15:45 (WEA_G1)	17:21	18:17	10	17:50 (WEA 03 (GRN))	20:16		21:11		21:51		
15	08:29	15:35 (WEA_G1)	07:39		18:34	17:42 (WEA 03 (GRN))	06:18		05:14	04:42				
	116:23	12	15:47 (WEA_G1)	17:24	18:19	7	17:49 (WEA 03 (GRN))	20:18		21:13		21:52		
16	08:28	15:35 (WEA_G1)	07:37		18:31		06:15		05:13	04:42				
	116:25	14	15:49 (WEA_G1)	17:26	18:21		20:19		21:14		21:52			
17	08:27	15:36 (WEA_G1)	07:35		18:29		06:13		05:11	04:42				
	116:26	15	15:51 (WEA_G1)	17:28	18:23		20:21		21:16		21:53			
18	08:26	15:35 (WEA_G1)	07:33		18:26		06:10		05:09	04:42				
	116:28	17	15:52 (WEA_G1)	17:30	18:25		20:23		21:18		21:53			
19	08:25	15:36 (WEA_G1)	07:30		18:24		06:08		05:08	04:42				
	116:30	19	15:55 (WEA_G1)	17:32	18:27		20:25		21:19		21:54			
20	08:24	15:36 (WEA_G1)	07:28		18:21	17:59 (WEA 02 (GRN))	06:06		05:06	20:47 (WEA K04)	04:42			
	116:32	20	15:56 (WEA_G1)	17:34	18:28	2	18:01 (WEA 02 (GRN))	20:27		21:21	1	20:48 (WEA K04)	21:54	
21	08:23	15:37 (WEA_G1)	07:26		18:19	18:00 (WEA 02 (GRN))	06:04		05:05	20:47 (WEA K04)	04:42			
	116:34	22	15:59 (WEA_G1)	17:36	18:30	4	18:04 (WEA 02 (GRN))	20:29		21:23	2	20:49 (WEA K04)	21:54	
22	08:21	15:38 (WEA_G1)	07:24		18:16	18:01 (WEA 02 (GRN))	06:01		05:03	20:47 (WEA K04)	04:42			
	116:35	21	15:59 (WEA_G1)	17:38	18:32	4	18:05 (WEA 02 (GRN))	20:31		21:24	4	20:51 (WEA K04)	21:54	
23	08:20	15:38 (WEA_G1)	07:22		18:14		05:59		05:02	20:46 (WEA K04)	04:43			
	116:37	20	15:58 (WEA_G1)	17:40	3	17:12 (WEA 07 (GRN))	18:34		20:33	6	20:52 (WEA K04)	21:54		
24	08:19	15:39 (WEA_G1)	07:19		18:11		05:57		05:00	20:46 (WEA K04)	04:43			
	116:39	19	15:58 (WEA_G1)	17:42	6	17:13 (WEA 07 (GRN))	18:36		20:34	7	20:53 (WEA K04)	21:55		
25	08:17	15:41 (WEA_G1)	07:17		17:07 (WEA 07 (GRN))	06:09		05:54		04:59	20:46 (WEA K04)	04:43		
	116:41	17	15:58 (WEA_G1)	17:44	9	17:16 (WEA 07 (GRN))	18:38		20:36	9	20:55 (WEA K04)	21:55		
26	08:16	15:41 (WEA_G1)	07:15		17:07 (WEA 07 (GRN))	06:06		05:52		04:58	20:47 (WEA K04)	04:44		
	116:43	16	15:57 (WEA_G1)	17:46	11	17:18 (WEA 07 (GRN))	18:40		20:38	9	20:56 (WEA K04)	21:55		
27	08:14	15:43 (WEA_G1)	07:12		17:06 (WEA 07 (GRN))	06:04		05:50		04:56	20:47 (WEA K04)	04:44		
	116:45	12	15:55 (WEA_G1)	17:48	14	17:20 (WEA 07 (GRN))	18:42		20:40	11	20:58 (WEA K04)	21:54		
28	08:13	15:46 (WEA_G1)	07:10		17:07 (WEA 07 (GRN))	06:02		05:48		04:55	20:48 (WEA K04)	04:45		
	116:47	8	15:54 (WEA_G1)	17:50	15	17:22 (WEA 07 (GRN))	18:44		20:42	11	20:59 (WEA K04)	21:54		
29	08:11				06:59		05:46		04:54		20:48 (WEA K04)	04:45		
	116:49				19:45		20:44		21:35	12	21:00 (WEA K04)	21:54		
30	08:09				06:57		05:44		04:53		20:48 (WEA K04)	04:46		
	116:51				19:47		20:46		21:36	13	21:01 (WEA K04)	21:54		
31	08:08				06:54				04:52		20:49 (WEA K04)			
	116:53				19:49				21:37	13	21:02 (WEA K04)			
	Sonnenscheinstunden   246		272		367		421		496		513	51		
	atr max.mögl.Beschattung   360		77		64		9		138					

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) Schatteneende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großholz (3 x V150-6.0) **Schattenrezeptor:** IO 10 - IO 10 Poggenpohler Weg 2 (Gosdorf)  
**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

Juli		August		September		Oktober		November		Dezember		
1	04:47		05:27	20:37 (WEA 42 (RW))	06:23		07:17	18:20 (WEA 03 (GRN))	07:16	16:06 (WEA 08 (GRN))	08:12	15:16 (WEA_G1)
2	04:47		05:29	20:37 (WEA 42 (RW))	06:24		07:19	18:18 (WEA 03 (GRN))	07:18	16:03 (WEA 08 (GRN))	08:14	15:17 (WEA_G1)
3	04:48		05:31	20:36 (WEA 42 (RW))	06:26		07:21	18:18 (WEA 03 (GRN))	07:20	16:03 (WEA 08 (GRN))	08:15	15:18 (WEA_G1)
4	04:49		05:32	20:36 (WEA 42 (RW))	06:28		07:22	18:18 (WEA 03 (GRN))	07:22	16:01 (WEA 08 (GRN))	08:17	15:18 (WEA_G1)
5	04:50		05:34	20:36 (WEA 42 (RW))	06:30		07:24	18:19 (WEA 03 (GRN))	07:24	16:02 (WEA 08 (GRN))	08:18	15:19 (WEA_G1)
6	04:51		05:36	20:35 (WEA 42 (RW))	06:32		07:26	18:19 (WEA 03 (GRN))	07:26	16:04 (WEA 08 (GRN))	08:20	15:20 (WEA_G1)
7	04:52		05:38	20:35 (WEA 42 (RW))	06:33		07:28	19:27 (WEA 43 (RW))	07:26	17:46 (WEA 07 (GRN))	08:22	15:21 (WEA_G1)
8	04:53	5	05:39	20:59 (WEA K04)	05:39		06:35	19:27 (WEA 43 (RW))	07:30	17:40 (WEA 07 (GRN))	08:26	15:22 (WEA_G1)
9	04:54	7	05:41	21:06 (WEA K04)	05:41		06:37	19:24 (WEA 43 (RW))	07:32	17:43 (WEA 07 (GRN))	08:28	15:23 (WEA_G1)
10	04:55		05:43	21:07 (WEA K04)	05:43		06:39	19:21 (WEA 43 (RW))	07:34	17:45 (WEA 07 (GRN))	08:30	15:24 (WEA_G1)
11	04:56		05:45	21:08 (WEA K04)	05:45		06:41	19:21 (WEA 43 (RW))	07:35	17:43 (WEA 07 (GRN))	08:32	15:24 (WEA_G1)
12	04:57	12	05:47	21:09 (WEA K04)	05:47		06:42	19:22 (WEA 43 (RW))	07:37	17:41 (WEA 07 (GRN))	08:34	15:25 (WEA_G1)
13	04:58	13	05:48	21:10 (WEA K04)	05:48		06:44	19:23 (WEA 43 (RW))	07:39	17:40 (WEA 07 (GRN))	08:36	15:25 (WEA_G1)
14	04:59		05:50	21:11 (WEA K04)	05:50		06:46	19:24 (WEA 43 (RW))	07:41	17:39 (WEA 07 (GRN))	08:38	15:26 (WEA_G1)
15	05:01	12	05:52	21:12 (WEA K04)	05:52		06:48	19:24 (WEA 43 (RW))	07:43	17:39 (WEA 07 (GRN))	08:40	15:26 (WEA_G1)
16	05:03		05:54	21:13 (WEA K04)	05:54		06:50	19:25 (WEA 43 (RW))	07:45	17:39 (WEA 07 (GRN))	08:42	15:27 (WEA_G1)
17	05:04		05:56	21:14 (WEA K04)	05:56		06:51	19:26 (WEA 43 (RW))	07:47	17:39 (WEA 07 (GRN))	08:44	15:27 (WEA_G1)
18	05:05	11	05:57	21:15 (WEA K04)	05:57		06:53	19:27 (WEA 43 (RW))	07:49	17:40 (WEA 07 (GRN))	08:46	15:28 (WEA_G1)
19	05:07	9	05:59	21:16 (WEA K04)	05:59		06:55	19:28 (WEA 43 (RW))	07:51	17:41 (WEA 07 (GRN))	08:48	15:28 (WEA_G1)
20	05:08	8	06:01	21:17 (WEA K04)	06:01		06:57	19:29 (WEA 43 (RW))	07:53	17:42 (WEA 07 (GRN))	08:50	15:29 (WEA_G1)
21	05:10	6	06:03	21:18 (WEA K04)	06:03		06:59	19:30 (WEA 43 (RW))	07:55	17:43 (WEA 07 (GRN))	08:52	15:29 (WEA_G1)
22	05:11		06:05	21:19 (WEA K04)	06:05		07:00	19:31 (WEA 43 (RW))	07:56	17:44 (WEA 07 (GRN))	08:54	15:30 (WEA_G1)
23	05:13	4	06:06	21:20 (WEA K04)	06:06		07:02	19:32 (WEA 43 (RW))	07:58	17:45 (WEA 07 (GRN))	08:56	15:30 (WEA_G1)
24	05:14	2	06:08	21:21 (WEA K04)	06:08		07:04	19:33 (WEA 43 (RW))	07:59	17:46 (WEA 07 (GRN))	08:58	15:31 (WEA_G1)
25	05:16		06:10	21:22 (WEA K04)	06:10		07:06	19:34 (WEA 43 (RW))	08:01	17:47 (WEA 07 (GRN))	09:00	15:31 (WEA_G1)
26	05:17		06:12	21:23 (WEA K04)	06:12		07:08	19:35 (WEA 43 (RW))	08:02	17:48 (WEA 07 (GRN))	09:02	15:32 (WEA_G1)
27	05:19		06:14	21:24 (WEA K04)	06:14		07:10	19:36 (WEA 43 (RW))	08:04	17:49 (WEA 07 (GRN))	09:04	15:32 (WEA_G1)
28	05:21		06:15	21:25 (WEA K04)	06:15		07:11	19:37 (WEA 43 (RW))	08:05	17:50 (WEA 07 (GRN))	09:06	15:33 (WEA_G1)
29	05:22		06:17	21:26 (WEA K04)	06:17		07:13	19:38 (WEA 43 (RW))	08:07	17:51 (WEA 07 (GRN))	09:08	15:33 (WEA_G1)
30	05:24		06:19	21:27 (WEA K04)	06:19		07:15	19:39 (WEA 43 (RW))	08:08	17:52 (WEA 07 (GRN))	09:10	15:34 (WEA_G1)
31	05:26	2	06:21	20:41 (WEA 42 (RW))	06:21		07:17	19:40 (WEA 43 (RW))	08:10	17:53 (WEA 07 (GRN))	09:12	15:34 (WEA_G1)
Sommerstunden		515	461									
astr. max. mögl. Beschattung		160	29		39		110		282		496	

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:

SWP Windpark Großenholz

Lizenzierter Anwender:

GL Garrad Hassan Deutschland GmbH
Sommerdeich 14 b
DE-25709 Kaiser-Wilhelm-Koog
(0 48 56)901-0

Berechnet:

22.06.2022 20:19/3.5.584

SHADOW - Kalender

Berechnung: Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0)Schattenrezeptor: IO 11 - IO 11 Poggenpohler Weg 8 (Gosdorf)

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

Table with columns for months (Januar, Februar, März, April, Mai, Juni) and rows for each day of the month, showing start and end times for shadows and maximum possible shading.

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

Matrix with columns: 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)

Projekt:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0

Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 11 - IO 11 Poggenpohler Weg 8 (Gosdorf)

### 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

	Juli	August	September	Oktober	November	Dezember
1	04:47	21:03 (WEA K04)	05:27	06:23	07:17	18:26 (WEA 05 (GRN))
2	04:47	21:15 (WEA K04)	05:29	06:24	07:19	18:27 (WEA 05 (GRN))
3	04:48	21:03 (WEA K04)	05:31	06:26	07:21	18:26 (WEA 05 (GRN))
4	04:49	21:16 (WEA K04)	05:32	06:28	07:22	18:26 (WEA 05 (GRN))
5	04:50	21:03 (WEA K04)	05:34	06:30	07:24	18:26 (WEA 05 (GRN))
6	04:51	21:02 (WEA K04)	05:36	06:32	07:26	18:26 (WEA 05 (GRN))
7	04:52	21:02 (WEA K04)	05:38	06:33	07:28	18:26 (WEA 05 (GRN))
8	04:53	21:12 (WEA K04)	05:39	06:35	07:30	18:26 (WEA 05 (GRN))
9	04:54	21:02 (WEA K04)	05:41	06:37	07:32	18:26 (WEA 05 (GRN))
10	04:55	21:02 (WEA K04)	05:43	06:39	07:34	18:26 (WEA 05 (GRN))
11	04:56	21:11 (WEA K04)	05:44	06:41	07:36	18:26 (WEA 05 (GRN))
12	04:57	21:03 (WEA K04)	05:47	06:42	07:38	18:26 (WEA 05 (GRN))
13	04:59	21:03 (WEA K04)	05:48	06:44	07:40	18:26 (WEA 05 (GRN))
14	05:00	21:03 (WEA K04)	05:50	06:46	07:42	18:26 (WEA 05 (GRN))
15	05:01	21:03 (WEA K04)	05:52	06:48	07:44	18:26 (WEA 05 (GRN))
16	05:03	21:03 (WEA K04)	05:54	06:50	07:46	18:26 (WEA 05 (GRN))
17	05:04	21:04 (WEA K04)	05:56	06:51	07:47	18:26 (WEA 05 (GRN))
18	05:05	21:04 (WEA K04)	05:57	06:53	07:49	18:26 (WEA 05 (GRN))
19	05:07	21:05 (WEA K04)	05:59	06:55	07:51	18:26 (WEA 05 (GRN))
20	05:08	21:05 (WEA K04)	06:01	06:57	07:53	18:26 (WEA 05 (GRN))
21	05:10	21:06 (WEA K04)	06:03	06:59	07:55	18:26 (WEA 05 (GRN))
22	05:11	21:06 (WEA K04)	06:05	07:00	07:56	18:26 (WEA 05 (GRN))
23	05:13	21:07 (WEA K04)	06:06	07:02	07:58	18:26 (WEA 05 (GRN))
24	05:14	21:07 (WEA K04)	06:08	07:04	07:59	18:26 (WEA 05 (GRN))
25	05:16	21:08 (WEA K04)	06:10	07:06	08:00	18:26 (WEA 05 (GRN))
26	05:17	21:09 (WEA K04)	06:12	07:08	08:01	18:26 (WEA 05 (GRN))
27	05:19	21:10 (WEA K04)	06:14	07:10	08:02	18:26 (WEA 05 (GRN))
28	05:21	21:11 (WEA K04)	06:16	07:12	08:03	18:26 (WEA 05 (GRN))
29	05:22	21:12 (WEA K04)	06:17	07:13	08:04	18:26 (WEA 05 (GRN))
30	05:24	21:13 (WEA K04)	06:19	07:15	08:05	18:26 (WEA 05 (GRN))
31	05:26	21:14 (WEA K04)	06:21	07:17	08:06	18:26 (WEA 05 (GRN))
Sonnenscheinstunden	515	461	383	328	257	231
astr.max.mögl.Beschattung	205	61	61	121	284	691

**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:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 12 - IO 12 Poggenpohler Weg 14 (Gosdorf)

### 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 Sonneneinfallsrichtung
  - Die Windenergieanlage/n ist/sind immer in Betrieb

Januar	Februar	März	April	Mai	Juni						
1   08:37 1   16:03 2   08:37 1   16:05 3   08:37 1   16:05 4   08:36 1   16:06 5   08:36 1   16:08 6   08:36 1   16:09 7   08:35 1   16:10 8   08:35 1   16:12 9   08:34 1   16:13 10   08:33 1   16:15 11   08:33 1   16:16 12   08:32 1   16:18 13   08:31 1   16:20 14   08:30 1   16:21 15   08:29 1   16:23 16   08:28 1   16:25 17   08:27 1   16:26 18   08:26 1   16:28 19   08:25 1   16:30 20   08:24 1   16:32 21   08:23 1   16:34 22   08:21 1   16:35 23   08:20 1   16:37 24   08:19 1   16:39 25   08:17 1   16:41 26   08:16 1   16:43 27   08:14 1   16:45 28   08:13 1   16:47 29   08:11 30   08:09 1   16:51 31   08:08 1   16:53	14:49 (WEA_G2)   08:06 15:18 (WEA_G2)   16:55 20 14:50 (WEA_G2)   08:04 15:18 (WEA_G2)   16:57 18 14:50 (WEA_G2)   08:03 15:18 (WEA_G2)   16:59 15 14:51 (WEA_G2)   08:01 15:19 (WEA_G2)   17:01 12 14:51 (WEA_G2)   07:59 15:19 (WEA_G2)   17:03 5 14:52 (WEA_G2)   07:57 15:19 (WEA_G2)   17:05 14:53 (WEA_G2)   07:55 15:19 (WEA_G2)   17:07 14:53 (WEA_G2)   07:53 15:19 (WEA_G2)   17:09 14:54 (WEA_G2)   07:51 15:19 (WEA_G2)   17:11 14:54 (WEA_G2)   07:49 15:19 (WEA_G2)   17:13 14:55 (WEA_G2)   07:47 15:19 (WEA_G2)   17:15 14:56 (WEA_G2)   07:45 15:19 (WEA_G2)   17:17 14:57 (WEA_G2)   07:43 15:19 (WEA_G2)   17:19 14:58 (WEA_G2)   07:41 15:19 (WEA_G2)   17:21 15:00 (WEA_G2)   07:39 15:18 (WEA_G2)   17:24 15:01 (WEA_G2)   07:37 15:18 (WEA_G2)   17:26 15:03 (WEA_G2)   07:35 15:17 (WEA_G2)   17:28 15:05 (WEA_G2)   07:33 15:15 (WEA_G2)   17:30 15:10 (WEA_G2)   07:30 15:55 (WEA_G1)   17:32 15:52 (WEA_G1)   07:28 15:56 (WEA_G1)   17:34 15:52 (WEA_G1)   07:26 15:59 (WEA_G1)   17:36 15:53 (WEA_G1)   07:24 16:01 (WEA_G1)   17:38 15:52 (WEA_G1)   07:22 16:03 (WEA_G1)   17:40 15:52 (WEA_G1)   07:19 16:05 (WEA_G1)   17:42 15:52 (WEA_G1)   07:17 16:08 (WEA_G1)   17:44 15:52 (WEA_G1)   07:15 16:09 (WEA_G1)   17:46 15:52 (WEA_G1)   07:12 16:11 (WEA_G1)   17:48 15:53 (WEA_G1)   07:10 16:14 (WEA_G1)   17:50 15:53 (WEA_G1)   07:08 16:16 (WEA_G1)   17:52 15:54 (WEA_G1)   07:06 16:19 (WEA_G1)   17:54 15:54 (WEA_G1)   07:04 16:22 (WEA_G1)   17:56 15:54 (WEA_G1)   07:02 16:25 (WEA_G1)   17:58 15:54 (WEA_G1)   07:00 16:28 (WEA_G1)   17:59 15:54 (WEA_G1)   06:58 16:31 (WEA_G1)   17:59 16:15 (WEA_G1)   18:02	15:55 (WEA_G1)   07:08 16:15 (WEA_G1)   17:52 15:56 (WEA_G1)   07:05 16:14 (WEA_G1)   17:54 15:58 (WEA_G1)   07:03 16:13 (WEA_G1)   17:56 15:59 (WEA_G1)   07:01 16:11 (WEA_G1)   17:58 16:03 (WEA_G1)   06:58 16:08 (WEA_G1)   18:00 06:56 17:32 (WEA 07 (GRN))   06:39 18:02 2   17:34 (WEA 07 (GRN))   20:01 06:53 17:31 (WEA 07 (GRN))   06:37 18:03 6   17:37 (WEA 07 (GRN))   20:02 06:51 17:38 (WEA 07 (GRN))   06:34 18:05 8   17:38 (WEA 07 (GRN))   20:04 06:49 17:29 (WEA 07 (GRN))   06:32 18:07 12   17:41 (WEA 07 (GRN))   20:06 06:46 17:29 (WEA 07 (GRN))   06:30 18:09 13   17:42 (WEA 07 (GRN))   20:08 06:44 17:29 (WEA 07 (GRN))   06:27 18:11 16   17:45 (WEA 07 (GRN))   20:10 06:41 17:29 (WEA 07 (GRN))   06:25 18:13 14   17:43 (WEA 07 (GRN))   20:12 06:39 17:30 (WEA 07 (GRN))   06:22 18:15 13   17:43 (WEA 07 (GRN))   20:14 06:36 17:31 (WEA 07 (GRN))   06:20 18:17 9   17:40 (WEA 07 (GRN))   20:16 06:34 17:29 (WEA 05 (GRN))   06:15 18:19 1   17:54 (WEA 05 (GRN))   20:19 06:31 17:53 (WEA 05 (GRN))   06:13 18:21 2   18:00 (WEA 03 (GRN))   20:23 06:28 17:57 (WEA 03 (GRN))   06:04 18:25 2   18:00 (WEA 03 (GRN))   20:25 06:26 17:57 (WEA 03 (GRN))   06:02 18:28 4   18:01 (WEA 03 (GRN))   20:27 06:19 17:57 (WEA 03 (GRN))   06:04 18:30 7   18:04 (WEA 03 (GRN))   20:29 06:16 17:57 (WEA 03 (GRN))   06:01 18:32 8   18:05 (WEA 03 (GRN))   20:31 06:14 17:58 (WEA 03 (GRN))   05:59 18:34 10   18:08 (WEA 03 (GRN))   20:33 06:11 17:59 (WEA 03 (GRN))   05:57 18:36 6   18:05 (WEA 03 (GRN))   20:34 06:09 17:57 (WEA 03 (GRN))   05:54 18:38 20:36 06:06 18:40 18:14 (WEA 02 (GRN))   05:50 18:42 1   18:15 (WEA 02 (GRN))   20:40 06:02 18:13 (WEA 02 (GRN))   05:48 18:44 3   18:16 (WEA 02 (GRN))   20:42 06:59 19:14 (WEA 02 (GRN))   05:46 19:45 5   19:19 (WEA 02 (GRN))   20:44 06:57 19:16 (WEA 02 (GRN))   05:44 19:47 3   19:19 (WEA 02 (GRN))   20:46 06:54 19:49 20:46 06:52 21:00 (WEA 04 (K))   21:37 21:02 (WEA 04 (K))   21:51	06:52 18:51 06:49 19:53 06:47 19:55 06:44 19:57 06:42 19:59 06:41 20:57 06:39 20:59 06:34 21:00 06:32 20:58 06:34 21:00 06:25 21:02 06:23 21:04 06:22 19:40 (WEA 43 (RW))   05:22 19:42 (WEA 43 (RW))   21:06 19:41 (WEA 43 (RW))   05:20 19:44 (WEA 43 (RW))   21:07 19:44 (WEA 43 (RW))   05:18 19:46 (WEA 43 (RW))   21:09 06:16 19:41 06:18 20:17 06:13 17:53 (WEA 05 (GRN))   06:15 17:54 (WEA 05 (GRN))   20:19 06:11 20:21 06:10 20:23 12:18 3   20:45 (WEA 42 (RW))   21:53 05:08 20:43 (WEA 42 (RW))   06:42 21:19 4   20:47 (WEA 42 (RW))   21:53 05:06 20:42 (WEA 42 (RW))   06:42 21:21 6   20:48 (WEA 42 (RW))   21:54 05:05 20:43 (WEA 42 (RW))   06:42 21:19 4   20:47 (WEA 42 (RW))   21:53 05:06 20:42 (WEA 42 (RW))   06:42 21:21 6   20:48 (WEA 42 (RW))   21:54 05:04 20:43 (WEA 42 (RW))   06:42 21:19 4   20:47 (WEA 42 (RW))   21:53 05:00 20:47 (WEA 42 (RW))   06:43 21:27 3   20:50 (WEA 42 (RW))   21:56 04:59 20:45 (WEA 42 (RW))   06:43 21:29 04:58 21:30 04:56 21:32 04:55 21:33 04:54 21:35 04:53 21:36 04:52 21:00 (WEA 04 (K))   21:37 21:02 (WEA 04 (K))   21:51	04:51 21:38 04:50 21:40 04:49 21:41 04:48 21:42 04:47 21:43 04:47 21:44 04:46 21:45 04:45 21:46 04:45 21:47 04:44 21:48 04:44 21:49 04:44 21:50 04:43 21:51 04:42 21:52 04:42 21:53 04:41 21:54 04:41 21:55 04:40 21:56 04:40 21:57 04:39 21:58 04:39 21:59 04:38 22:00 04:38 22:01 04:37 22:02 04:37 22:03 04:36 22:04 04:36 22:05 04:35 22:06 04:35 22:07 04:34 22:08 04:34 22:09 04:33 22:10 04:33 22:11 04:32 22:12 04:32 22:13 04:31 22:14 04:31 22:15 04:30 22:16 04:30 22:17 04:29 22:18 04:29 22:19 04:28 22:20 04:28 22:21 04:27 22:22 04:27 22:23 04:26 22:24 04:26 22:25 04:25 22:26 04:25 22:27 04:24 22:28 04:24 22:29 04:23 22:30 04:23 22:31 04:22 22:32 04:22 22:33 04:21 22:34 04:21 22:35 04:20 22:36 04:20 22:37 04:19 22:38 04:19 22:39 04:18 22:40 04:18 22:41 04:17 22:42 04:17 22:43 04:16 22:44 04:16 22:45 04:15 22:46 04:15 22:47 04:14 22:48 04:14 22:49 04:13 22:50 04:13 22:51 04:12 22:52 04:12 22:53 04:11 22:54 04:11 22:55 04:10 22:56 04:10 22:57 04:09 22:58 04:09 22:59 04:08 23:00 04:08	04:51 21:00 (WEA 04 (K)) 21:38 3 21:03 (WEA 04 (K)) 21:40 4 21:04 (WEA 04 (K)) 21:41 5 21:06 (WEA 04 (K)) 21:42 6 21:07 (WEA 04 (K)) 21:43 6 21:07 (WEA 04 (K)) 21:44 8 21:09 (WEA 04 (K)) 21:45 8 21:09 (WEA 04 (K)) 21:46 9 21:11 (WEA 04 (K)) 21:47 9 21:11 (WEA 04 (K)) 21:48 10 21:12 (WEA 04 (K)) 21:49 10 21:12 (WEA 04 (K)) 21:50 10 21:13 (WEA 04 (K)) 21:51 11 21:14 (WEA 04 (K)) 21:52 11 21:15 (WEA 04 (K)) 21:53 11 21:16 (WEA 04 (K)) 21:54 12 21:17 (WEA 04 (K)) 21:55 12 21:18 (WEA 04 (K)) 21:56 12 21:19 (WEA 04 (K)) 21:57 12 21:20 (WEA 04 (K)) 21:58 12 21:21 (WEA 04 (K)) 21:59 12 21:22 (WEA 04 (K)) 22:00 12 21:23 (WEA 04 (K)) 22:01 12 21:24 (WEA 04 (K)) 22:02 12 21:25 (WEA 04 (K)) 22:03 12 21:26 (WEA 04 (K)) 22:04 12 21:27 (WEA 04 (K)) 22:05 12 21:28 (WEA 04 (K)) 22:06 12 21:29 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11 23:52 (WEA 04 (K)) 24:30 11 23:53 (WEA 04 (K)) 24:31 11 23:54 (WEA 04 (K)) 24:32 11 23:55 (WEA 04 (K)) 24:33 11 23:56 (WEA 04 (K)) 24:34 11 23:57 (WEA 04 (K)) 24:35 11 23:58 (WEA 04 (K)) 24:36 11 23:59 (WEA 04 (K)) 24:37 11 24:00 (WEA 04 (K))	Sonnenscheinstunden   246 astr. max.mögl. Beschattung   604	272 92	143	421 7	496 38	513 296

**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) Schattennende	(WEA mit erstem Schatten) (WEA mit letztem Schatten)
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Projekt:

SWP Windpark Großholz

Lizenzierter Anwender:

GL Garrad Hassan Deutschland GmbH  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großholz (3 x V150-6.0) **Schattenrezeptor:** IO 12 - IO 12 Poggenpohler Weg 14 (Gosdorf)

### 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

Juli		August		September		Oktober		November		Dezember				
1	04:47	21:06 (WEA K04)	05:27	06:23	19:39 (WEA 43 (RW))	07:17	18:09 (WEA 07 (GRN))	07:16		08:12	14:37 (WEA G2)			
	21:53	21:17 (WEA K04)	21:17	20:10	19:41 (WEA 43 (RW))	18:55	18:23 (WEA 07 (GRN))	16:44		15:58	15:01 (WEA G2)			
2	04:47	21:07 (WEA K04)	05:29	06:24		07:19	18:07 (WEA 07 (GRN))	07:18		08:14	14:38 (WEA G2)			
	21:53	21:17 (WEA K04)	21:16	20:07		18:53	18:22 (WEA 07 (GRN))	16:42		15:58	15:02 (WEA G2)			
3	04:48	21:07 (WEA K04)	05:31	06:26		07:21	18:07 (WEA 07 (GRN))	07:20		08:15	14:38 (WEA G2)			
	21:53	21:17 (WEA K04)	21:14	20:05		18:59	18:21 (WEA 07 (GRN))	16:40		15:57	15:03 (WEA G2)			
4	04:49	21:07 (WEA K04)	05:32	06:28		07:22	18:06 (WEA 07 (GRN))	07:22		08:17	14:37 (WEA G2)			
	21:52	21:16 (WEA K04)	21:12	20:03		18:48	18:19 (WEA 07 (GRN))	16:38		15:56	15:03 (WEA G2)			
5	04:50	21:08 (WEA K04)	05:34	06:30		07:24	18:06 (WEA 07 (GRN))	07:24		08:18	14:38 (WEA G2)			
	21:52	21:16 (WEA K04)	21:10	20:00		18:45	18:16 (WEA 07 (GRN))	16:36		15:56	15:04 (WEA G2)			
6	04:51	21:07 (WEA K04)	05:36	06:32		07:26	18:07 (WEA 07 (GRN))	07:26		08:19	14:38 (WEA G2)			
	21:51	21:15 (WEA K04)	21:08	19:58		18:43	18:14 (WEA 07 (GRN))	16:34	7	15:33 (WEA G1)	15:55	27	15:05 (WEA G2)	
7	04:52	21:07 (WEA K04)	05:38	06:33		07:28	18:08 (WEA 07 (GRN))	07:28		08:21	14:38 (WEA G2)			
	21:50	21:14 (WEA K04)	21:06	19:55		18:40	18:11 (WEA 07 (GRN))	16:32	12	15:42 (WEA G1)	15:54	28	15:06 (WEA G2)	
8	04:53	21:07 (WEA K04)	05:39	06:35		07:30	18:09 (WEA 07 (GRN))	07:30		08:25	14:39 (WEA G2)			
	21:50	21:14 (WEA K04)	21:04	19:53		18:38	18:09 (WEA 07 (GRN))	16:30	16	15:44 (WEA G1)	15:54	28	15:06 (WEA G2)	
9	04:54	21:07 (WEA K04)	05:41	06:37		07:32	18:08 (WEA 07 (GRN))	07:32		08:23	14:39 (WEA G2)			
	21:49	21:13 (WEA K04)	21:02	19:50		18:36	18:08 (WEA 07 (GRN))	16:28	18	15:45 (WEA G1)	15:54	28	15:07 (WEA G2)	
10	04:55	21:08 (WEA K04)	05:43	06:39		07:34	18:09 (WEA 07 (GRN))	07:34		08:25	14:39 (WEA G2)			
	21:48	21:12 (WEA K04)	21:00	19:48		18:33	18:07 (WEA 07 (GRN))	16:26	20	15:46 (WEA G1)	15:53	28	15:07 (WEA G2)	
11	04:56	21:08 (WEA K04)	05:45	06:41		07:35	18:09 (WEA 07 (GRN))	07:35		08:26	14:39 (WEA G2)			
	21:47	21:11 (WEA K04)	20:58	19:45		18:31	18:07 (WEA 07 (GRN))	16:25	21	15:47 (WEA G1)	15:53	29	15:08 (WEA G2)	
12	04:57	21:09 (WEA K04)	05:47	06:42		07:37	18:09 (WEA 07 (GRN))	07:37		08:27	14:39 (WEA G2)			
	21:46	21:11 (WEA K04)	20:56	19:43		18:28	18:07 (WEA 07 (GRN))	16:23	22	15:48 (WEA G1)	15:53	33	15:08 (WEA G2)	
13	04:59	21:09 (WEA K04)	05:48	06:44		07:39	18:09 (WEA 07 (GRN))	07:39		08:28	14:40 (WEA G2)			
	21:45	21:10 (WEA K04)	20:54	19:40		18:26	18:06 (WEA 07 (GRN))	16:21	23	15:48 (WEA G1)	15:53	36	15:08 (WEA G2)	
14	05:00		05:50	06:46	19:05 (WEA 02 (GRN))	07:41	18:06 (WEA 07 (GRN))	07:42		08:29	14:40 (WEA G2)			
	21:44		20:51	19:38	19:10 (WEA 02 (GRN))	18:24	18:05 (WEA 07 (GRN))	16:20	21	15:46 (WEA G1)	15:53	40	15:09 (WEA G2)	
15	05:01		05:52	06:48	19:04 (WEA 02 (GRN))	07:43	18:06 (WEA 07 (GRN))	07:44		08:30	14:40 (WEA G2)			
	21:43		20:49	19:35	19:07 (WEA 02 (GRN))	18:21	18:05 (WEA 07 (GRN))	16:18	19	15:44 (WEA G1)	15:53	40	15:09 (WEA G2)	
16	05:03		05:54	06:50	19:02 (WEA 02 (GRN))	07:45	18:06 (WEA 07 (GRN))	07:45		08:31	14:40 (WEA G2)			
	21:42		20:47	19:33	19:04 (WEA 02 (GRN))	18:19	18:05 (WEA 07 (GRN))	16:16	17	15:42 (WEA G1)	15:53	42	15:10 (WEA G2)	
17	05:04		05:56	06:51	19:00 (WEA 02 (GRN))	07:47	18:05 (WEA 07 (GRN))	07:47		08:32	14:40 (WEA G2)			
	21:41		20:45	19:30		18:17	18:04 (WEA 07 (GRN))	16:15	16	15:41 (WEA G1)	15:53	42	15:10 (WEA G2)	
18	05:05		05:57	06:53		07:49	18:05 (WEA 07 (GRN))	07:49		08:32	14:40 (WEA G2)			
	21:39		20:43	19:28		18:14	18:03 (WEA 07 (GRN))	16:13	13	15:39 (WEA G1)	15:53	44	15:11 (WEA G2)	
19	05:07		05:59	06:55	18:48 (WEA 03 (GRN))	07:51	18:04 (WEA 07 (GRN))	07:51		08:33	14:40 (WEA G2)			
	21:38		20:40	19:25	18:52 (WEA 03 (GRN))	18:12	18:03 (WEA 07 (GRN))	16:12	11	15:37 (WEA G1)	15:53	44	15:12 (WEA G2)	
20	05:08	20:56 (WEA 42 (RW))	06:01	06:57	18:44 (WEA 03 (GRN))	07:53	18:04 (WEA 07 (GRN))	07:53		08:34	14:40 (WEA G2)			
	21:37	21:01 (WEA 42 (RW))	20:38	19:23	18:53 (WEA 03 (GRN))	18:10	18:03 (WEA 07 (GRN))	16:11	8	15:35 (WEA G1)	15:54	45	15:12 (WEA G2)	
21	05:10	20:54 (WEA 42 (RW))	06:03	06:59	18:43 (WEA 03 (GRN))	07:55	18:04 (WEA 07 (GRN))	07:55		08:34	14:40 (WEA G2)			
	21:35	21:02 (WEA 42 (RW))	20:36	19:20	18:51 (WEA 03 (GRN))	18:07	18:03 (WEA 07 (GRN))	16:09	7	15:34 (WEA G1)	15:54	45	15:13 (WEA G2)	
22	05:11	20:53 (WEA 42 (RW))	06:05	07:00	18:42 (WEA 03 (GRN))	07:56	18:03 (WEA 07 (GRN))	07:57		08:35	14:40 (WEA G2)			
	21:34	21:00 (WEA 42 (RW))	20:34	19:18	18:49 (WEA 03 (GRN))	18:05	18:02 (WEA 07 (GRN))	16:08	4	15:33 (WEA G1)	15:55	45	15:13 (WEA G2)	
23	05:13	20:53 (WEA 42 (RW))	06:06	07:02	18:42 (WEA 03 (GRN))	07:58	18:02 (WEA 07 (GRN))	07:58		08:35	14:40 (WEA G2)			
	21:32	20:59 (WEA 42 (RW))	20:31	19:15	18:47 (WEA 03 (GRN))	18:03	18:01 (WEA 07 (GRN))	16:07	2	15:31 (WEA G1)	15:55	45	15:14 (WEA G2)	
24	05:14	20:53 (WEA 42 (RW))	06:08	07:04	18:42 (WEA 03 (GRN))	08:00	18:00 (WEA 07 (GRN))	08:00		08:36	14:40 (WEA G2)			
	21:31	20:57 (WEA 42 (RW))	20:29	19:13	18:44 (WEA 03 (GRN))	18:01	18:00 (WEA 07 (GRN))	16:05	10	14:52 (WEA G2)	15:56	45	15:14 (WEA G2)	
25	05:16	20:53 (WEA 42 (RW))	06:10	07:06	18:41 (WEA 03 (GRN))	08:02	18:00 (WEA 07 (GRN))	08:02		08:36	14:40 (WEA G2)			
	21:29	20:57 (WEA 42 (RW))	20:27	19:10	18:38 (WEA 03 (GRN))	18:00	18:00 (WEA 07 (GRN))	16:04	13	14:54 (WEA G2)	15:56	44	15:14 (WEA G2)	
26	05:17	20:52 (WEA 42 (RW))	06:12	07:08	18:39 (WEA 03 (GRN))	08:04	18:00 (WEA 07 (GRN))	08:04		08:37	14:40 (WEA G2)			
	21:28	20:55 (WEA 42 (RW))	20:24	19:08	18:36 (WEA 03 (GRN))	18:00	18:00 (WEA 07 (GRN))	16:03	16	14:56 (WEA G2)	15:57	43	15:14 (WEA G2)	
27	05:19	20:53 (WEA 42 (RW))	06:14	07:10	18:34 (WEA 03 (GRN))	08:05	18:00 (WEA 07 (GRN))	08:05		08:37	14:40 (WEA G2)			
	21:26	20:54 (WEA 42 (RW))	20:22	19:05	18:33 (WEA 03 (GRN))	08:06	18:00 (WEA 07 (GRN))	16:02	18	14:57 (WEA G2)	15:58	43	15:14 (WEA G2)	
28	05:21		06:15	07:11	18:33 (WEA 05 (GRN))	08:08	18:00 (WEA 07 (GRN))	08:07		08:37	14:40 (WEA G2)			
	21:24		20:19	19:03	18:34 (WEA 05 (GRN))	18:02	18:00 (WEA 07 (GRN))	16:01	21	14:59 (WEA G2)	15:59	41	15:16 (WEA G2)	
29	05:22		06:17	07:13	18:33 (WEA 05 (GRN))	08:10	18:00 (WEA 07 (GRN))	08:09		08:37	14:40 (WEA G2)			
	21:23		20:17	19:00	18:31 (WEA 05 (GRN))	08:10	18:00 (WEA 07 (GRN))	16:00	22	15:00 (WEA G2)	16:00	41	15:17 (WEA G2)	
30	05:24		06:19	07:15	19:43 (WEA 43 (RW))	18:11	18:10 (WEA 07 (GRN))	08:10		08:38 (WEA G2)	16:01	41	15:17 (WEA G2)	
	21:21		20:15	19:46 (WEA 43 (RW))	18:58	18:22 (WEA 07 (GRN))	18:11	18:10 (WEA 07 (GRN))	16:01	23	15:01 (WEA G2)	16:01	37	15:16 (WEA G2)
31	05:26		06:21	07:16	19:41 (WEA 43 (RW))		18:11	18:10 (WEA 07 (GRN))	16:01		08:37	14:40 (WEA G2)		
	21:19		20:12	19:44 (WEA 43 (RW))		18:11	18:10 (WEA 07 (GRN))	16:01		08:37	14:40 (WEA G2)			
Sonnenscheinstunden	515		461	383	308	228	154	100	257		231	36	15:17 (WEA G2)	
astr. max.mögl. Beschattung	124		6	67		99		380			1124			

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) Schatteneende		



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 13 - IO 13 Poggenpohler Weg 20 (Gosdorf)

### 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	08:37	14:02 (WEA_G3)   08:06	16:05 (WEA_G1)   07:08	06:52	19:22 (WEA_O2 (GRN))   05:41	09:51
2	08:37	15:25 (WEA_G2)   16:55	16:22 (WEA_G1)   17:52	19:51	19:24 (WEA_O2 (GRN))   20:47	21:38
3	08:37	14:03 (WEA_G3)   08:04	16:05 (WEA_G1)   07:05	06:49	19:23 (WEA_O2 (GRN))   05:39	04:50
4	08:36	15:26 (WEA_G2)   16:57	16:25 (WEA_G1)   17:54	19:53	19:26 (WEA_O2 (GRN))   20:49	21:40
5	08:36	14:03 (WEA_G3)   08:03	16:06 (WEA_G1)   07:03	06:47	19:23 (WEA_O2 (GRN))   05:37	04:49
6	08:35	15:27 (WEA_G2)   16:59	16:27 (WEA_G1)   17:56	19:55	19:27 (WEA_O2 (GRN))   20:51	21:41
7	08:35	14:04 (WEA_G3)   08:01	16:06 (WEA_G1)   07:01	06:44	19:23 (WEA_O2 (GRN))   05:35	04:48
8	08:34	15:29 (WEA_G2)   17:01	16:29 (WEA_G1)   17:58	19:57	19:23 (WEA_O2 (GRN))   20:53	21:42
9	08:34	14:05 (WEA_G3)   07:59	16:06 (WEA_G1)   06:58	06:42	19:23 (WEA_O2 (GRN))   05:33	04:47
10	08:33	15:30 (WEA_G2)   17:03	16:28 (WEA_G1)   18:00	19:59	19:23 (WEA_O2 (GRN))   20:55	21:43
11	08:33	14:05 (WEA_G3)   07:57	16:07 (WEA_G1)   06:56	06:39	19:23 (WEA_O2 (GRN))   05:31	04:47
12	08:32	15:31 (WEA_G2)   17:05	16:28 (WEA_G1)   18:02	20:01	19:23 (WEA_O2 (GRN))   20:57	21:44
13	08:32	14:07 (WEA_G3)   07:55	16:08 (WEA_G1)   06:53	06:37	19:23 (WEA_O2 (GRN))   05:29	04:46
14	08:31	15:33 (WEA_G2)   17:07	16:27 (WEA_G1)   18:03	20:02	19:23 (WEA_O2 (GRN))   20:59	21:45
15	08:31	14:08 (WEA_G3)   07:53	16:09 (WEA_G1)   06:51	06:34	19:23 (WEA_O2 (GRN))   05:27	04:45
16	08:30	15:35 (WEA_G2)   17:09	16:26 (WEA_G1)   18:05	20:04	19:23 (WEA_O2 (GRN))   21:00	21:46
17	08:30	14:09 (WEA_G3)   07:51	16:11 (WEA_G1)   06:49	06:32	19:23 (WEA_O2 (GRN))   05:25	04:45
18	08:29	15:36 (WEA_G2)   17:11	16:25 (WEA_G1)   18:07	20:06	19:23 (WEA_O2 (GRN))   21:02	21:47
19	08:29	14:11 (WEA_G3)   07:49	16:14 (WEA_G1)   06:46	06:30	19:23 (WEA_O2 (GRN))   05:23	04:44
20	08:28	15:36 (WEA_G2)   17:13	16:23 (WEA_G1)   18:09	20:08	19:23 (WEA_O2 (GRN))   21:04	21:48
21	08:28	14:12 (WEA_G3)   07:47	16:14 (WEA_G1)   06:44	06:28	19:23 (WEA_O2 (GRN))   05:22	04:44
22	08:27	15:36 (WEA_G2)   17:15	16:11 (WEA_G1)   18:11	20:10	19:23 (WEA_O2 (GRN))   21:06	21:49
23	08:27	14:14 (WEA_G3)   07:45	16:11 (WEA_G1)   06:41	06:25	19:23 (WEA_O2 (GRN))   05:20	04:43
24	08:26	15:36 (WEA_G2)   17:17	16:13 (WEA_G1)   18:13	20:12	19:23 (WEA_O2 (GRN))   21:07	21:50
25	08:26	14:17 (WEA_G3)   07:43	16:09 (WEA_G1)   06:39	06:22	19:23 (WEA_O2 (GRN))   05:18	04:43
26	08:25	15:37 (WEA_G2)   17:19	16:15 (WEA_G1)   18:15	20:14	19:23 (WEA_O2 (GRN))   21:09	21:50
27	08:25	14:18 (WEA_G3)   07:41	16:06 (WEA_G1)   06:36	06:20	19:23 (WEA_O2 (GRN))   05:16	04:43
28	08:24	15:37 (WEA_G2)   17:21	16:17 (WEA_G1)   18:17	20:16	19:23 (WEA_O2 (GRN))   21:11	21:51
29	08:24	14:19 (WEA_G3)   07:39	16:04 (WEA_G1)   06:34	06:18	19:23 (WEA_O2 (GRN))   05:14	04:42
30	08:23	15:37 (WEA_G2)   17:24	16:19 (WEA_G1)   18:19	20:17	19:23 (WEA_O2 (GRN))   21:13	21:52
31	08:23	14:20 (WEA_G3)   07:37	16:03 (WEA_G1)   06:31	06:15	19:23 (WEA_O2 (GRN))   05:13	04:42
1	08:22	15:38 (WEA_G2)   17:26	16:21 (WEA_G1)   18:21	20:19	19:52 (WEA_O3 (RW))   21:14	21:52
2	08:22	14:21 (WEA_G3)   07:35	16:09 (WEA_G1)   06:29	06:13	19:50 (WEA_O3 (RW))   05:11	04:42
3	08:21	15:38 (WEA_G2)   17:28	16:23 (WEA_G1)   18:23	20:21	19:53 (WEA_O3 (RW))   21:16	21:53
4	08:21	14:22 (WEA_G3)   07:33	16:06 (WEA_G1)   06:26	06:10	19:53 (WEA_O3 (RW))   05:09	04:42
5	08:20	15:38 (WEA_G2)   17:30	16:25 (WEA_G1)   18:25	20:23	19:53 (WEA_O3 (RW))   21:18	21:53
6	08:20	14:23 (WEA_G3)   07:30	16:04 (WEA_G1)   06:24	06:08	19:53 (WEA_O3 (RW))   05:08	04:42
7	08:19	15:37 (WEA_G2)   17:32	16:27 (WEA_G1)   18:27	20:25	19:53 (WEA_O3 (RW))   21:19	21:53
8	08:19	14:24 (WEA_G3)   07:28	16:03 (WEA_G1)   06:21	06:06	19:53 (WEA_O3 (RW))   05:06	04:42
9	08:18	15:36 (WEA_G2)   17:34	16:28 (WEA_G1)   18:28	20:27	19:53 (WEA_O3 (RW))   21:21	21:54
10	08:18	14:25 (WEA_G3)   07:26	16:02 (WEA_G1)   06:19	06:04	19:53 (WEA_O3 (RW))   05:05	04:42
11	08:17	15:37 (WEA_G2)   17:36	16:30 (WEA_G1)   18:30	20:29	19:53 (WEA_O3 (RW))   21:23	21:54
12	08:17	14:26 (WEA_G3)   07:24	16:03 (WEA_G1)   06:16	06:01	19:53 (WEA_O3 (RW))   05:03	04:43
13	08:16	15:36 (WEA_G2)   17:38	16:32 (WEA_G1)   18:32	20:31	19:53 (WEA_O3 (RW))   21:24	21:54
14	08:16	14:27 (WEA_G3)   07:22	16:05 (WEA_G1)   06:14	06:00	19:53 (WEA_O3 (RW))   05:02	04:43
15	08:15	15:35 (WEA_G2)   17:40	16:34 (WEA_G1)   18:34	20:33	19:53 (WEA_O3 (RW))   21:26	21:54
16	08:15	14:28 (WEA_G3)   07:19	16:06 (WEA_G1)   06:11	05:57	19:53 (WEA_O3 (RW))   05:00	04:43
17	08:14	15:34 (WEA_G2)   17:42	16:36 (WEA_G1)   18:36	20:34	19:53 (WEA_O3 (RW))   21:27	21:55
18	08:14	14:29 (WEA_G3)   07:17	16:09 (WEA_G1)   06:09	05:54	19:53 (WEA_O3 (RW))   04:59	04:43
19	08:13	15:33 (WEA_G2)   17:44	16:38 (WEA_G1)   18:38	20:36	19:53 (WEA_O3 (RW))   21:29	21:55
20	08:13	14:30 (WEA_G3)   07:15	16:06 (WEA_G1)   06:06	05:52	19:53 (WEA_O3 (RW))   04:58	04:44
21	08:12	16:09 (WEA_G1)   17:46	18:40 (WEA_G1)   20:38	21:30	20:56 (WEA_O4 (RW))   21:55	21:56
22	08:12	16:06 (WEA_G1)   17:12	18:04 (WEA_G1)   19:50	20:57	20:53 (WEA_O4 (RW))   21:54	21:56
23	08:11	16:11 (WEA_G1)   17:48	18:42 (WEA_G1)   20:40	21:32	20:58 (WEA_O4 (RW))   21:56	21:56
24	08:11	16:06 (WEA_G1)   17:10	18:06 (WEA_G1)   19:54	20:55	20:53 (WEA_O4 (RW))   21:54	21:56
25	08:10	16:14 (WEA_G1)   17:50	18:44 (WEA_G1)   20:42	21:33	20:59 (WEA_O4 (RW))   21:54	21:56
26	08:10	16:06 (WEA_G1)   17:11	18:08 (WEA_G1)   19:56	20:56	20:54 (WEA_O4 (RW))   21:54	21:56
27	08:09	16:15 (WEA_G1)   17:48	18:45 (WEA_G1)   20:44	21:35	21:00 (WEA_O4 (RW))   21:54	21:56
28	08:09	16:05 (WEA_G1)   17:17	18:07 (WEA_G1)   19:54	20:54	20:56 (WEA_O4 (RW))   21:54	21:56
29	08:08	16:18 (WEA_G1)   17:47	18:47 (WEA_G1)   20:46	21:36	20:58 (WEA_O4 (RW))   21:54	21:56
30	08:08	16:05 (WEA_G1)   17:13	18:09 (WEA_G1)   19:49	20:52	20:58 (WEA_O4 (RW))   21:54	21:56
31	08:08	16:20 (WEA_G1)   17:41	18:49 (WEA_G1)   20:46	21:37	20:58 (WEA_O4 (RW))   21:54	21:56
Sonnenscheinstunden   240						
astr. max.mögl. Beschattung   994						
		272	207		31	134

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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DNV

Projekt: SWP Windpark Großenholz

Lizenzierter Anwender: GL Garrad Hassan Deutschland GmbH Sommerdeich 14 b DE-25709 Kaiser-Wilhelm-Koog (0 48 56)901-0

Berechnet: 22.06.2022 20:19/3.5.584



SHADOW - Kalender

Berechnung: Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0)Schattenrezeptor: IO 14 - IO 14 Poggenpohler Weg 28 (Gosdorf) 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

Table with columns for months (Januar, Februar, März, April, Mai, Juni) and rows for individual days, listing solar times and shadow duration.

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)



Projekt:

SWP Windpark Großenholz

Lizenzierter Anwender:

GL Garrad Hassan Deutschland GmbH  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0

Berechnet:

22.06.2022 20:19/3.5.584

SHADOW - Kalender

Berechnung: Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) Schattenrezeptor: IO 14 - IO 14 Poggenpohler Weg 28 (Gosdorf)

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

Jul	August	September	Oktober	November	Dezember
1   04:47	05:27	06:23	07:17	07:16	15:48 (WEA_G1)   08:12
21:53	21:17	20:10	18:55	16:44	22 16:10 (WEA_G1)   15:56
2   04:47	05:29	06:24	07:19	07:18	15:47 (WEA_G1)   08:14
21:53	21:16	20:07	18:53	16:42	23 16:10 (WEA_G1)   15:58
3   04:48	05:31	06:26	07:21	07:20	15:47 (WEA_G1)   08:15
21:53	21:14	20:05	18:50	16:40	20 16:07 (WEA_G1)   15:57
4   04:49	05:32	06:28	07:22	07:22	15:47 (WEA_G1)   08:17
21:52	21:12	20:03	18:48	16:38	18 16:05 (WEA_G1)   15:56
5   04:50	05:34	06:30	19:28 (WEA_02 (GRN))   07:24	07:24	15:48 (WEA_G1)   08:18
21:52	21:10	20:00	19:31 (WEA_02 (GRN))   18:45	16:36	16 16:04 (WEA_G1)   15:56
6   04:51	05:36	06:32	19:26 (WEA_02 (GRN))   07:26	07:26	15:48 (WEA_G1)   08:19
21:51	21:08	19:58	19:29 (WEA_02 (GRN))   18:43	16:34	14 16:02 (WEA_G1)   15:55
7   04:52	05:38	06:33	19:25 (WEA_02 (GRN))   07:28	07:28	15:48 (WEA_G1)   08:21
21:50	21:06	19:55	19:27 (WEA_02 (GRN))   18:40	16:32	12 16:00 (WEA_G1)   15:55
8   04:53	05:39	06:35	07:30	07:30	15:49 (WEA_G1)   08:22
21:50	21:04	19:53	19:30	16:30	8 15:57 (WEA_G1)   15:54
9   04:54	21:08 (WEA_42 (RW))   05:41	06:37	19:13 (WEA_03 (GRN))   07:32	07:32	15:49 (WEA_G1)   08:23
21:49	5 21:13 (WEA_42 (RW))   21:02	19:50	6 19:19 (WEA_03 (GRN))   18:38	16:28	6 16:55 (WEA_G1)   15:54
10   04:55	21:08 (WEA_42 (RW))   05:43	06:39	19:11 (WEA_03 (GRN))   07:34	07:34	15:07 (WEA_G2)   08:25
21:48	4 21:12 (WEA_42 (RW))   21:00	19:48	8 19:19 (WEA_03 (GRN))   18:33	16:26	13 15:53 (WEA_G1)   15:53
11   04:56	21:07 (WEA_42 (RW))   05:45	06:41	19:10 (WEA_03 (GRN))   07:35	07:36	15:05 (WEA_G2)   08:26
21:47	4 21:11 (WEA_42 (RW))   20:58	19:45	7 19:17 (WEA_03 (GRN))   18:31	16:25	16 15:21 (WEA_G2)   15:53
12   04:57	21:08 (WEA_42 (RW))   05:47	06:42	19:09 (WEA_03 (GRN))   07:37	07:38	15:04 (WEA_G2)   08:27
21:46	3 21:11 (WEA_42 (RW))   20:56	19:43	5 19:14 (WEA_03 (GRN))   18:28	16:23	18 15:22 (WEA_G2)   15:53
13   04:59	21:07 (WEA_42 (RW))   05:48	06:44	19:09 (WEA_03 (GRN))   07:39	07:40	15:02 (WEA_G2)   08:28
21:45	3 21:10 (WEA_42 (RW))   20:54	19:40	3 19:12 (WEA_03 (GRN))   18:26	7 17:57 (WEA_08 (GRN))   16:21	22 15:24 (WEA_G2)   15:53
14   05:00	21:07 (WEA_42 (RW))   05:50	06:46	19:09 (WEA_03 (GRN))   07:41	07:42	15:01 (WEA_G2)   08:29
21:44	2 21:09 (WEA_42 (RW))   20:51	19:38	1 19:10 (WEA_03 (GRN))   18:24	6 17:54 (WEA_08 (GRN))   16:20	24 15:25 (WEA_G2)   15:53
15   05:01	21:06 (WEA_42 (RW))   05:52	06:48	18:51 (WEA_07 (GRN))   07:43	07:44	15:01 (WEA_G2)   08:30
21:43	2 21:08 (WEA_42 (RW))   20:49	19:35	4 18:55 (WEA_07 (GRN))   18:21	5 17:52 (WEA_08 (GRN))   16:18	24 15:25 (WEA_G2)   15:53
16   05:03	21:06 (WEA_42 (RW))   05:54	06:50	18:47 (WEA_07 (GRN))   07:45	07:45	15:00 (WEA_G2)   08:31
21:42	1 21:07 (WEA_42 (RW))   20:47	19:33	10 18:57 (WEA_07 (GRN))   18:19	2 17:49 (WEA_08 (GRN))   16:16	26 15:26 (WEA_G2)   15:53
17   05:04	05:56	06:51	18:46 (WEA_07 (GRN))   07:47	07:47	15:00 (WEA_G2)   08:32
21:41	20:45	19:30	12 18:58 (WEA_07 (GRN))   18:17	16:15	27 15:27 (WEA_G2)   15:53
18   05:05	05:57	18:53	18:45 (WEA_07 (GRN))   07:49	07:49	14:59 (WEA_G2)   08:32
21:39	20:43	19:28	14 18:59 (WEA_07 (GRN))   18:14	16:13	28 15:27 (WEA_G2)   15:53
19   05:07	05:59	06:55	18:44 (WEA_07 (GRN))   07:51	07:51	14:59 (WEA_G2)   08:33
21:38	20:40	19:25	13 18:57 (WEA_07 (GRN))   18:12	16:12	29 15:28 (WEA_G2)   15:53
20   05:08	06:01	06:57	18:43 (WEA_07 (GRN))   07:53	07:53	14:11 (WEA_G3)   08:34
21:37	20:38	19:23	11 18:54 (WEA_05 (GRN))   18:10	16:11	40 15:28 (WEA_G2)   15:54
21   05:10	06:03	06:59	18:43 (WEA_07 (GRN))   07:55	07:55	14:09 (WEA_G3)   08:34
21:35	20:36	19:20	8 18:51 (WEA_07 (GRN))   18:07	16:09	46 15:29 (WEA_G2)   15:54
22   05:11	06:05	07:00	18:43 (WEA_07 (GRN))   07:56	07:57	14:07 (WEA_G3)   08:35
21:34	20:34	19:18	6 18:49 (WEA_07 (GRN))   18:05	16:08	50 15:29 (WEA_G2)   15:55
23   05:13	06:06	20:00 (WEA_43 (RW))   07:02	18:44 (WEA_07 (GRN))   07:58	07:58	14:06 (WEA_G3)   08:35
21:32	20:31	2 20:02 (WEA_43 (RW))   19:15	3 18:47 (WEA_07 (GRN))   18:03	16:07	53 15:29 (WEA_G2)   15:55
24   05:14	06:08	19:59 (WEA_43 (RW))   07:04	08:00	08:00	14:05 (WEA_G3)   08:36
21:31	20:29	1 20:00 (WEA_43 (RW))   19:13	18:01	16:05	55 15:30 (WEA_G2)   15:56
25   05:16	06:10	07:06	07:02	08:02	14:04 (WEA_G3)   08:36
21:29	20:27	19:10	16:58	16:04	56 15:28 (WEA_G2)   15:56
26   05:17	06:12	07:08	07:04	08:04	14:03 (WEA_G3)   08:37
21:28	20:24	19:08	16:56	16:03	56 15:27 (WEA_G2)   15:57
27   05:19	06:14	07:10	07:06	08:05	14:03 (WEA_G3)   08:37
21:26	20:22	19:05	16:54	16:02	56 15:26 (WEA_G2)   15:58
28   05:21	06:15	07:11	07:08	08:07	14:03 (WEA_G3)   08:37
21:24	20:19	19:03	16:52	14 16:06 (WEA_G1)   16:01	55 15:25 (WEA_G2)   15:59
29   05:22	06:17	07:13	07:10	08:09	14:03 (WEA_G3)   08:37
21:23	20:17	19:00	16:50	17 16:08 (WEA_G1)   16:00	54 15:24 (WEA_G2)   16:00
30   05:24	06:19	07:15	07:12	08:10	14:03 (WEA_G3)   08:37
21:21	20:15	18:58	16:48	19 16:09 (WEA_G1)   15:59	54 15:23 (WEA_G2)   16:01
31   05:26	06:21	07:16	07:14	08:11	08:37
21:19	20:12	18:56	16:46	21 16:10 (WEA_G1)   16:02	54 15:22 (WEA_G2)   16:02
Sonnenscheinstunden	515	461	383	328	257
max.mögl.Beschattung	24	3	119	101	941

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

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 15 - IO 15 Poggenpohler Weg 30 (Gosdorf)

### 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	08:37	13:43 (WEA_G3)	08:06	16:10 (WEA_G1)	07:08	17:13 (WEA_08 (GRN))	06:52	19:01 (WEA_07 (GRN))	05:41	04:51				
	16:03	65	15:25 (WEA_G2)	16:55	12	16:22 (WEA_G1)	17:52	10	17:23 (WEA_08 (GRN))	19:51	14	19:15 (WEA_07 (GRN))	20:47	21:38
2	08:37	13:44 (WEA_G3)	08:04	16:09 (WEA_G1)	07:05	17:16 (WEA_08 (GRN))	06:49	19:03 (WEA_07 (GRN))	05:39	04:50				
	16:04	65	15:26 (WEA_G2)	16:57	16	16:25 (WEA_G1)	17:54	6	17:22 (WEA_08 (GRN))	19:53	12	19:26 (WEA_03 (GRN))	20:49	21:40
3	08:37	13:44 (WEA_G3)	08:03	16:09 (WEA_G1)	07:03		06:47		06:47	8	19:05 (WEA_07 (GRN))	05:37	04:49	
	16:05	67	15:27 (WEA_G2)	16:59	18	16:27 (WEA_G1)	17:56		19:55			20:51	21:41	
4	08:36	13:45 (WEA_G3)	08:01	16:09 (WEA_G1)	07:01		06:44		06:44	8	19:23 (WEA_03 (GRN))	05:35	04:48	
	16:07	67	15:29 (WEA_G2)	17:01	20	16:29 (WEA_G1)	17:58		19:57	7	19:30 (WEA_03 (GRN))	20:53	21:42	
5	08:36	13:45 (WEA_G3)	07:59	16:09 (WEA_G1)	06:58		06:42		06:42	7	19:24 (WEA_03 (GRN))	05:33	04:47	
	16:08	68	15:30 (WEA_G2)	17:03	22	16:31 (WEA_G1)	18:00		19:59	8	19:32 (WEA_03 (GRN))	20:55	21:43	
6	08:36	13:46 (WEA_G3)	07:57	16:09 (WEA_G1)	06:56		06:39		06:39	10	19:23 (WEA_03 (GRN))	05:31	04:47	
	16:09	68	15:31 (WEA_G2)	17:05	25	16:34 (WEA_G1)	18:02		20:01	8	19:33 (WEA_03 (GRN))	20:57	21:44	
7	08:35	13:47 (WEA_G3)	07:55	16:10 (WEA_G1)	06:53		06:37		06:37	11	19:24 (WEA_03 (GRN))	05:29	04:46	
	16:10	68	15:33 (WEA_G2)	17:07	25	16:35 (WEA_G1)	18:03		20:02	11	19:35 (WEA_03 (GRN))	20:59	21:45	
8	08:35	13:48 (WEA_G3)	07:53	16:10 (WEA_G1)	06:51		06:34		06:34	7	19:25 (WEA_03 (GRN))	05:27	04:45	
	16:12	69	15:35 (WEA_G2)	17:09	25	16:35 (WEA_G1)	18:05		20:04	7	19:32 (WEA_03 (GRN))	21:00	21:46	
9	08:34	13:48 (WEA_G3)	07:51	16:11 (WEA_G1)	06:49		06:32		06:32	3	19:36 (WEA_02 (GRN))	05:25	04:45	
	16:13	70	15:36 (WEA_G2)	17:11	24	16:35 (WEA_G1)	18:07		20:06	3	19:39 (WEA_02 (GRN))	21:02	21:47	
10	08:33	13:49 (WEA_G3)	07:49	16:11 (WEA_G1)	06:46		06:30		06:30	5	19:36 (WEA_02 (GRN))	05:23	04:44	
	16:15	70	15:37 (WEA_G2)	17:13	24	16:35 (WEA_G1)	18:09		20:08	5	19:41 (WEA_02 (GRN))	21:04	21:48	
11	08:33	13:50 (WEA_G3)	07:47	16:12 (WEA_G1)	06:44		06:27		06:27	5	19:47 (WEA_02 (GRN))	05:22	04:44	
	16:16	68	15:37 (WEA_G2)	17:15	22	16:34 (WEA_G1)	18:11	3	17:45 (WEA_06 (GRN))	20:10	5	19:42 (WEA_02 (GRN))	21:06	21:49
12	08:32	13:51 (WEA_G3)	07:45	16:14 (WEA_G1)	06:41		06:25		06:25			05:20	04:43	
	16:18	66	15:37 (WEA_G2)	17:17	19	16:33 (WEA_G1)	18:13	5	17:46 (WEA_06 (GRN))	20:12		21:07	21:50	
13	08:31	13:53 (WEA_G3)	07:43	16:15 (WEA_G1)	06:39		06:22		06:22			05:18	04:43	
	16:20	65	15:38 (WEA_G2)	17:19	17	16:32 (WEA_G1)	18:15	6	17:48 (WEA_06 (GRN))	20:14		21:09	21:50	
14	08:30	13:54 (WEA_G3)	07:41	16:17 (WEA_G1)	06:36		06:20		06:20			05:16	04:43	
	16:21	62	15:38 (WEA_G2)	17:22	12	16:29 (WEA_G1)	18:17	8	17:50 (WEA_06 (GRN))	20:16		21:11	21:51	
15	08:29	13:56 (WEA_G3)	07:39	16:21 (WEA_G1)	06:34		06:18		06:18			05:14	04:42	
	16:23	61	15:39 (WEA_G2)	17:24	5	16:26 (WEA_G1)	18:19	4	17:49 (WEA_06 (GRN))	20:17		21:13	21:52	
16	08:28	13:57 (WEA_G3)	07:37		06:31		06:15		06:15			05:13	04:42	
	16:25	58	15:39 (WEA_G2)	17:26		18:21	20:19		20:19			21:14	21:52	
17	08:27	14:00 (WEA_G3)	07:35		06:29		06:13		06:13			05:11	04:42	
	16:26	54	15:40 (WEA_G2)	17:28		18:23	20:21		20:21			21:16	21:53	
18	08:26	14:01 (WEA_G3)	07:33		06:26		06:10		06:10			05:09	04:42	
	16:28	51	15:39 (WEA_G2)	17:30		18:25	20:23		20:23			21:18	21:53	
19	08:25	14:05 (WEA_G3)	07:30		06:24		06:08		06:08			05:08	04:42	
	16:30	45	15:40 (WEA_G2)	17:32		18:27	20:25		20:25			21:19	21:53	
20	08:24	15:07 (WEA_G3)	07:28		06:21		06:06		06:06			05:06	04:42	
	16:32	32	15:39 (WEA_G2)	17:34		18:28	20:27		20:27			21:21	21:54	
21	08:23	15:08 (WEA_G3)	07:26		06:19		06:04		06:04			05:05	04:42	
	16:34	32	15:40 (WEA_G2)	17:36		18:30	20:29		20:29			21:23	21:54	
22	08:21	15:09 (WEA_G3)	07:24		06:16		06:01		06:01			05:03	04:43	
	16:35	30	15:39 (WEA_G2)	17:38		18:32	20:31		20:31			21:24	21:54	
23	08:20	15:10 (WEA_G3)	07:22		06:14		05:59		05:59			05:02	04:43	
	16:37	29	15:39 (WEA_G2)	17:40		18:34	20:33		20:33			21:26	21:54	
24	08:19	15:11 (WEA_G3)	07:19		06:11		05:57		05:57			05:00	04:43	
	16:39	28	15:39 (WEA_G2)	17:42		18:36	3	18:06 (WEA_07 (GRN))	05:57		20:03 (WEA_43 (RW))	05:00	04:43	
25	08:17	15:12 (WEA_G3)	07:17		06:09		05:54		05:54			05:00	04:43	
	16:41	27	15:39 (WEA_G2)	17:44	3	17:16 (WEA_08 (GRN))	18:38	7	18:11 (WEA_05 (GRN))	20:36	3	20:04 (WEA_43 (RW))	04:59	04:43
26	08:16	15:13 (WEA_G3)	07:15		06:07		05:52		05:52			05:00	04:44	
	16:43	25	15:38 (WEA_G2)	17:46	5	17:18 (WEA_08 (GRN))	18:40	10	18:13 (WEA_05 (GRN))	20:38	3	20:06 (WEA_43 (RW))	04:58	04:44
27	08:14	15:14 (WEA_G3)	07:12		06:04		05:50		05:50			05:00	04:44	
	16:45	23	15:37 (WEA_G2)	17:48	8	17:20 (WEA_08 (GRN))	18:42	13	18:15 (WEA_07 (GRN))	20:40		21:32	21:54	
28	08:13	15:17 (WEA_G3)	07:10		06:02		05:48		05:48			05:00	04:45	
	16:47	20	16:14 (WEA_G1)	17:50	9	17:22 (WEA_08 (GRN))	18:44	15	18:16 (WEA_07 (GRN))	20:42		21:33	21:54	
29	08:11	15:18 (WEA_G3)			06:59		05:46		05:46			05:00	04:45	
	16:49	20	16:16 (WEA_G1)		19:45		20:44		20:44			21:35	21:54	
30	08:09	15:21 (WEA_G3)			06:57		05:44		05:44			05:00	04:46	
	16:51	18	16:18 (WEA_G1)		19:47		20:46		20:46			21:36	21:54	
31	08:08	16:10 (WEA_G3)			06:54							04:52		
	16:53	10	16:20 (WEA_G1)		19:49							21:37		
	Sonnenscheinstunden	248		272		367		421		496		513		
	astr.max.mögl.Beschattung	1501		311		141		98						

**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:** Gesamtbelastung: Vorbelastung und Projekt Großholz (3 x V150-6.0) **Schattenrezeptor:** IO 15 - IO 15 Poggenpohler Weg 30 (Gosdorf)

### 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	04:47	05:27		06:23	19:35 (WEA 02 (GRN))	07:17		18:21 (WEA 06 (GRN))	07:16	15:41 (WEA_G1)	08:12	13:32 (WEA_G3)
	21:53	21:17		20:10	6 19:41 (WEA 02 (GRN))	18:55		18:27 (WEA 06 (GRN))	16:44	23 16:04 (WEA_G1)	15:58	69 15:19 (WEA_G2)
2	04:47	05:29		06:24	19:34 (WEA 02 (GRN))	07:19		18:20 (WEA 06 (GRN))	07:18	15:40 (WEA_G1)	08:14	13:32 (WEA_G3)
	21:53	21:16		20:07	5 19:39 (WEA 02 (GRN))	18:53		18:23 (WEA 06 (GRN))	16:42	25 16:05 (WEA_G1)	15:58	70 15:20 (WEA_G2)
3	04:48	05:31		06:26	19:34 (WEA 02 (GRN))	07:21		18:20 (WEA 06 (GRN))	07:20	15:40 (WEA_G1)	08:15	13:33 (WEA_G3)
	21:53	21:14		20:05	3 19:37 (WEA 02 (GRN))	18:50		18:21 (WEA 06 (GRN))	16:40	25 16:05 (WEA_G1)	15:57	69 15:20 (WEA_G2)
4	04:49	05:32		06:28	19:23 (WEA 03 (GRN))	07:22			07:22	15:39 (WEA_G1)	08:17	13:32 (WEA_G3)
	21:52	21:12		20:03	8 19:35 (WEA 02 (GRN))	18:48			16:38	26 16:05 (WEA_G1)	15:56	69 15:19 (WEA_G2)
5	04:50	05:34		06:30	19:20 (WEA 03 (GRN))	07:24			16:36	24 15:40 (WEA_G1)	08:18	13:32 (WEA_G3)
	21:52	21:10		20:00	11 19:31 (WEA 03 (GRN))	18:45			16:36	24 15:40 (WEA_G1)	08:18	13:32 (WEA_G3)
6	04:51	05:36		06:32	19:19 (WEA 03 (GRN))	07:26			16:34	22 16:02 (WEA_G1)	15:55	68 15:17 (WEA_G2)
	21:51	21:08		19:58	10 19:29 (WEA 03 (GRN))	18:43			16:34	22 16:02 (WEA_G1)	15:55	68 15:17 (WEA_G2)
7	04:52	05:38		06:33	19:19 (WEA 03 (GRN))	07:28			16:32	20 16:00 (WEA_G1)	15:55	68 15:17 (WEA_G2)
	21:50	21:06		19:55	8 19:27 (WEA 03 (GRN))	18:40			16:32	20 16:00 (WEA_G1)	15:55	68 15:17 (WEA_G2)
8	04:53	05:39		06:35	19:18 (WEA 03 (GRN))	07:30			16:30	17 15:57 (WEA_G1)	15:54	67 15:16 (WEA_G2)
	21:50	21:04		19:53	6 19:24 (WEA 03 (GRN))	18:38			16:30	17 15:57 (WEA_G1)	15:54	67 15:16 (WEA_G2)
9	04:54	05:41		06:37	19:00 (WEA 07 (GRN))	07:32			16:28	15 15:55 (WEA_G1)	15:54	67 15:16 (WEA_G2)
	21:49	21:02		19:50	8 19:22 (WEA 03 (GRN))	18:36			16:28	15 15:55 (WEA_G1)	15:54	67 15:16 (WEA_G2)
10	04:55	05:43		06:39	18:57 (WEA 07 (GRN))	07:34			16:26	12 15:53 (WEA_G1)	15:53	66 15:15 (WEA_G2)
	21:48	21:00		19:48	11 19:19 (WEA 03 (GRN))	18:33			16:26	12 15:53 (WEA_G1)	15:53	66 15:15 (WEA_G2)
11	04:56	05:45		06:41	18:55 (WEA 07 (GRN))	07:35			16:25	10 15:52 (WEA_G1)	15:53	65 15:15 (WEA_G2)
	21:47	20:58		19:45	14 19:09 (WEA 07 (GRN))	18:31			16:25	10 15:52 (WEA_G1)	15:53	65 15:15 (WEA_G2)
12	04:57	05:47		06:42	18:53 (WEA 07 (GRN))	07:37		17:49 (WEA 06 (GRN))	07:38	14:53 (WEA_G2)	08:27	13:33 (WEA_G3)
	21:46	20:56		19:43	15 19:08 (WEA 07 (GRN))	18:28		17:57 (WEA 06 (GRN))	16:23	18 15:50 (WEA_G1)	15:53	65 15:15 (WEA_G2)
13	04:59	05:48		06:44	18:52 (WEA 07 (GRN))	07:39		17:47 (WEA 06 (GRN))	07:40	14:50 (WEA_G2)	08:28	13:33 (WEA_G3)
	21:45	20:54		19:40	17 19:09 (WEA 07 (GRN))	18:26		17:57 (WEA 06 (GRN))	16:21	20 15:48 (WEA_G1)	15:53	64 15:14 (WEA_G2)
14	05:00	05:50		06:46	18:52 (WEA 07 (GRN))	07:41		17:46 (WEA 06 (GRN))	07:42	14:48 (WEA_G2)	08:29	13:34 (WEA_G3)
	21:44	20:51		19:38	17 19:09 (WEA 07 (GRN))	18:24		17:54 (WEA 06 (GRN))	16:20	21 15:46 (WEA_G1)	15:53	64 15:14 (WEA_G2)
15	05:01	05:52		06:48	18:51 (WEA 07 (GRN))	07:43		17:45 (WEA 06 (GRN))	07:44	14:47 (WEA_G2)	08:30	13:34 (WEA_G3)
	21:43	20:49		19:35	16 19:07 (WEA 07 (GRN))	18:21		17:52 (WEA 06 (GRN))	16:18	23 15:10 (WEA_G2)	15:53	64 15:14 (WEA_G2)
16	05:03	05:54		06:50	18:50 (WEA 07 (GRN))	07:45		17:45 (WEA 06 (GRN))	07:45	14:46 (WEA_G2)	08:31	13:34 (WEA_G3)
	21:42	20:47		19:33	14 19:04 (WEA 07 (GRN))	18:19		17:45 (WEA 06 (GRN))	16:16	25 15:11 (WEA_G2)	15:53	63 15:14 (WEA_G2)
17	05:04	05:56	20:12 (WEA 43 (RW))	06:51	18:51 (WEA 07 (GRN))	07:47		17:45 (WEA 06 (GRN))	07:47	14:45 (WEA_G2)	08:32	13:35 (WEA_G3)
	21:41	20:45	3 20:15 (WEA 43 (RW))	19:30	11 19:02 (WEA 05 (GRN))	18:17		17:47 (WEA 06 (GRN))	16:15	27 15:12 (WEA_G2)	15:53	62 15:14 (WEA_G2)
18	05:05	05:57	20:09 (WEA 43 (RW))	06:53	18:52 (WEA 07 (GRN))	07:49			16:15	27 15:12 (WEA_G2)	15:53	62 15:14 (WEA_G2)
	21:39	20:43	3 20:12 (WEA 43 (RW))	19:28	7 18:59 (WEA 05 (GRN))	18:14			16:13	28 15:13 (WEA_G2)	15:53	64 15:15 (WEA_G2)
19	05:07	05:59	20:09 (WEA 43 (RW))	06:55	18:53 (WEA 07 (GRN))	07:51			16:12	29 15:13 (WEA_G2)	15:53	62 15:15 (WEA_G2)
	21:38	20:40	2 20:11 (WEA 43 (RW))	19:25	4 18:57 (WEA 07 (GRN))	18:12			16:12	29 15:13 (WEA_G2)	15:53	62 15:15 (WEA_G2)
20	05:08	06:01	20:08 (WEA 43 (RW))	06:57		07:53			16:11	30 15:14 (WEA_G2)	15:54	62 15:15 (WEA_G2)
	21:37	20:38	1 20:09 (WEA 43 (RW))	19:23		18:10			16:11	30 15:14 (WEA_G2)	15:54	62 15:15 (WEA_G2)
21	05:10	06:03		06:59		07:55			16:11	30 15:14 (WEA_G2)	15:54	62 15:15 (WEA_G2)
	21:35	20:36		19:20		18:07			16:09	31 15:15 (WEA_G2)	15:54	62 15:16 (WEA_G2)
22	05:11	06:05		07:00		07:56			16:09	31 15:15 (WEA_G2)	15:54	62 15:16 (WEA_G2)
	21:34	20:34		19:18		18:05			16:08	32 15:16 (WEA_G2)	15:55	62 15:16 (WEA_G2)
23	05:13	06:06		07:02		07:58			16:07	33 15:17 (WEA_G2)	15:55	62 15:17 (WEA_G2)
	21:32	20:31		19:15		18:03			16:07	33 15:17 (WEA_G2)	15:55	62 15:17 (WEA_G2)
24	05:14	06:08		07:04		08:00			16:05	34 15:18 (WEA_G2)	15:56	62 15:18 (WEA_G2)
	21:31	20:29		19:13		18:01			16:05	34 15:18 (WEA_G2)	15:56	62 15:18 (WEA_G2)
25	05:16	06:10		07:06		08:02			16:04	35 15:19 (WEA_G2)	15:57	62 15:19 (WEA_G2)
	21:29	20:27		19:10		18:58			16:03	35 15:19 (WEA_G2)	15:57	62 15:19 (WEA_G2)
26	05:17	06:12		07:08		07:59			16:03	35 15:19 (WEA_G2)	15:57	62 15:19 (WEA_G2)
	21:28	20:24		19:08		18:56			16:03	35 15:19 (WEA_G2)	15:57	62 15:19 (WEA_G2)
27	05:19	06:14		07:10		08:06		15:49 (WEA_G1)	16:02	36 15:20 (WEA_G2)	15:58	63 15:20 (WEA_G2)
	21:26	20:22		19:05		18:54		15:57 (WEA_G1)	16:02	36 15:20 (WEA_G2)	15:58	63 15:20 (WEA_G2)
28	05:21	06:15		07:11		08:08		15:46 (WEA_G1)	16:02	36 15:20 (WEA_G2)	15:58	63 15:20 (WEA_G2)
	21:24	20:19		19:03		18:52		15:59 (WEA_G1)	16:01	36 15:20 (WEA_G2)	15:59	64 15:21 (WEA_G2)
29	05:22	06:17		07:13	18:24 (WEA 06 (GRN))	07:10		15:44 (WEA_G1)	16:00	37 15:21 (WEA_G2)	15:59	64 15:21 (WEA_G2)
	21:22	20:17		19:00	7 18:31 (WEA 06 (GRN))	18:50		16:02 (WEA_G1)	16:00	37 15:21 (WEA_G2)	15:59	64 15:21 (WEA_G2)
30	05:24	06:19		07:15	18:22 (WEA 06 (GRN))	07:12		16:03 (WEA_G1)	16:00	37 15:21 (WEA_G2)	15:59	64 15:21 (WEA_G2)
	21:21	20:15		18:58	7 18:29 (WEA 06 (GRN))	18:48		16:03 (WEA_G1)	15:59	37 15:21 (WEA_G2)	16:01	64 15:22 (WEA_G2)
31	05:26	06:21	19:40 (WEA 02 (GRN))			07:14		15:42 (WEA_G1)			08:37	13:41 (WEA_G3)
	21:19	20:12	1 19:41 (WEA 02 (GRN))			16:46		16:04 (WEA_G1)			16:02	66 15:23 (WEA_G2)
Sonnenscheinstunden		515	461		383		328		257		231	
astr.max.mögl.Beschattung				10	205		130		964		2014	

### 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:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
 Sommerdeich 14 b  
 DE-25709 Kaiser-Wilhelm-Koog  
 (0 48 56)901-0

Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 16 - IO 16 Achterhof (Gosdorf)

### 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   08:37   14:21 (WEA_G2)   08:06		07:08	17:14 (WEA_06 (GRN))   06:52	19:16 (WEA_02 (GRN))   05:41	04:51
16:03   22   14:43 (WEA_G2)   16:55		17:52	10   17:24 (WEA_06 (GRN))   19:51	8   19:24 (WEA_02 (GRN))   20:47	21:38
2   08:37   14:22 (WEA_G2)   08:04		07:05	17:16 (WEA_06 (GRN))   06:49	19:18 (WEA_02 (GRN))   05:39	04:50
16:04   21   14:43 (WEA_G2)   16:57		17:54	7   17:23 (WEA_06 (GRN))   19:53	6   19:24 (WEA_02 (GRN))   20:49	21:40
3   08:37   14:23 (WEA_G2)   08:03		07:03			04:49
16:05   19   14:42 (WEA_G2)   16:59		17:56			21:41
4   08:36   14:24 (WEA_G2)   08:01		07:01	17:29 (WEA_07 (GRN))   06:44	19:28 (WEA_01 (GRN))   05:35	04:48
16:07   19   14:43 (WEA_G2)   17:01		17:58	1   17:30 (WEA_07 (GRN))   19:57	2   19:30 (WEA_01 (GRN))   20:53	21:42
5   08:36   14:25 (WEA_G2)   07:59		06:58	17:26 (WEA_07 (GRN))   06:42	19:30 (WEA_01 (GRN))   05:33	04:47
16:08   18   15:30 (WEA_G1)   17:03		18:00	7   17:33 (WEA_07 (GRN))   19:59	2   19:32 (WEA_01 (GRN))   20:55	21:43
6   08:36   14:26 (WEA_G2)   07:57		06:56	17:24 (WEA_07 (GRN))   06:39	19:32 (WEA_01 (GRN))   05:31	04:47
16:09   18   15:31 (WEA_G1)   17:05		18:02	10   17:34 (WEA_07 (GRN))   20:01	1   19:33 (WEA_01 (GRN))   20:57	21:44
7   08:35   14:29 (WEA_G2)   07:55		06:53	17:23 (WEA_07 (GRN))   06:37		04:45
16:10   16   15:33 (WEA_G1)   17:07		18:03	14   17:37 (WEA_07 (GRN))   20:02		21:45
8   08:35   14:30 (WEA_G2)   07:53	2   16:36 (WEA_08 (GRN))   06:51	17:21 (WEA_07 (GRN))   06:34	17:21 (WEA_07 (GRN))   06:34	1   20:26 (WEA_41 (RW))   04:46	21:46
16:12   16   15:35 (WEA_G1)   17:09	2   16:38 (WEA_08 (GRN))   06:55	18:05	17   17:38 (WEA_07 (GRN))   20:04	2   20:27 (WEA_41 (RW))   04:45	21:46
9   08:34   14:34 (WEA_G2)   07:51		06:49	20   17:41 (WEA_07 (GRN))   20:06		04:45
16:13   11   15:36 (WEA_G1)   17:11	4   16:40 (WEA_08 (GRN))   07:07	18:07	17   17:40 (WEA_07 (GRN))   20:08		21:47
10   08:33   15:28 (WEA_G1)   07:49		06:46	17:20 (WEA_07 (GRN))   06:30		04:44
16:15   10   15:38 (WEA_G1)   17:13	7   16:43 (WEA_08 (GRN))   07:09	18:09	20   17:40 (WEA_07 (GRN))   20:10		21:48
11   08:33   15:29 (WEA_G1)   07:47		06:44	17:20 (WEA_07 (GRN))   06:27		04:44
16:16   11   15:39 (WEA_G1)   17:15	9   16:45 (WEA_08 (GRN))   07:11	18:11	20   17:40 (WEA_07 (GRN))   20:10		21:49
12   08:32   15:28 (WEA_G1)   07:45		06:41	17:20 (WEA_07 (GRN))   06:25		04:43
16:18   13   15:41 (WEA_G1)   17:17	11   16:48 (WEA_08 (GRN))   07:13	18:13	19   17:39 (WEA_07 (GRN))   20:12		21:50
13   08:31   15:28 (WEA_G1)   07:43		06:39	17:21 (WEA_07 (GRN))   06:22		04:43
16:20   15   15:43 (WEA_G1)   17:19	12   16:50 (WEA_08 (GRN))   07:15	18:15	18   17:39 (WEA_07 (GRN))   20:14		21:50
14   08:30   15:29 (WEA_G1)   07:41		06:36	17:21 (WEA_07 (GRN))   06:20	19:46 (WEA_43 (RW))   05:16	04:43
16:21   16   15:45 (WEA_G1)   17:22	9   16:48 (WEA_08 (GRN))   07:17	18:17	17   17:50 (WEA_05 (GRN))   20:16	1   19:47 (WEA_43 (RW))   21:11	21:51
15   08:29   15:29 (WEA_G1)   07:39		06:34	17:23 (WEA_07 (GRN))   06:18	19:46 (WEA_43 (RW))   05:14	04:42
16:23   18   15:47 (WEA_G1)   17:24	4   16:45 (WEA_08 (GRN))   07:19	18:19	15   17:52 (WEA_05 (GRN))   20:18	3   19:49 (WEA_43 (RW))   21:13	21:52
16   08:28   15:29 (WEA_G1)   07:37		06:31	17:24 (WEA_07 (GRN))   06:15	19:47 (WEA_43 (RW))   05:13	04:42
16:25   20   15:49 (WEA_G1)   17:26		06:28	18:21   17:54 (WEA_05 (GRN))   20:19	5   19:52 (WEA_43 (RW))   21:14	21:52
17   08:27   15:30 (WEA_G1)   07:35		06:25	13   17:53 (WEA_05 (GRN))   20:21	7   19:53 (WEA_43 (RW))   21:16	21:53
16:26   21   15:51 (WEA_G1)   17:28		06:23	2   17:55 (WEA_05 (GRN))   20:21	7   19:53 (WEA_43 (RW))   21:16	21:53
18   08:26   15:29 (WEA_G1)   07:33		06:20		19:48 (WEA_43 (RW))   05:09	04:42
16:28   24   15:53 (WEA_G1)   17:30		06:18		6   19:54 (WEA_43 (RW))   21:18	21:53
19   08:25   15:30 (WEA_G1)   07:30		06:14			04:42
16:30   25   15:55 (WEA_G1)   17:32		06:11			21:54
20   08:24   15:30 (WEA_G1)   07:28		06:11	17:58 (WEA_03 (GRN))   06:06		04:42
16:32   26   15:56 (WEA_G1)   17:34		06:08	3   18:01 (WEA_03 (GRN))   20:27		21:54
21   08:23   15:31 (WEA_G1)   07:25		06:19	6   18:04 (WEA_03 (GRN))   20:29		04:42
16:34   26   15:57 (WEA_G1)   17:36		06:16	9   18:05 (WEA_03 (GRN))   20:31		21:54
22   08:21   15:32 (WEA_G1)   07:24		06:16	17:56 (WEA_03 (GRN))   06:01		04:43
16:35   26   15:58 (WEA_G1)   17:38		06:14	9   18:05 (WEA_03 (GRN))   20:31		21:54
23   08:20   15:32 (WEA_G1)   07:22		06:14	17:56 (WEA_03 (GRN))   05:59		04:43
16:37   25   15:57 (WEA_G1)   17:40		06:11	12   18:08 (WEA_03 (GRN))   20:33		21:54
24   08:19   15:32 (WEA_G1)   07:19		06:11	17:56 (WEA_03 (GRN))   05:57		04:43
16:39   25   15:57 (WEA_G1)   17:42		06:09	13   18:09 (WEA_03 (GRN))   20:34		21:55
25   08:17   15:33 (WEA_G1)   07:17	2   17:14 (WEA_06 (GRN))   06:09	18:36	13   18:10 (WEA_03 (GRN))   20:36		04:43
16:41   24   15:57 (WEA_G1)   17:44	2   17:16 (WEA_06 (GRN))   06:07	18:38	13   18:10 (WEA_03 (GRN))   20:36		21:55
26   08:16   15:34 (WEA_G1)   07:15		06:07	17:57 (WEA_03 (GRN))   05:52		04:44
16:43   23   15:57 (WEA_G1)   17:46	4   17:18 (WEA_06 (GRN))   06:04	18:40	11   18:08 (WEA_03 (GRN))   20:38		21:55
27   08:14   15:35 (WEA_G1)   07:12		06:04	17:59 (WEA_03 (GRN))   05:50		04:44
16:45   21   15:56 (WEA_G1)   17:48	7   17:20 (WEA_06 (GRN))   06:02	18:42	7   18:06 (WEA_03 (GRN))   20:40		21:54
28   08:13   15:37 (WEA_G1)   07:10		06:02			04:45
16:47   19   15:56 (WEA_G1)   17:50	8   17:22 (WEA_06 (GRN))   06:00	18:44			21:54
29   08:11   15:38 (WEA_G1)   07:07		06:00	19:16 (WEA_02 (GRN))   05:46		04:45
16:49   17   15:55 (WEA_G1)   17:51		06:00	3   19:19 (WEA_02 (GRN))   20:44		21:54
30   08:09   15:40 (WEA_G1)   07:02		06:00	19:15 (WEA_02 (GRN))   05:44		04:46
16:51   13   15:53 (WEA_G1)   17:53		06:00	5   19:20 (WEA_02 (GRN))   20:46		21:54
31   08:08   15:42 (WEA_G1)   07:00		06:00	19:16 (WEA_02 (GRN))   05:44		04:46
16:53   8   15:50 (WEA_G1)   17:55		06:00	6   19:22 (WEA_02 (GRN))   20:48		21:54
Sommereinheiten   248		272			3
astr. max. mögl. Beschattung   586		79		421	
					513

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

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





Projekt:

SWP Windpark Großenholz

Lizenzierter Anwender:

GL Garrad Hassan Deutschland GmbH  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

Berechnung: Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) Schattenrezeptor: IO 16 - IO 16 Achterhof (Gosdorf)

### 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

Jul	August	September	Oktober	November	Dezember
1 04:47	21:09 (WEA 42 (RW)) 05:27	06:23	07:17	18:00 (WEA 07 (GRN)) 07:16	16:06 (WEA 08 (GRN)) 08:12
2 12:54	8 21:17 (WEA 42 (RW)) 12:17	20:10	18:55	19 18:19 (WEA 07 (GRN)) 16:44	6 16:12 (WEA 08 (GRN)) 15:58
3 21:53	21:09 (WEA 42 (RW)) 05:29	06:24	07:19	17:58 (WEA 07 (GRN)) 07:18	16:06 (WEA 08 (GRN)) 08:14
4 04:49	21:17 (WEA 42 (RW)) 12:16	20:07	18:53	20 18:18 (WEA 07 (GRN)) 16:42	4 16:10 (WEA 08 (GRN)) 15:58
5 10:45	21:10 (WEA 42 (RW)) 05:31	05:26	07:21	17:58 (WEA 07 (GRN)) 07:20	16:06 (WEA 08 (GRN)) 08:15
6 21:53	7 21:17 (WEA 42 (RW)) 12:14	20:05	18:50	20 18:19 (WEA 07 (GRN)) 16:40	1 16:07 (WEA 08 (GRN)) 15:57
7 04:51	21:10 (WEA 42 (RW)) 05:32	06:28	07:22	17:58 (WEA 07 (GRN)) 07:22	08:17
8 21:52	6 21:16 (WEA 42 (RW)) 12:12	20:03	18:48	20 18:18 (WEA 07 (GRN)) 16:38	15:56
9 10:45	21:10 (WEA 42 (RW)) 05:34	06:30	07:24	17:58 (WEA 07 (GRN)) 07:24	15:19 (WEA_G1)
10 21:52	6 21:16 (WEA 42 (RW)) 12:10	20:00	18:45	18 18:19 (WEA 07 (GRN)) 16:36	15:56
11 04:51	21:10 (WEA 42 (RW)) 05:36	06:32	07:26	17:58 (WEA 07 (GRN)) 07:26	15:18 (WEA_G1)
12 21:51	5 21:15 (WEA 42 (RW)) 12:08	19:58	18:43	16 18:14 (WEA 07 (GRN)) 16:34	15:55
13 10:45	21:10 (WEA 42 (RW)) 05:41	06:37	07:32	18:02 (WEA 07 (GRN)) 07:32	15:22
14 21:50	4 21:14 (WEA 42 (RW)) 12:06	19:55	2 19:27 (WEA 01 (GRN)) 18:40	12 18:11 (WEA 07 (GRN)) 16:32	15:55
15 04:53	21:10 (WEA 42 (RW)) 05:39	06:35	07:30	18:00 (WEA 07 (GRN)) 07:30	15:22
16 21:50	4 21:14 (WEA 42 (RW)) 12:04	19:53	1 19:24 (WEA 01 (GRN)) 18:38	9 18:09 (WEA 07 (GRN)) 16:30	15:54
17 10:45	21:10 (WEA 42 (RW)) 05:41	06:37	07:32	18:02 (WEA 07 (GRN)) 07:32	15:22
18 21:49	3 21:13 (WEA 42 (RW)) 12:02	19:50	18:36	4 18:06 (WEA 07 (GRN)) 16:28	15:54
19 04:55	21:11 (WEA 42 (RW)) 05:43	06:39	19:11 (WEA 02 (GRN)) 07:34	07:34	15:22
20 21:48	1 21:12 (WEA 42 (RW)) 12:00	19:48	6 19:17 (WEA 02 (GRN)) 18:33	18:26	15:53
21 10:45	05:45	06:41	19:09 (WEA 02 (GRN)) 07:35	17:52 (WEA 06 (GRN)) 07:36	15:14 (WEA_G1)
22 21:47	20:56	19:45	8 19:17 (WEA 02 (GRN)) 18:31	4 17:56 (WEA 06 (GRN)) 16:25	9 15:23 (WEA_G1)
23 04:57	05:47	06:42	19:07 (WEA 02 (GRN)) 07:37	17:49 (WEA 06 (GRN)) 07:38	15:11 (WEA_G1)
24 21:46	20:56	19:43	7 19:14 (WEA 02 (GRN)) 18:28	9 17:58 (WEA 06 (GRN)) 16:23	14 15:25 (WEA_G1)
25 10:45	05:48	06:44	19:07 (WEA 02 (GRN)) 07:39	17:40 (WEA 06 (GRN)) 07:40	15:10 (WEA_G1)
26 21:45	20:54	19:40	5 19:12 (WEA 02 (GRN)) 18:26	9 17:57 (WEA 06 (GRN)) 16:21	17 15:27 (WEA_G1)
27 05:00	05:50	06:46	19:06 (WEA 02 (GRN)) 07:41	17:47 (WEA 06 (GRN)) 07:42	15:08 (WEA_G1)
28 21:44	20:51	19:38	4 19:10 (WEA 02 (GRN)) 18:24	7 17:54 (WEA 06 (GRN)) 16:20	20 15:28 (WEA_G1)
29 10:45	05:52	06:48	19:02	17:47 (WEA 06 (GRN)) 07:44	15:08 (WEA_G1)
30 21:43	20:49	19:35	18:21	5 17:52 (WEA 06 (GRN)) 16:18	21 15:29 (WEA_G1)
31 05:03	05:54	06:50	18:48 (WEA 03 (GRN)) 07:45	17:47 (WEA 06 (GRN)) 07:45	15:07 (WEA_G1)
1 21:42	20:47	19:33	6 18:54 (WEA 03 (GRN)) 18:19	2 17:49 (WEA 06 (GRN)) 16:16	23 15:30 (WEA_G1)
2 10:45	05:56	06:51	18:46 (WEA 03 (GRN)) 07:47	17:47	15:06 (WEA_G1)
3 21:41	20:45	19:30	10 18:56 (WEA 03 (GRN)) 18:17	16:15	24 15:30 (WEA_G1)
4 05:05	05:57	06:53	18:44 (WEA 03 (GRN)) 07:49	07:49	15:06 (WEA_G1)
5 21:39	20:43	19:28	13 18:57 (WEA 03 (GRN)) 18:14	16:13	25 15:31 (WEA_G1)
6 10:45	05:59	06:55	18:44 (WEA 03 (GRN)) 07:51	17:51	15:06 (WEA_G1)
7 21:38	20:40	19:25	13 18:57 (WEA 03 (GRN)) 18:12	16:12	25 15:31 (WEA_G1)
8 05:08	06:01	06:57	18:43 (WEA 03 (GRN)) 07:53	07:53	15:06 (WEA_G1)
9 21:37	20:38	19:23	12 18:55 (WEA 03 (GRN)) 18:10	16:11	26 15:32 (WEA_G1)
10 10:45	06:03	06:59	18:42 (WEA 03 (GRN)) 07:55	17:55	15:07 (WEA_G1)
11 21:35	20:36	19:20	9 18:51 (WEA 03 (GRN)) 18:07	16:09	26 15:33 (WEA_G1)
12 05:11	06:05	07:00	18:42 (WEA 03 (GRN)) 07:56	07:57	15:07 (WEA_G1)
13 21:34	20:34	19:18	7 18:49 (WEA 03 (GRN)) 18:05	16:08	26 15:33 (WEA_G1)
14 10:45	06:06	07:02	18:43 (WEA 03 (GRN)) 07:58	17:58	15:07 (WEA_G1)
15 21:32	20:31	19:15	4 18:47 (WEA 03 (GRN)) 18:03	16:07	25 15:32 (WEA_G1)
16 05:14	06:08	07:04	08:00	08:00	15:06 (WEA_G1)
17 21:31	20:29	19:13	18:01	16:05	24 15:30 (WEA_G1)
18 10:45	06:10	07:06	18:02	16:06	25 15:31 (WEA_G1)
19 21:29	20:27	6 19:57 (WEA 43 (RW)) 19:10	16:58	16:04	21 15:28 (WEA_G1)
20 05:17	06:12	19:49 (WEA 43 (RW)) 07:08	07:04	08:04	15:07 (WEA_G1)
21 21:28	20:24	6 19:55 (WEA 43 (RW)) 19:08	16:56	16:03	20 15:27 (WEA_G1)
22 10:45	06:14	19:48 (WEA 43 (RW)) 07:10	07:06	16:10 (WEA 06 (GRN)) 08:05	15:06 (WEA_G1)
23 05:21	06:15	19:47 (WEA 43 (RW)) 07:11	18:04 (WEA 05 (GRN)) 16:54	6 16:16 (WEA 06 (GRN)) 16:02	18 15:26 (WEA_G1)
24 21:24	20:23	3 19:50 (WEA 43 (RW)) 19:03	16:52	9 16:17 (WEA 06 (GRN)) 16:01	16 15:25 (WEA_G1)
25 10:45	06:17	19:47 (WEA 43 (RW)) 07:13	18:02 (WEA 05 (GRN)) 07:10	16:07 (WEA 06 (GRN)) 08:09	15:09 (WEA_G1)
26 21:23	20:17	1 19:48 (WEA 43 (RW)) 19:00	18:32 (WEA 05 (GRN)) 16:50	12 16:19 (WEA 06 (GRN)) 16:00	15 15:24 (WEA_G1)
27 05:24	06:19	07:15	18:01 (WEA 07 (GRN)) 07:12	16:07 (WEA 06 (GRN)) 08:10	15:10 (WEA_G1)
28 21:21	20:15	18:58	18 18:19 (WEA 07 (GRN)) 16:48	10 16:17 (WEA 06 (GRN)) 15:59	13 16:02 (WEA_G1)
29 10:45	06:21	07:14	16:46	16:06 (WEA 06 (GRN))	15:09
30 21:19	20:12	16:46	8 16:14 (WEA 06 (GRN))	257	16:02
Sommereinheiten   515	461	383	328	219	419
astr. max. mögl. Beschattung   52	25	167	219	419	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	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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Projekt:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0

DNV

Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6,0) **Schattenrezeptor:** IO 17 - IO 17 Bäderstraße 24a (Gosdorf)

### 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   08:37   14:33 (WEA_G2)   08:06		15:49 (WEA_G1)   07:08	17:16 (WEA_06 (GRN))   06:52	05:41	04:51
16:03   25   14:58 (WEA_G2)   16:55	10	15:59 (WEA_G1)   07:52	8   17:24 (WEA_06 (GRN))   19:51	20:47	21:38
2   08:37   14:34 (WEA_G2)   08:04		07:05	17:19 (WEA_06 (GRN))   06:49	05:39	04:50
16:04   25   14:59 (WEA_G2)   16:57		17:54	2   17:21 (WEA_06 (GRN))   19:53	20:49	21:40
3   08:37   14:35 (WEA_G2)   08:03		07:03		05:37	04:49
16:05   23   14:58 (WEA_G2)   16:59		17:56		19:26 (WEA_01 (GRN))   19:55	21:41
4   08:36   14:36 (WEA_G2)   08:01		07:01	17:26 (WEA_07 (GRN))   06:44	05:35	04:48
16:07   23   14:59 (WEA_G2)   17:01		17:58	4   17:30 (WEA_07 (GRN))   19:57	20:53	21:42
5   08:36   14:36 (WEA_G2)   07:59		06:58	17:24 (WEA_07 (GRN))   06:42	05:33	04:47
16:08   22   14:58 (WEA_G2)   17:03		18:00	9   17:33 (WEA_07 (GRN))   19:59	20:55	21:43
6   08:36   14:37 (WEA_G2)   07:57		06:56	17:23 (WEA_07 (GRN))   06:39	05:31	04:47
16:09   21   14:58 (WEA_G2)   17:05		18:02	11   17:34 (WEA_07 (GRN))   20:01	20:57	21:44
7   08:35   14:39 (WEA_G2)   07:55		06:53	17:22 (WEA_07 (GRN))   06:37	05:29	04:46
16:10   20   14:59 (WEA_G2)   17:07		18:03	15   17:37 (WEA_07 (GRN))   20:02	20:59	21:45
8   08:35   14:39 (WEA_G2)   07:53		06:51	17:21 (WEA_07 (GRN))   06:34	05:27	04:45
16:12   19   14:58 (WEA_G2)   17:09		18:05	17   17:38 (WEA_07 (GRN))   20:04	21:00	21:46
9   08:34   14:41 (WEA_G2)   07:51		06:49	17:22 (WEA_07 (GRN))   06:27	05:25	04:45
16:13   16   14:57 (WEA_G2)   17:11		18:07	18   17:40 (WEA_07 (GRN))   20:06	21:02	21:47
10   08:33   14:42 (WEA_G2)   07:49		06:46	17:21 (WEA_07 (GRN))   06:20	05:23	04:44
16:15   15   14:57 (WEA_G2)   17:13	2	16:43 (WEA_08 (GRN))   18:09	18   17:39 (WEA_07 (GRN))   20:08	21:04	21:48
11   08:33   14:44 (WEA_G2)   07:47		16:41 (WEA_08 (GRN))   06:44	17:22 (WEA_07 (GRN))   06:27	19:41 (WEA_43 (RW))   05:22	21:49
16:16   13   15:39 (WEA_G1)   17:15	4	16:45 (WEA_08 (GRN))   18:11	16   17:38 (WEA_07 (GRN))   20:10	19:42 (WEA_43 (RW))   21:06	21:49
12   08:32   14:46 (WEA_G2)   07:45		16:41 (WEA_08 (GRN))   06:41	17:23 (WEA_07 (GRN))   06:25	19:42 (WEA_43 (RW))   05:20	21:49
16:18   11   15:41 (WEA_G1)   17:17	7	16:40 (WEA_08 (GRN))   18:13	13   17:36 (WEA_07 (GRN))   20:12	19:44 (WEA_43 (RW))   21:07	21:50
13   08:31   15:30 (WEA_G1)   07:43		16:42 (WEA_08 (GRN))   06:39	17:25 (WEA_07 (GRN))   06:22	19:42 (WEA_43 (RW))   05:18	21:50
16:20   5   15:43 (WEA_G1)   17:19	8	16:50 (WEA_08 (GRN))   18:15	10   17:35 (WEA_07 (GRN))   20:14	19:46 (WEA_43 (RW))   21:09	21:50
14   08:30   15:38 (WEA_G1)   07:41		16:42 (WEA_08 (GRN))   06:36	17:28 (WEA_07 (GRN))   06:20	19:42 (WEA_43 (RW))   05:16	21:50
16:21   7   15:45 (WEA_G1)   17:21	9	16:51 (WEA_08 (GRN))   18:17	4   17:50 (WEA_08 (GRN))   20:16	19:47 (WEA_43 (RW))   21:11	21:51
15   08:29   15:38 (WEA_G1)   07:39		16:44 (WEA_08 (GRN))   06:34	17:50 (WEA_08 (GRN))   06:18	05:14	04:42
16:23   9   15:47 (WEA_G1)   17:24	7	16:51 (WEA_08 (GRN))   18:19	2   17:52 (WEA_08 (GRN))   20:18	21:13	21:52
16   08:28   15:38 (WEA_G1)   07:37		06:31	06:15	05:13	04:42
16:25   11   15:49 (WEA_G1)   17:26		18:21	20:19	21:14	21:52
17   08:27   15:39 (WEA_G1)   07:35		06:29	06:13	05:11	04:42
16:26   12   15:51 (WEA_G1)   17:28		18:23	20:21	21:16	21:53
18   08:26   15:38 (WEA_G1)   07:33		06:26	17:56 (WEA_03 (GRN))   06:10	05:09	04:42
16:28   15   15:53 (WEA_G1)   17:30		18:25	2   17:58 (WEA_03 (GRN))   20:23	21:18	21:53
19   08:25   15:39 (WEA_G1)   07:30		06:24	17:55 (WEA_03 (GRN))   06:08	05:08	04:42
16:30   16   15:55 (WEA_G1)   17:32		18:27	5   18:00 (WEA_03 (GRN))   20:25	21:19	21:54
20   08:24   15:38 (WEA_G1)   07:28		06:21	17:54 (WEA_03 (GRN))   06:06	05:06	04:42
16:32   18   15:56 (WEA_G1)   17:34		18:28	7   18:01 (WEA_03 (GRN))   20:27	21:21	21:54
21   08:23   15:39 (WEA_G1)   07:26		06:19	17:54 (WEA_03 (GRN))   06:04	05:05	04:42
16:34   20   15:59 (WEA_G1)   17:36		18:30	10   18:04 (WEA_03 (GRN))   20:29	21:23	21:54
22   08:21   15:40 (WEA_G1)   07:24		06:16	17:54 (WEA_03 (GRN))   06:01	05:03	20:50 (WEA_42 (RW))   04:43
16:35   21   16:01 (WEA_G1)   17:38		18:32	11   18:05 (WEA_03 (GRN))   20:31	21:24	1   20:51 (WEA_42 (RW))   21:54
23   08:20   15:40 (WEA_G1)   07:22		06:14	17:55 (WEA_03 (GRN))   05:59	05:02	20:50 (WEA_42 (RW))   04:43
16:37   23   16:03 (WEA_G1)   17:40		18:34	11   18:06 (WEA_03 (GRN))   20:33	21:26	2   20:52 (WEA_42 (RW))   21:54
24   08:19   15:40 (WEA_G1)   07:19		06:11	17:56 (WEA_03 (GRN))   05:57	05:00	20:50 (WEA_42 (RW))   04:43
16:39   24   16:04 (WEA_G1)   17:42		18:36	8   18:04 (WEA_03 (GRN))   20:34	21:27	3   20:53 (WEA_42 (RW))   21:55
25   08:17   15:41 (WEA_G1)   07:17		17:15 (WEA_06 (GRN))   06:09		04:59	20:50 (WEA_42 (RW))   04:43
16:41   24   16:05 (WEA_G1)   17:44	1	17:16 (WEA_06 (GRN))   18:38		21:29	5   20:55 (WEA_42 (RW))   21:55
26   08:16   15:41 (WEA_G1)   07:15		17:15 (WEA_06 (GRN))   06:07		04:58	20:50 (WEA_42 (RW))   04:44
16:43   23   16:04 (WEA_G1)   17:46	3	17:18 (WEA_06 (GRN))   18:40		21:30	6   20:56 (WEA_42 (RW))   21:55
27   08:14   15:41 (WEA_G1)   07:12		17:15 (WEA_06 (GRN))   06:04	18:13 (WEA_02 (GRN))   05:50	04:57	20:51 (WEA_42 (RW))   04:44
16:45   23   16:04 (WEA_G1)   17:48	5	17:20 (WEA_06 (GRN))   18:42	2   18:15 (WEA_02 (GRN))   20:40	21:32	7   20:58 (WEA_42 (RW))   21:54
28   08:13   15:43 (WEA_G1)   07:10		17:16 (WEA_06 (GRN))   06:02	18:12 (WEA_02 (GRN))   05:48	04:55	20:51 (WEA_42 (RW))   04:45
16:47   21   16:04 (WEA_G1)   17:50	6	17:22 (WEA_06 (GRN))   18:44	4   18:16 (WEA_02 (GRN))   20:42	21:33	8   20:59 (WEA_42 (RW))   21:54
29   08:11   15:44 (WEA_G1)   07:08		17:19 (WEA_06 (GRN))   06:00	18:13 (WEA_02 (GRN))   05:46	04:54	20:52 (WEA_42 (RW))   04:45
16:49   19   16:03 (WEA_G1)   17:52		19:45	6   19:19 (WEA_02 (GRN))   20:44	21:35	8   21:00 (WEA_42 (RW))   21:54
30   08:09   15:45 (WEA_G1)   07:06		06:57	18:14 (WEA_02 (GRN))   05:44	04:53	20:52 (WEA_42 (RW))   04:46
16:51   17   16:02 (WEA_G1)   17:54		19:47	6   19:20 (WEA_02 (GRN))   20:46	21:36	9   21:01 (WEA_42 (RW))   21:54
31   08:08   15:47 (WEA_G1)   07:04		06:54		04:52	20:53 (WEA_42 (RW))   04:46
16:53   14   16:01 (WEA_G1)   17:56		19:49		21:37	8   21:01 (WEA_42 (RW))   21:54
Sommereinheiten   248	272	367	421	496	513
astr. max. mögl. Beschattung   555	62	219	13	57	125

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

SWP Windpark Großenholz

Lizenzierter Anwender:

GL Garrad Hassan Deutschland GmbH  
 Sommerdeich 14 b  
 DE-25709 Kaiser-Wilhelm-Koog  
 (0 48 56)901-0

Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 17 - IO 17 Bäderstraße 24a (Gosdorf)

### 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

Juli		August		September		Oktober		November		Dezember	
1	04:47	21:13 (WEA K04)	05:27	06:23	19:40 (WEA 43 (RW))	07:17	18:03 (WEA 07 (GRN))	07:16	16:10 (WEA 08 (GRN))	06:12	14:26 (WEA G2)
2	04:47	21:17 (WEA K04)	05:29	06:24	19:41 (WEA 43 (RW))	07:19	18:01 (WEA 07 (GRN))	07:18	16:12 (WEA 08 (GRN))	06:14	14:25 (WEA G2)
3	04:48	21:14 (WEA K04)	05:31	06:26		07:21	18:00 (WEA 07 (GRN))	07:20		06:15	14:25 (WEA G2)
4	04:49	21:15 (WEA K04)	05:32	06:28		07:22	17:59 (WEA 07 (GRN))	07:22		06:17	14:24 (WEA G2)
5	04:50	21:15 (WEA K04)	05:34	06:30		07:24	18:00 (WEA 07 (GRN))	07:24		06:18	14:24 (WEA G2)
6	04:51	21:16 (WEA K04)	05:36	06:32		07:26	18:01 (WEA 07 (GRN))	07:26		06:19	14:23 (WEA G2)
7	04:52	21:16 (WEA K04)	05:38	06:33		07:28	18:02 (WEA 07 (GRN))	07:28		06:21	14:23 (WEA G2)
8	04:53	21:17 (WEA K04)	05:39	06:35		07:30	18:03 (WEA 07 (GRN))	07:30		06:22	14:22 (WEA G2)
9	04:54	21:17 (WEA K04)	05:41	06:37	20:30 (WEA 41 (RW))	07:32	18:04 (WEA 07 (GRN))	07:32		06:23	14:22 (WEA G2)
10	04:55	21:18 (WEA K04)	05:43	06:39	20:31 (WEA 41 (RW))	07:34	18:05 (WEA 07 (GRN))	07:34	15:19 (WEA G1)	06:25	14:21 (WEA G2)
11	04:56	21:18 (WEA K04)	05:45	06:41		07:35	18:06 (WEA 07 (GRN))	07:35	15:18 (WEA G1)	06:26	14:21 (WEA G2)
12	04:57	21:19 (WEA K04)	05:47	06:42		07:37	18:07 (WEA 07 (GRN))	07:37	15:17 (WEA G1)	06:27	14:20 (WEA G2)
13	04:59	21:19 (WEA K04)	05:48	06:44	19:05 (WEA 02 (GRN))	07:39	18:08 (WEA 07 (GRN))	07:39	15:16 (WEA G1)	06:28	14:20 (WEA G2)
14	05:00	21:20 (WEA K04)	05:50	06:46	19:06 (WEA 02 (GRN))	07:41	18:09 (WEA 07 (GRN))	07:41	15:15 (WEA G1)	06:29	14:19 (WEA G2)
15	05:01	21:20 (WEA K04)	05:52	06:48	19:07 (WEA 02 (GRN))	07:43	18:10 (WEA 07 (GRN))	07:43	15:14 (WEA G1)	06:30	14:19 (WEA G2)
16	05:03	21:21 (WEA K04)	05:54	06:50	19:08 (WEA 02 (GRN))	07:45	18:11 (WEA 07 (GRN))	07:45	15:13 (WEA G1)	06:31	14:18 (WEA G2)
17	05:04	21:21 (WEA K04)	05:56	06:51	19:09 (WEA 02 (GRN))	07:47	18:12 (WEA 07 (GRN))	07:47	15:12 (WEA G1)	06:32	14:18 (WEA G2)
18	05:05	21:22 (WEA K04)	05:57	06:53	19:10 (WEA 02 (GRN))	07:49	18:13 (WEA 07 (GRN))	07:49	15:11 (WEA G1)	06:33	14:17 (WEA G2)
19	05:07	21:22 (WEA K04)	05:59	06:55	19:11 (WEA 02 (GRN))	07:51	18:14 (WEA 07 (GRN))	07:51	15:10 (WEA G1)	06:34	14:17 (WEA G2)
20	05:08	21:23 (WEA K04)	06:01	06:57	19:12 (WEA 02 (GRN))	07:53	18:15 (WEA 07 (GRN))	07:53	15:09 (WEA G1)	06:35	14:16 (WEA G2)
21	05:10	21:23 (WEA K04)	06:03	06:59	19:13 (WEA 02 (GRN))	07:55	18:16 (WEA 07 (GRN))	07:55	15:08 (WEA G1)	06:36	14:16 (WEA G2)
22	05:11	21:24 (WEA K04)	06:05	07:00	19:14 (WEA 02 (GRN))	07:56	18:17 (WEA 07 (GRN))	07:56	15:07 (WEA G1)	06:37	14:15 (WEA G2)
23	05:13	21:24 (WEA K04)	06:06	07:02	19:15 (WEA 02 (GRN))	07:58	18:18 (WEA 07 (GRN))	07:58	15:06 (WEA G1)	06:38	14:15 (WEA G2)
24	05:14	21:25 (WEA K04)	06:08	07:04	19:16 (WEA 02 (GRN))	08:00	18:19 (WEA 07 (GRN))	08:00	15:05 (WEA G1)	06:39	14:14 (WEA G2)
25	05:16	21:25 (WEA K04)	06:10	07:06	19:17 (WEA 02 (GRN))	08:01	18:20 (WEA 07 (GRN))	08:01	15:04 (WEA G1)	06:40	14:14 (WEA G2)
26	05:17	21:26 (WEA K04)	06:12	07:07	19:18 (WEA 02 (GRN))	08:02	18:21 (WEA 07 (GRN))	08:02	15:03 (WEA G1)	06:41	14:13 (WEA G2)
27	05:19	21:26 (WEA K04)	06:14	07:10	19:19 (WEA 02 (GRN))	08:04	18:22 (WEA 07 (GRN))	08:04	15:02 (WEA G1)	06:42	14:13 (WEA G2)
28	05:21	21:27 (WEA K04)	06:15	07:11	19:20 (WEA 02 (GRN))	08:05	18:23 (WEA 07 (GRN))	08:05	15:01 (WEA G1)	06:43	14:12 (WEA G2)
29	05:22	21:27 (WEA K04)	06:17	07:13	19:21 (WEA 02 (GRN))	08:07	18:24 (WEA 07 (GRN))	08:07	15:00 (WEA G1)	06:44	14:12 (WEA G2)
30	05:24	21:28 (WEA K04)	06:19	07:15	19:22 (WEA 02 (GRN))	08:09	18:25 (WEA 07 (GRN))	08:09	14:59 (WEA G1)	06:45	14:11 (WEA G2)
31	05:26	21:29 (WEA K04)	06:21	07:17	19:23 (WEA 02 (GRN))	08:11	18:26 (WEA 07 (GRN))	08:11	14:58 (WEA G1)	06:46	14:11 (WEA G2)
Sommereinheiten	515	461	383	328	257	231	753				
astr. max. mögl. Beschattung	85	13	88	104	147	231	753				

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:

SWP Windpark Großenholz

Lizenzierter Anwender:

GL Garrad Hassan Deutschland GmbH  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0

Berechnet:

22.06.2022 20:19/3.5.584

### SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 18 - IO 18 Ratjensdorfer Felde 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	08:37 16:03	08:06 16:55	15:59 (WEA_G3)   07:08 16:15 (WEA_G3)   17:52	06:52 19:51	05:41 20:47	04:51 21:38
2	08:37 16:04	08:04 16:57	16:01 (WEA_G3)   07:05 16:14 (WEA_G3)   17:54	06:49 19:53	05:39 20:49	04:50 21:40
3	08:37 16:05	08:02 16:59	16:03 (WEA_G3)   07:03 16:13 (WEA_G3)   17:56	06:47 19:55	05:37 20:51	04:49 21:41
4	08:36 16:06	08:01 17:01	16:06 (WEA_G3)   07:00 16:09 (WEA_G3)   17:58	06:44 19:57	05:35 20:53	04:48 21:42
5	08:36 16:08	07:59 17:03		06:58 17:59	06:42 19:59	05:33 20:55
6	08:36 16:09	07:57 17:05		06:56 18:01	06:39 20:00	05:31 20:57
7	08:35 16:10	07:55 17:07		06:53 18:03	06:37 20:02	05:29 20:58
8	08:35 16:12	07:53 17:09		06:51 18:05	06:34 20:04	05:27 21:00
9	08:34 16:13	07:51 17:11		06:48 18:07	06:32 20:06	05:25 21:02
10	08:33 16:15	15:37 (WEA 15 (GCN))   07:49 15:38 (WEA 15 (GCN))   17:13	06:46 18:09	06:29 20:08	05:23 21:04	04:44 21:48
11	08:33 16:16	07:47 17:15	06:44 18:11	06:27 20:10	05:21 21:06	04:44 21:49
12	08:32 16:18	07:45 17:17	06:41 18:13	06:25 20:12	05:20 21:07	04:43 21:50
13	08:31 16:20	07:43 17:19	06:39 18:15	06:22 20:14	05:18 21:09	04:43 21:50
14	08:30 16:21	07:41 17:21	06:36 18:17	06:20 20:16	05:16 21:11	04:43 21:51
15	08:29 16:23	07:39 17:23	06:34 18:19	06:17 20:17	05:14 21:13	04:42 21:52
16	08:28 16:25	07:37 17:25	06:31 18:21	06:15 20:19	05:13 21:14	04:42 21:52
17	08:27 16:26	07:35 17:28	06:29 18:23	06:13 20:21	05:11 21:16	04:42 21:53
18	08:26 16:28	07:33 17:30	06:26 18:25	06:10 20:23	05:09 21:18	04:42 21:53
19	08:25 16:30	07:30 17:32	06:24 18:27	06:08 20:25	05:08 21:19	04:42 21:53
20	08:24 16:32	07:28 17:34	06:21 18:28	06:06 20:27	05:06 21:21	04:42 21:54
21	08:22 16:34	15:56 (WEA_G3)   07:26 15:59 (WEA_G3)   17:36	06:19 18:30	06:03 20:29	05:05 21:23	04:42 21:54
22	08:21 16:35	15:55 (WEA_G3)   07:24 16:00 (WEA_G3)   17:38	06:16 18:32	06:01 20:31	05:03 21:24	04:42 21:54
23	08:20 16:37	15:56 (WEA_G3)   07:21 16:03 (WEA_G3)   17:40	06:14 18:34	05:59 20:32	05:02 21:26	04:43 21:54
24	08:18 16:39	15:55 (WEA_G3)   07:19 16:05 (WEA_G3)   17:42	06:11 18:36	05:57 20:34	05:00 21:27	04:43 21:54
25	08:17 16:41	15:56 (WEA_G3)   07:17 16:08 (WEA_G3)   17:44	06:09 18:38	05:54 20:36	04:59 21:29	04:43 21:55
26	08:16 16:43	15:56 (WEA_G3)   07:15 16:09 (WEA_G3)   17:46	06:06 18:40	05:52 20:38	04:58 21:30	04:44 21:54
27	08:14 16:45	15:56 (WEA_G3)   07:12 16:11 (WEA_G3)   17:48	06:04 18:42	05:50 20:40	04:56 21:32	04:44 21:54
28	08:13 16:47	15:57 (WEA_G3)   07:10 16:14 (WEA_G3)   17:50	06:01 18:44	05:48 20:42	04:55 21:33	04:45 21:54
29	08:11 16:49	15:57 (WEA_G3)   16:16 (WEA_G3)	06:59 19:45	05:46 20:44	04:54 21:34	04:45 21:54
30	08:09 16:51	15:58 (WEA_G3)   16:17 (WEA_G3)	06:56 19:47	05:43 20:46	04:53 21:36	04:46 21:54
31	08:08 16:53	15:59 (WEA_G3)   16:16 (WEA_G3)	06:54 19:49	 21:37	04:52 21:37	 21:54
Sonnenscheinstunden   248		272	367	421	496	513
astr.max.mögl.Beschattung   138		42				

**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:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 18 - IO 18 Ratjensdorfer Felde 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 Sonneneinstrahlrichtung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli	August	September	Oktober	November	Dezember
1	04:47 21:53	05:27 21:17	06:23 20:10	07:17 18:55	07:16 16:44	08:12 15:58
2	04:47 21:53	05:29 21:16	06:24 20:07	07:19 18:53	07:18 16:42	08:14 15:58 1 15:20 (WEA 15 (GCN)) 15:21 (WEA 15 (GCN))
3	04:48 21:53	05:31 21:14	06:26 20:05	07:20 18:50	07:20 16:40	08:15 15:57
4	04:49 21:52	05:32 21:12	06:28 20:03	07:22 18:48	07:22 16:38	08:17 15:56
5	04:50 21:52	05:34 21:10	06:30 20:00	07:24 18:45	07:24 16:36	08:18 15:55
6	04:51 21:51	05:36 21:08	06:32 19:58	07:26 18:43	07:26 16:34	08:19 15:55
7	04:52 21:50	05:38 21:06	06:33 19:55	07:28 18:40	07:28 16:32	08:21 15:54 5 15:36 (WEA_G3) 15:41 (WEA_G3)
8	04:53 21:50	05:39 21:04	06:35 19:53	07:30 18:38	07:30 16:30	08:22 15:54 11 15:44 (WEA_G3)
9	04:54 21:49	05:41 21:02	06:37 19:50	07:32 18:36	07:32 16:28	08:23 15:54 14 15:45 (WEA_G3)
10	04:55 21:48	05:43 21:00	06:39 19:48	07:34 18:33	07:34 16:26	08:24 15:53 16 15:46 (WEA_G3)
11	04:56 21:47	05:45 20:58	06:41 19:45	07:35 18:31	07:36 16:25	08:26 15:53 18 15:47 (WEA_G3)
12	04:57 21:46	05:47 20:56	06:42 19:43	07:37 18:28	07:38 16:23	08:27 15:53 19 15:49 (WEA_G3)
13	04:59 21:45	05:48 20:54	06:44 19:40	07:39 18:26	07:40 16:21	08:28 15:53 19 15:48 (WEA_G3)
14	05:00 21:44	05:50 20:51	06:46 19:38	07:41 18:24	07:42 16:20	08:29 15:53 17 15:46 (WEA_G3)
15	05:01 21:43	05:52 20:49	06:48 19:35	07:43 18:21	07:43 16:18	08:30 15:53 15 15:44 (WEA_G3)
16	05:02 21:42	05:54 20:47	06:50 19:33	07:45 18:19	07:45 16:16	08:31 15:53 13 15:42 (WEA_G3)
17	05:04 21:41	05:55 20:45	06:51 19:30	07:47 18:16	07:47 16:15	08:32 15:53 12 15:41 (WEA_G3)
18	05:05 21:39	05:57 20:43	06:53 19:28	07:49 18:14	07:49 16:13	08:32 15:53 10 15:39 (WEA_G3)
19	05:07 21:38	05:59 20:40	06:55 19:25	07:51 18:12	07:51 16:12	08:33 15:53 7 15:37 (WEA_G3)
20	05:08 21:37	06:01 20:38	06:57 19:23	07:53 18:10	07:53 16:11	08:34 15:54 4 15:35 (WEA_G3)
21	05:10 21:35	06:03 20:36	06:59 19:20	07:54 18:07	07:55 16:09	08:34 15:54 3 15:34 (WEA_G3)
22	05:11 21:34	06:05 20:34	07:00 19:18	07:56 18:05	07:57 16:08	08:35 15:55 08:35
23	05:13 21:32	06:06 20:31	07:02 19:15	07:58 18:03	07:58 16:07	08:35 15:55
24	05:14 21:31	06:08 20:29	07:04 19:13	08:00 18:01	08:00 16:05	08:36 15:56
25	05:16 21:29	06:10 20:27	07:06 19:10	07:02 16:58	08:02 16:04	08:36 15:56
26	05:17 21:28	06:12 20:24	07:08 19:08	07:04 16:56	08:04 16:03	08:37 15:57
27	05:19 21:26	06:14 20:22	07:09 19:05	07:06 16:54	08:05 16:02	08:37 15:58
28	05:21 21:24	06:15 20:19	07:11 19:03	07:08 16:52	08:07 16:01	08:37 15:59
29	05:22 21:23	06:17 20:17	07:13 19:00	07:10 16:50	08:09 16:00	08:37 16:00
30	05:24 21:21	06:19 20:15	07:15 18:58	07:12 16:48	08:10 15:59	08:37 16:00
31	05:26 21:19	06:21 20:12		07:14 16:46		08:37 16:02
Sonnenscheinstunden	515	461	383	328	257	231
astr.max.mögl.Beschattung					183	1

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:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 19 - IO 19 Ratjensdorfer Felde 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 Sonneneinstrahlungsrichtung  
 Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:37 16:03	08:06 16:55	21 16:00 (WEA_G3)   07:08 16:21 (WEA_G3)   17:52	06:52 19:51	05:41 20:47	04:51 21:38
2	08:37 16:04	08:04 16:57	21 16:00 (WEA_G3)   07:05 16:21 (WEA_G3)   17:54	06:49 19:53	05:39 20:49	04:50 21:40
3	08:37 16:05	08:02 16:59	19 16:01 (WEA_G3)   07:03 16:20 (WEA_G3)   17:56	06:47 19:55	05:37 20:51	04:49 21:41
4	08:36 16:06	08:01 17:01	18 16:02 (WEA_G3)   07:00 16:20 (WEA_G3)   17:58	06:44 19:57	05:35 20:53	04:48 21:42
5	08:36 16:08	07:59 17:03	14 16:04 (WEA_G3)   06:58 16:18 (WEA_G3)   17:59	06:42 19:59	05:33 20:55	04:47 21:43
6	08:36 16:09	07:57 17:05	12 16:05 (WEA_G3)   06:56 16:17 (WEA_G3)   18:01	06:39 20:00	05:31 20:57	04:47 21:44
7	08:35 16:10	07:55 17:07	5 16:09 (WEA_G3)   06:53 16:14 (WEA_G3)   18:03	06:37 20:02	05:29 20:58	04:46 21:45
8	08:35 16:12	07:53 17:09	06:51 18:05	06:34 20:04	05:27 21:00	04:45 21:46
9	08:34 16:13	07:51 17:11	06:48 18:07	06:32 20:06	05:25 21:02	04:45 21:47
10	08:33 16:15	15:36 (WEA 15 (GCN))   07:49 2 15:38 (WEA 15 (GCN))   17:13	06:46 18:09	06:29 20:08	05:23 21:04	04:44 21:48
11	08:33 16:16	15:37 (WEA 15 (GCN))   07:47 2 15:39 (WEA 15 (GCN))   17:15	06:44 18:11	06:27 20:10	05:21 21:06	04:44 21:49
12	08:32 16:18	15:38 (WEA 15 (GCN))   07:45 3 15:41 (WEA 15 (GCN))   17:17	06:41 18:13	06:25 20:12	05:20 21:07	04:43 21:50
13	08:31 16:20	15:40 (WEA 15 (GCN))   07:43 3 15:43 (WEA 15 (GCN))   17:19	06:39 18:15	06:22 20:14	05:18 21:09	04:43 21:50
14	08:30 16:21	07:41 17:21	06:36 18:17	06:20 20:16	05:16 21:11	04:43 21:51
15	08:29 16:23	07:39 17:23	06:34 18:19	06:17 20:17	05:14 21:13	04:42 21:52
16	08:28 16:25	07:37 17:26	06:31 18:21	06:15 20:19	05:13 21:14	04:42 21:52
17	08:27 16:26	07:35 17:28	06:29 18:23	06:13 20:21	05:11 21:16	04:42 21:53
18	08:26 16:28	07:33 17:30	06:26 18:25	06:10 20:23	05:09 21:18	04:42 21:53
19	08:25 16:30	07:30 17:32	06:24 18:27	06:08 20:25	05:08 21:19	04:42 21:53
20	08:24 16:32	07:28 17:34	06:21 18:28	06:06 20:27	05:06 21:21	04:42 21:54
21	08:22 16:34	07:26 17:36	06:19 18:30	06:03 20:29	05:05 21:23	04:42 21:54
22	08:21 16:35	07:24 17:38	06:16 18:32	06:01 20:31	05:03 21:24	04:42 21:54
23	08:20 16:37	16:00 (WEA_G3)   07:21 3 16:03 (WEA_G3)   17:40	06:14 18:34	05:59 20:32	05:02 21:26	04:43 21:54
24	08:18 16:39	15:59 (WEA_G3)   07:19 6 16:05 (WEA_G3)   17:42	06:11 18:36	05:57 20:34	05:00 21:27	04:43 21:54
25	08:17 16:41	15:59 (WEA_G3)   07:17 9 16:08 (WEA_G3)   17:44	06:09 18:38	05:54 20:36	04:59 21:29	04:43 21:55
26	08:16 16:43	15:59 (WEA_G3)   07:15 10 16:09 (WEA_G3)   17:46	06:06 18:40	05:52 20:38	04:58 21:30	04:44 21:54
27	08:14 16:45	15:59 (WEA_G3)   07:12 12 16:11 (WEA_G3)   17:48	06:04 18:42	05:50 20:40	04:56 21:32	04:44 21:54
28	08:13 16:47	15:59 (WEA_G3)   07:10 15 16:14 (WEA_G3)   17:50	06:01 18:44	05:48 20:42	04:55 21:33	04:45 21:54
29	08:11 16:49	15:59 (WEA_G3)   17 16:16 (WEA_G3)	06:59 19:45	05:46 20:44	04:54 21:34	04:45 21:54
30	08:09 16:51	15:59 (WEA_G3)   19 16:18 (WEA_G3)	06:56 19:47	05:43 20:46	04:53 21:36	04:46 21:54
31	08:08 16:53	16:00 (WEA_G3)   20 16:20 (WEA_G3)	06:54 19:49	 21:37	04:52 21:37	 
	Sonnenscheinstunden   248	272	367	421	496	513
	astr.max.mögl.Beschattung   121	110				

**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) Schatteneinde	(WEA mit erstem Schatten) (WEA mit letztem Schatten)
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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 19 - IO 19 Ratjensdorfer Felde 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 Sonneneinstrahlungsrichtung  
Die Windenergieanlage/n ist/sind immer in Betrieb

	July	August	September	Oktober	November	Dezember
1	04:47	05:27	06:23	07:17	07:16	08:12
	21:53	21:17	20:10	18:55	16:44	15:58
2	04:47	05:29	06:24	07:19	07:18	08:14
	21:53	21:16	20:07	18:53	16:42	15:58
3	04:48	05:31	06:26	07:20	07:20	08:15
	21:53	21:14	20:05	18:50	16:40	15:57
4	04:49	05:32	06:28	07:22	07:22	15:38 (WEA_G3)   08:17
	21:52	21:12	20:03	18:48	16:38	15:44 (WEA_G3)   15:56
5	04:50	05:34	06:30	07:24	07:24	15:36 (WEA_G3)   08:18
	21:52	21:10	20:00	18:45	16:36	15:48 (WEA_G3)   15:55
6	04:51	05:36	06:32	07:26	07:26	15:34 (WEA_G3)   08:19
	21:51	21:08	19:58	18:43	16:34	15:49 (WEA_G3)   15:55
7	04:52	05:38	06:33	07:28	07:28	15:33 (WEA_G3)   08:21
	21:50	21:06	19:55	18:40	16:32	15:50 (WEA_G3)   15:54
8	04:53	05:39	06:35	07:30	07:30	15:32 (WEA_G3)   08:22
	21:50	21:04	19:53	18:38	16:30	15:51 (WEA_G3)   15:54
9	04:54	05:41	06:37	07:32	07:32	15:31 (WEA_G3)   08:23
	21:49	21:02	19:50	18:36	16:28	15:52 (WEA_G3)   15:54
10	04:55	05:43	06:39	07:34	07:34	15:31 (WEA_G3)   08:24
	21:48	21:00	19:48	18:33	16:26	15:52 (WEA_G3)   15:53
11	04:56	05:45	06:41	07:35	07:36	15:30 (WEA_G3)   08:26
	21:47	20:58	19:45	18:31	16:25	15:51 (WEA_G3)   15:53
12	04:57	05:47	06:42	07:37	07:38	15:31 (WEA_G3)   08:27
	21:46	20:56	19:43	18:28	16:23	15:50 (WEA_G3)   15:53
13	04:59	05:48	06:44	07:39	07:40	15:31 (WEA_G3)   08:28
	21:45	20:54	19:40	18:26	16:21	15:48 (WEA_G3)   15:53
14	05:00	05:50	06:46	07:41	07:42	15:31 (WEA_G3)   08:29
	21:44	20:51	19:38	18:24	16:20	15:46 (WEA_G3)   15:53
15	05:01	05:52	06:48	07:43	07:43	15:32 (WEA_G3)   08:30
	21:43	20:49	19:35	18:21	16:18	15:44 (WEA_G3)   15:53
16	05:02	05:54	06:50	07:45	07:45	15:32 (WEA_G3)   08:31
	21:42	20:47	19:33	18:19	16:16	15:42 (WEA_G3)   15:53
17	05:04	05:55	06:51	07:47	07:47	15:32 (WEA_G3)   08:32
	21:41	20:45	19:30	18:16	16:15	15:41 (WEA_G3)   15:53
18	05:05	05:57	06:53	07:49	07:49	15:33 (WEA_G3)   08:32
	21:39	20:43	19:28	18:14	16:13	15:39 (WEA_G3)   15:53
19	05:07	05:59	06:55	07:51	07:51	15:34 (WEA_G3)   08:33
	21:38	20:40	19:25	18:12	16:12	15:37 (WEA_G3)   15:53
20	05:08	06:01	06:57	07:53	07:53	08:34
	21:37	20:38	19:23	18:10	16:11	15:54
21	05:10	06:03	06:59	07:54	07:55	08:34
	21:35	20:36	19:20	18:07	16:09	15:54
22	05:11	06:05	07:00	07:56	07:57	08:35
	21:34	20:34	19:18	18:05	16:08	15:55
23	05:13	06:06	07:02	07:58	07:58	08:35
	21:32	20:31	19:15	18:03	16:07	15:55
24	05:14	06:08	07:04	08:00	08:00	08:36
	21:31	20:29	19:13	18:01	16:05	15:56
25	05:16	06:10	07:06	07:02	08:02	08:36
	21:29	20:27	19:10	16:58	16:04	15:56
26	05:17	06:12	07:08	07:04	08:04	08:37
	21:28	20:24	19:08	16:56	16:03	15:57
27	05:19	06:14	07:09	07:06	08:05	08:37
	21:26	20:22	19:05	16:54	16:02	15:58
28	05:21	06:15	07:11	07:08	08:07	08:37
	21:24	20:19	19:03	16:52	16:01	15:59
29	05:22	06:17	07:13	07:10	08:09	15:21 (WEA 15 (GCN))   08:37
	21:23	20:17	19:00	16:50	16:00	15:24 (WEA 15 (GCN))   16:00
30	05:24	06:19	07:15	07:12	08:10	15:20 (WEA 15 (GCN))   08:37
	21:21	20:15	18:58	16:48	15:59	15:23 (WEA 15 (GCN))   16:01
31	05:26	06:21		07:14		08:37
	21:19	20:12		16:46		16:02
Sonnenscheinstunden		515	461	383	328	257
astr.max.mögl.Beschattung					229	

**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)

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 20 - IO 20 Ratjensdorfer Felde 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 Sonneneinstrahlungsrichtung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:37 16:03	15:22 (WEA 15 (GCN)) 16:55	08:06 16:55	15:51 (WEA_G3) 17:52	07:08 17:52	06:52 20:47
2	08:37 16:04	15:21 (WEA 15 (GCN)) 16:57	08:04 16:57	15:51 (WEA_G3) 17:54	07:05 17:54	06:49 20:49
3	08:37 16:05	15:22 (WEA 15 (GCN)) 16:59	08:02 16:59	15:52 (WEA_G3) 17:56	07:03 17:56	06:47 20:51
4	08:36 16:06	15:24 (WEA 15 (GCN)) 17:01	08:01 17:01	15:53 (WEA_G3) 17:58	07:01 17:58	06:44 20:53
5	08:36 16:08	15:24 (WEA 15 (GCN)) 17:03	07:59 17:03	15:54 (WEA_G3) 18:00	06:58 18:00	06:42 20:55
6	08:36 16:09	15:24 (WEA 15 (GCN)) 17:05	07:57 17:05	15:55 (WEA_G3) 18:01	06:56 18:01	06:39 20:57
7	08:35 16:10	15:26 (WEA 15 (GCN)) 17:07	07:55 17:07	15:57 (WEA_G3) 18:03	06:53 18:03	06:37 20:58
8	08:35 16:12	15:26 (WEA 15 (GCN)) 17:09	07:53 17:09	16:00 (WEA_G3) 18:05	06:51 18:05	06:34 21:00
9	08:34 16:13	15:28 (WEA 15 (GCN)) 17:11	07:51 17:11	16:19 (WEA_G2) 18:07	06:48 18:07	06:32 21:02
10	08:33 16:15	15:30 (WEA 15 (GCN)) 17:13	07:49 17:13	16:21 (WEA_G2) 18:09	06:46 18:09	06:29 21:04
11	08:33 16:16	15:31 (WEA 15 (GCN)) 17:15	07:47 17:15	16:22 (WEA_G2) 18:11	06:44 18:11	06:27 21:06
12	08:32 16:18	15:33 (WEA 15 (GCN)) 17:17	07:45 17:17	16:24 (WEA_G2) 18:13	06:41 18:13	06:25 21:07
13	08:31 16:20	15:33 (WEA 15 (GCN)) 17:19	07:43 17:19	16:28 (WEA_G2) 18:15	06:39 18:15	06:22 21:09
14	08:30 16:21	15:30 (WEA 15 (GCN)) 17:21	07:41 17:21	16:31 (WEA_G2) 18:17	06:39 18:17	06:20 21:11
15	08:29 16:23	15:30 (WEA 15 (GCN)) 17:23	07:39 17:23	16:34 (WEA_G2) 18:19	06:36 18:19	06:17 21:13
16	08:28 16:25	15:31 (WEA 15 (GCN)) 17:26	07:37 17:26	16:36 (WEA_G2) 18:21	06:34 18:21	06:15 21:14
17	08:27 16:26	15:32 (WEA 15 (GCN)) 17:28	07:35 17:28	16:38 (WEA_G2) 18:23	06:32 18:23	06:13 21:16
18	08:26 16:28	15:33 (WEA 15 (GCN)) 17:30	07:33 17:30	16:40 (WEA_G2) 18:25	06:30 18:25	06:10 21:18
19	08:25 16:30	15:52 (WEA_G3) 17:32	07:30 17:32	16:42 (WEA_G2) 18:27	06:28 18:27	06:08 21:19
20	08:24 16:32	15:51 (WEA_G3) 17:34	07:28 17:34	16:44 (WEA_G2) 18:28	06:26 18:28	06:06 21:21
21	08:23 16:34	15:51 (WEA_G3) 17:36	07:26 17:36	16:46 (WEA_G2) 18:30	06:24 18:30	06:04 21:23
22	08:21 16:35	15:50 (WEA_G3) 17:38	07:24 17:38	16:48 (WEA_G2) 18:32	06:22 18:32	06:02 21:24
23	08:20 16:37	15:50 (WEA_G3) 17:40	07:21 17:40	16:50 (WEA_G2) 18:34	06:20 18:34	05:59 21:26
24	08:19 16:39	16:03 (WEA_G3) 17:42	07:19 17:42	16:52 (WEA_G2) 18:36	06:18 18:36	05:57 21:27
25	08:17 16:41	16:05 (WEA_G3) 17:44	07:17 17:44	16:54 (WEA_G2) 18:38	06:16 18:38	05:54 21:29
26	08:16 16:43	16:08 (WEA_G3) 17:46	07:15 17:46	16:56 (WEA_G2) 18:40	06:14 18:40	05:52 21:30
27	08:14 16:45	16:09 (WEA_G3) 17:48	07:12 17:48	16:58 (WEA_G2) 18:42	06:12 18:42	05:50 21:32
28	08:13 16:47	16:11 (WEA_G3) 17:50	07:10 17:50	17:00 (WEA_G2) 18:44	06:10 18:44	05:48 21:33
29	08:11 16:49	16:14 (WEA_G3) 17:52	07:07 17:52	17:02 (WEA_G2) 18:46	06:08 18:46	05:46 21:34
30	08:09 16:51	16:16 (WEA_G3) 17:54	07:05 17:54	17:04 (WEA_G2) 18:48	06:06 18:48	05:44 21:36
31	08:08 16:53	16:17 (WEA_G3) 17:56	07:03 17:56	17:06 (WEA_G2) 18:50	06:04 18:50	05:42 21:37
Sonnenscheinstunden	248	272	367	421	496	513
astr. max. mögl. Beschattung	266	319	1			

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) Schattende	(WEA mit letztem Schatten)



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 20 - IO 20 Ratjensdorfer Felde 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 Sonneneinstrahlungsrichtung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli	August	September	Oktober	November	Dezember
1	04:47 21:53	05:27 21:17	06:23 20:10	07:17 18:55	07:16 16:44	08:12 15:58
2	04:47 21:53	05:29 21:16	06:24 20:07	07:19 18:53	07:18 16:42	08:14 15:58
3	04:48 21:53	05:31 21:14	06:26 20:05	07:20 18:50	07:20 16:40	08:15 15:57
4	04:49 21:52	05:32 21:12	06:28 20:03	07:22 18:48	07:22 16:38	08:17 15:56
5	04:50 21:52	05:34 21:10	06:30 20:00	07:24 18:45	07:24 16:36	08:18 15:56
6	04:51 21:51	05:36 21:08	06:32 19:58	07:26 18:43	07:26 16:34	08:19 15:55
7	04:52 21:50	05:38 21:06	06:33 19:55	07:28 18:40	07:28 16:32	08:21 15:54
8	04:53 21:50	05:39 21:04	06:35 19:53	07:30 18:38	07:30 16:30	08:22 15:54
9	04:54 21:49	05:41 21:02	06:37 19:50	07:32 18:36	07:32 16:28	08:23 15:54
10	04:55 21:48	05:43 21:00	06:39 19:48	07:34 18:33	07:34 16:26	08:25 15:53
11	04:56 21:47	05:45 20:58	06:41 19:45	07:35 18:31	07:35 16:25	08:26 15:53
12	04:57 21:46	05:47 20:56	06:42 19:43	07:37 18:28	07:37 16:23	08:27 15:53
13	04:59 21:45	05:48 20:54	06:44 19:40	07:39 18:26	07:40 16:21	08:28 15:53
14	05:00 21:44	05:50 20:51	06:46 19:38	07:41 18:24	07:42 16:20	08:29 15:53
15	05:01 21:43	05:52 20:49	06:48 19:35	07:43 18:21	07:44 16:18	08:30 15:53
16	05:02 21:42	05:54 20:47	06:50 19:33	07:45 18:19	07:45 16:16	08:31 15:53
17	05:04 21:41	05:56 20:45	06:51 19:30	07:47 18:17	07:47 16:15	08:32 15:53
18	05:05 21:39	05:57 20:43	06:53 19:28	07:49 18:14	07:49 16:13	08:32 15:53
19	05:07 21:38	05:59 20:40	06:55 19:25	07:51 18:12	07:51 16:12	08:33 15:53
20	05:08 21:37	06:01 20:38	06:57 19:23	07:53 18:10	07:53 16:11	08:34 15:54
21	05:10 21:35	06:03 20:36	06:59 19:20	07:54 18:07	07:55 16:09	08:34 15:54
22	05:11 21:34	06:05 20:34	07:00 19:18	07:56 18:05	07:57 16:08	08:35 15:55
23	05:13 21:32	06:06 20:31	07:02 19:15	07:58 18:03	07:58 16:07	08:35 15:55
24	05:14 21:31	06:08 20:29	07:04 19:13	08:00 18:01	08:00 16:05	08:36 15:56
25	05:16 21:29	06:10 20:27	07:06 19:10	08:02 16:58	08:02 16:04	08:36 15:56
26	05:17 21:28	06:12 20:24	07:08 19:08	08:04 16:56	08:04 16:03	08:37 15:57
27	05:19 21:26	06:14 20:22	07:09 19:05	08:06 16:54	08:05 16:02	08:37 15:58
28	05:21 21:24	06:15 20:19	07:11 19:03	08:08 16:52	08:07 16:01	08:37 15:59
29	05:22 21:23	06:17 20:17	07:13 19:00	08:10 16:50	08:09 16:00	08:37 16:00
30	05:24 21:21	06:19 20:15	07:15 18:58	08:12 16:48	08:10 15:53	08:37 16:01
31	05:26 21:19	06:21 20:12		08:14 16:46	08:10 15:51	08:37 16:02
Sonnenscheinstunden	515	461	383	328	257	231
astr.max.mögl.Beschattung			1	33	508	63

**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:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 21 - IO 21 Morest, Grömitz  
**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	08:37 16:03	08:06 16:55	07:08 17:52		06:52 19:51	10	19:14 (WEA 15 (GCN)) 19:24 (WEA 15 (GCN))	05:41 20:47	19:43 (WEA_G3) 20:04 (WEA_G3)	04:51 21:38
2	08:37 16:04	08:04 16:57	07:05 17:54	2	17:24 (WEA 17 (GCN)) 17:26 (WEA 17 (GCN))	11	19:15 (WEA 15 (GCN)) 19:26 (WEA 15 (GCN))	05:39 20:49	19:44 (WEA_G3) 20:02 (WEA_G3)	04:50 21:40
3	08:37 16:05	08:02 16:59	07:03 17:56	3	17:23 (WEA 17 (GCN)) 17:29 (WEA 17 (GCN))	11	19:16 (WEA 15 (GCN)) 19:27 (WEA 16 (GCN))	05:37 20:51	19:45 (WEA_G3) 20:00 (WEA_G3)	04:49 21:41
4	08:36 16:07	08:01 17:01	07:00 17:58	4	17:21 (WEA 17 (GCN)) 17:30 (WEA 17 (GCN))	13	19:17 (WEA 16 (GCN)) 19:30 (WEA 16 (GCN))	05:35 20:53	19:49 (WEA_G3) 19:59 (WEA_G3)	04:48 21:42
5	08:36 16:08	07:59 17:03	06:58 18:00	5	17:21 (WEA 17 (GCN)) 17:33 (WEA 17 (GCN))	16	19:16 (WEA 16 (GCN)) 19:32 (WEA 16 (GCN))	05:33 20:55		04:47 21:43
6	08:36 16:09	07:57 17:05	06:56 18:01	6	17:21 (WEA 17 (GCN)) 17:34 (WEA 17 (GCN))	18	19:15 (WEA 16 (GCN)) 19:33 (WEA 16 (GCN))	05:31 20:57		04:47 21:44
7	08:35 16:10	07:55 17:07	06:53 18:03	7	17:21 (WEA 17 (GCN)) 17:36 (WEA 17 (GCN))	20	19:15 (WEA 16 (GCN)) 19:35 (WEA_G2)	05:29 20:58		04:46 21:45
8	08:35 16:12	07:53 17:09	06:51 18:05	8	17:21 (WEA 17 (GCN)) 17:35 (WEA 17 (GCN))	21	19:15 (WEA 16 (GCN)) 19:36 (WEA_G2)	05:27 21:00		04:45 21:46
9	08:34 16:13	07:51 17:11	06:48 18:07	9	17:23 (WEA 17 (GCN)) 17:34 (WEA 17 (GCN))	24	19:15 (WEA 16 (GCN)) 19:39 (WEA_G2)	05:25 21:02		04:45 21:47
10	08:33 16:15	07:49 17:13	06:46 18:09	10	17:24 (WEA 17 (GCN)) 17:42 (WEA 18 (GCN))	25	19:16 (WEA 16 (GCN)) 19:41 (WEA_G2)	05:23 21:04		04:44 21:48
11	08:33 16:16	07:47 17:15	06:44 18:11	11	17:34 (WEA 18 (GCN)) 17:45 (WEA 18 (GCN))	25	19:17 (WEA 16 (GCN)) 19:42 (WEA_G2)	05:22 21:06		04:44 21:49
12	08:32 16:18	07:45 17:17	06:41 18:13	12	17:32 (WEA 18 (GCN)) 17:46 (WEA 18 (GCN))	25	19:19 (WEA 16 (GCN)) 19:44 (WEA_G2)	05:20 21:07		04:43 21:49
13	08:31 16:20	07:43 17:19	06:39 18:15	13	17:31 (WEA 18 (GCN)) 17:48 (WEA 18 (GCN))	18	19:27 (WEA_G2) 19:45 (WEA_G2)	05:18 21:09		04:43 21:50
14	08:30 16:21	07:41 17:21	06:36 18:17	14	17:30 (WEA 18 (GCN)) 17:50 (WEA 18 (GCN))	19	19:28 (WEA_G2) 19:47 (WEA_G2)	05:16 21:11		04:43 21:51
15	08:29 16:23	07:39 17:24	06:34 18:19	15	17:30 (WEA 18 (GCN)) 17:51 (WEA 18 (GCN))	17	19:29 (WEA_G2) 19:46 (WEA_G2)	05:14 21:13		04:42 21:51
16	08:28 16:25	07:37 17:26	06:31 18:21	16	17:29 (WEA 18 (GCN)) 17:51 (WEA 18 (GCN))	17	19:30 (WEA_G2) 19:52 (WEA_G3)	05:13 21:14		04:42 21:52
17	08:27 16:26	07:35 17:28	06:29 18:23	17	17:29 (WEA 18 (GCN)) 17:51 (WEA 18 (GCN))	17	19:31 (WEA_G2) 19:53 (WEA_G3)	05:11 21:16		04:42 21:53
18	08:26 16:28	07:33 17:30	06:26 18:25	18	17:29 (WEA 18 (GCN)) 17:50 (WEA 18 (GCN))	12	19:35 (WEA_G2) 19:55 (WEA_G3)	05:09 21:18		04:42 21:53
19	08:25 16:30	07:30 17:32	06:24 18:27	19	17:29 (WEA 18 (GCN)) 17:49 (WEA 18 (GCN))	12	19:45 (WEA_G3) 19:57 (WEA_G3)	05:08 21:19		04:42 21:53
20	08:24 16:32	07:28 17:34	06:21 18:28	20	17:29 (WEA 18 (GCN)) 17:48 (WEA 18 (GCN))	15	19:44 (WEA_G3) 19:59 (WEA_G3)	05:06 21:21		04:42 21:54
21	08:22 16:34	07:26 17:36	06:19 18:30	21	17:31 (WEA 18 (GCN)) 17:47 (WEA 18 (GCN))	18	19:42 (WEA_G3) 20:00 (WEA_G3)	05:05 21:23		04:42 21:54
22	08:21 16:35	07:24 17:38	06:16 18:32	22	17:32 (WEA 18 (GCN)) 17:44 (WEA 18 (GCN))	20	19:42 (WEA_G3) 20:02 (WEA_G3)	05:03 21:24		04:43 21:54
23	08:20 16:37	07:21 17:40	06:14 18:34	23	17:36 (WEA 18 (GCN)) 17:40 (WEA 18 (GCN))	21	19:42 (WEA_G3) 20:03 (WEA_G3)	05:02 21:26		04:43 21:54
24	08:18 16:39	07:19 17:42	06:11 18:36	24	05:57 20:34	24	19:41 (WEA_G3) 20:05 (WEA_G3)	05:00 21:27		04:43 21:54
25	08:17 16:41	07:17 17:44	06:09 18:38	25	05:54 20:36	26	19:41 (WEA_G3) 20:07 (WEA_G3)	04:59 21:29		04:43 21:54
26	08:16 16:43	07:15 17:46	06:06 18:40	26	05:52 20:38	27	19:41 (WEA_G3) 20:08 (WEA_G3)	04:58 21:30		04:44 21:54
27	08:14 16:45	07:12 17:48	06:04 18:42	27	05:50 20:40	26	19:41 (WEA_G3) 20:07 (WEA_G3)	04:57 21:32		04:44 21:54
28	08:13 16:47	07:10 17:50	06:01 18:44	28	05:48 20:42	25	19:41 (WEA_G3) 20:06 (WEA_G3)	04:55 21:33		04:45 21:54
29	08:11 16:49	06:59 19:45		29	05:46 20:44	23	19:42 (WEA_G3) 20:05 (WEA_G3)	04:54 21:34		04:45 21:54
30	08:09 16:51	06:57 19:47		30	05:44 20:46	23	19:42 (WEA_G3) 20:05 (WEA_G3)	04:53 21:36		04:46 21:54
31	08:08 16:53	06:54 19:49		31	05:42 20:48		04:52 21:37			
	Sonnenscheinstunden astr. max. mögl. Beschattung	248 272	367 328		421 579		496 64			513

**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:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 21 - IO 21 Morest, Grömitz**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

Juli		August		September		Oktober		November		Dezember	
1	04:47 21:53	05:27 21:17		06:23 20:10	25	19:16 (WEA 16 (GCN)) 19:41 (WEA_G2)	07:17 18:55	16	18:10 (WEA 18 (GCN)) 18:26 (WEA 18 (GCN))	07:16 16:44	08:12 15:58
2	04:47 21:53	05:29 21:16		06:24 20:07	25	19:14 (WEA 16 (GCN)) 19:39 (WEA_G2)	07:19 18:53	12	18:11 (WEA 18 (GCN)) 18:23 (WEA 18 (GCN))	07:18 16:42	08:13 15:58
3	04:48 21:53	05:31 21:14		06:26 20:05	24	19:13 (WEA 16 (GCN)) 19:37 (WEA_G2)	07:20 18:50	8	18:13 (WEA 18 (GCN)) 18:21 (WEA 18 (GCN))	07:20 16:40	08:15 15:57
4	04:49 21:52	05:32 21:12		06:28 20:02	21	19:12 (WEA 16 (GCN)) 19:33 (WEA_G2)	07:22 18:48	12	18:01 (WEA 17 (GCN)) 18:19 (WEA 18 (GCN))	07:22 16:38	08:16 15:56
5	04:50 21:51	05:34 21:10		06:30 20:00	20	19:11 (WEA 16 (GCN)) 19:31 (WEA_G2)	07:24 18:45	12	17:59 (WEA 17 (GCN)) 18:11 (WEA 17 (GCN))	07:24 16:36	08:18 15:56
6	04:51 21:51	05:36 21:08		06:32 19:58	18	19:11 (WEA 16 (GCN)) 19:29 (WEA 16 (GCN))	07:26 18:43	14	17:58 (WEA 17 (GCN)) 18:12 (WEA 17 (GCN))	07:26 16:34	08:19 15:55
7	04:52 21:50	05:38 21:06		06:33 19:55	15	19:12 (WEA 16 (GCN)) 19:27 (WEA 16 (GCN))	07:28 18:40	14	17:57 (WEA 17 (GCN)) 18:11 (WEA 17 (GCN))	07:28 16:32	08:21 15:55
8	04:53 21:49	05:39 21:04		06:35 19:53	13	19:11 (WEA 16 (GCN)) 19:24 (WEA 16 (GCN))	07:30 18:38	13	17:56 (WEA 17 (GCN)) 18:09 (WEA 17 (GCN))	07:30 16:30	08:22 15:54
9	04:54 21:49	05:41 21:02	6	06:37 19:50	12	19:56 (WEA_G3) 20:08 (WEA_G3)	07:32 18:36	11	17:56 (WEA 17 (GCN)) 18:07 (WEA 17 (GCN))	07:32 16:28	08:23 15:54
10	04:55 21:48	05:43 21:00	12	06:39 19:48	10	19:54 (WEA_G3) 20:10 (WEA_G3)	07:34 18:33	7	17:57 (WEA 17 (GCN)) 18:04 (WEA 17 (GCN))	07:34 16:26	08:24 15:53
11	04:56 21:47	05:45 20:58	16	06:41 19:45	9	19:53 (WEA_G3) 20:12 (WEA_G3)	07:35 18:31	5	17:57 (WEA 17 (GCN)) 18:02 (WEA 17 (GCN))	07:36 16:25	08:26 15:53
12	04:57 21:46	05:47 20:56	19	06:42 19:43	8	19:51 (WEA_G3) 20:12 (WEA_G3)	07:37 18:28	1	17:58 (WEA 17 (GCN)) 17:59 (WEA 17 (GCN))	07:38 16:23	08:27 15:53
13	04:59 21:45	05:48 20:54	23	06:44 19:40	6	19:50 (WEA_G3) 20:13 (WEA_G3)	07:39 18:26		07:40 16:21	08:28 15:53	
14	05:00 21:44	05:50 20:51	24	06:46 19:38	3	19:50 (WEA_G3) 20:14 (WEA_G3)	07:41 18:24		07:42 16:20	08:29 15:53	
15	05:01 21:43	05:52 20:49	26	06:48 19:35		19:48 (WEA_G3) 20:14 (WEA_G3)	07:43 18:21		07:43 16:18	08:30 15:53	
16	05:03 21:42	05:54 20:47	26	06:50 19:33		19:48 (WEA_G3) 20:14 (WEA_G3)	07:45 18:19		07:45 16:16	08:31 15:53	
17	05:04 21:40	05:56 20:45	27	06:51 19:30		19:48 (WEA_G3) 20:15 (WEA_G3)	07:47 18:17		07:47 16:15	08:32 15:53	
18	05:05 21:39	05:57 20:43	25	06:53 19:28		19:47 (WEA_G3) 20:12 (WEA_G3)	07:49 18:14		07:49 16:13	08:32 15:53	
19	05:07 21:38	05:59 20:40	24	06:55 19:25		19:47 (WEA_G3) 20:11 (WEA_G3)	07:51 18:12		07:51 16:12	08:33 15:53	
20	05:08 21:37	06:01 20:38	22	06:57 19:23		19:47 (WEA_G3) 20:09 (WEA_G3)	07:53 18:10		07:53 16:11	08:34 15:54	
21	05:10 21:35	06:03 20:36	19	06:59 19:20	11	19:47 (WEA_G3) 20:06 (WEA_G3)	07:54 18:07		07:55 16:09	08:34 15:54	
22	05:11 21:34	06:05 20:33	17	07:00 19:18	15	19:47 (WEA_G3) 20:04 (WEA_G3)	07:56 18:05		07:57 16:08	08:35 15:55	
23	05:13 21:32	06:06 20:31	14	07:02 19:15	18	19:48 (WEA_G3) 20:02 (WEA_G3)	07:58 18:03		07:58 16:07	08:35 15:55	
24	05:14 21:31	06:08 20:29	11	07:04 19:13	20	19:49 (WEA_G3) 20:00 (WEA_G3)	08:00 18:01		08:00 16:05	08:36 15:56	
25	05:16 21:29	06:10 20:27	13	07:06 19:10	21	19:37 (WEA_G2) 19:57 (WEA_G3)	07:02 16:58		08:02 16:04	08:36 15:56	
26	05:17 21:28	06:12 20:24	16	07:08 19:08	22	19:34 (WEA_G2) 19:55 (WEA_G3)	07:04 16:56		08:04 16:03	08:36 15:57	
27	05:19 21:26	06:14 20:22	16	07:09 19:05	23	19:32 (WEA_G2) 19:53 (WEA_G3)	07:06 16:54		08:05 16:02	08:37 15:58	
28	05:21 21:24	06:15 20:19	17	07:11 19:03	22	19:30 (WEA_G2) 19:47 (WEA_G2)	07:08 16:52		08:07 16:01	08:37 15:59	
29	05:22 21:23	06:17 20:17	19	07:13 19:00	22	19:29 (WEA_G2) 19:48 (WEA_G2)	07:10 16:50		08:09 16:00	08:37 16:00	
30	05:24 21:21	06:19 20:15	18	07:15 18:58	18	19:28 (WEA_G2) 19:46 (WEA_G2)	07:12 16:48		08:10 15:59	08:37 16:01	
31	05:26 21:19	06:21 20:12	18	07:14 19:44		19:19 (WEA 16 (GCN)) 19:44 (WEA_G2)	07:14 16:46		08:37 16:02	16:01 231	
Sonnenscheinstunden	515	461		383	401		328	125	257		
astr.max.mögl.Beschattung		456									

**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) Schatteneende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6,0) **Schattenrezeptor:** IO 22 - IO 22 Poggenpohl 4 (Cismarfelde)

### 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	08:37 16:03	08:06 16:55	07:08 17:52		06:52 19:51	05:41 20:47		04:51 21:38	16 20:47 (WEA_G1) 21:03 (WEA_G1)
2	08:37 16:04	08:04 16:57	07:05 17:54		06:49 19:53	05:39 20:49		04:50 21:40	17 20:47 (WEA_G1) 21:04 (WEA_G1)
3	08:37 16:05	08:02 16:59	07:03 17:56		06:47 19:55	05:37 20:51		04:49 21:41	18 20:48 (WEA_G1) 21:06 (WEA_G1)
4	08:36 16:07	08:01 17:01	07:01 17:58		06:44 19:57	05:35 20:53		04:48 21:42	19 20:48 (WEA_G1) 21:07 (WEA_G1)
5	08:36 16:08	07:59 17:03	06:58 18:00		06:42 19:59	05:33 20:55		04:47 21:43	19 20:48 (WEA_G1) 21:07 (WEA_G1)
6	08:36 16:09	07:57 17:05	06:56 18:02		06:39 20:01	05:31 20:57		04:47 21:44	19 20:49 (WEA_G1) 21:08 (WEA_G1)
7	08:35 16:11	07:55 17:07	06:53 18:03		06:37 20:02	05:29 20:58		04:46 21:45	18 20:49 (WEA_G1) 21:07 (WEA_G1)
8	08:35 16:12	07:53 17:09	06:51 18:05		06:34 20:04	05:27 21:00		04:45 21:46	18 20:50 (WEA_G1) 21:08 (WEA_G1)
9	08:34 16:13	07:51 17:11	06:48 18:07		06:32 20:06	05:25 21:02		04:45 21:47	17 20:50 (WEA_G1) 21:07 (WEA_G1)
10	08:33 16:15	07:49 17:13	06:46 18:09		06:30 20:08	05:23 21:04		04:44 21:48	16 20:51 (WEA_G1) 21:07 (WEA_G1)
11	08:33 16:16	07:47 17:15	06:44 18:11		06:27 20:10	05:22 21:06		04:44 21:49	16 20:51 (WEA_G1) 21:07 (WEA_G1)
12	08:32 16:18	07:45 17:17	06:41 18:13		06:25 20:12	05:20 21:07		04:43 21:49	16 20:51 (WEA_G1) 21:07 (WEA_G1)
13	08:31 16:20	07:43 17:19	06:39 18:15		06:22 20:14	05:18 21:09		04:43 21:50	15 20:52 (WEA_G1) 21:07 (WEA_G1)
14	08:30 16:21	07:41 17:22	06:36 18:17		06:20 20:16	05:16 21:11		04:43 21:51	14 20:53 (WEA_G1) 21:07 (WEA_G1)
15	08:29 16:23	07:39 17:24	06:34 18:19		06:18 20:17	05:14 21:13		04:43 21:51	14 20:53 (WEA_G1) 21:07 (WEA_G1)
16	08:28 16:25	07:37 17:26	06:31 18:21		06:15 20:19	05:13 21:14		04:42 21:52	13 20:53 (WEA_G1) 21:06 (WEA_G1)
17	08:27 16:26	07:35 17:28	06:29 18:23		06:13 20:21	05:11 21:16		04:42 21:53	13 20:53 (WEA_G1) 21:06 (WEA_G1)
18	08:26 16:28	07:33 17:30	06:26 18:25		06:10 20:23	05:09 21:18		04:42 21:53	14 20:54 (WEA_G1) 21:08 (WEA_G1)
19	08:25 16:30	07:30 17:32	06:24 18:27		06:08 20:25	05:08 21:19		04:42 21:53	13 20:55 (WEA_G1) 21:08 (WEA_G1)
20	08:24 16:32	07:28 17:34	06:21 18:28		06:06 20:27	05:06 21:21		04:42 21:54	13 20:55 (WEA_G1) 21:08 (WEA_G1)
21	08:22 16:34	07:26 17:36	06:19 18:30		06:04 20:29	05:05 21:23	20:47 (WEA_G1)	04:42 21:54	13 20:55 (WEA_G1) 21:08 (WEA_G1)
22	08:21 16:36	07:24 17:38	06:16 18:32	18:04 (WEA 20 (GCS))	06:01 20:31	05:03 21:24	20:47 (WEA_G1)	04:43 21:54	13 20:55 (WEA_G1) 21:08 (WEA_G1)
23	08:20 16:37	07:21 17:40	06:14 18:34	18:05 (WEA 20 (GCS)) 18:07 (WEA 20 (GCS)) 18:08 (WEA 20 (GCS))	05:59 20:32	05:02 21:26	20:46 (WEA_G1)	04:43 21:54	13 20:55 (WEA_G1) 21:08 (WEA_G1)
24	08:18 16:39	07:19 17:42	06:11 18:36		05:57 20:34	05:00 21:27	20:52 (WEA_G1)	04:43 21:54	13 20:56 (WEA_G1) 21:09 (WEA_G1)
25	08:17 16:41	07:17 17:44	06:09 18:38		05:54 20:36	04:59 21:29	20:46 (WEA_G1)	04:43 21:54	13 20:55 (WEA_G1) 21:09 (WEA_G1)
26	08:16 16:43	07:15 17:46	06:06 18:40		05:52 20:38	04:58 21:30	20:46 (WEA_G1)	04:44 21:54	14 20:56 (WEA_G1) 21:09 (WEA_G1)
27	08:14 16:45	07:12 17:48	06:04 18:42		05:50 20:40	04:57 21:32	20:46 (WEA_G1)	04:44 21:54	13 20:55 (WEA_G1) 21:09 (WEA_G1)
28	08:13 16:47	07:10 17:50	06:02 18:44		05:48 20:42	04:55 21:33	20:58 (WEA_G1)	04:45 21:54	14 20:56 (WEA_G1) 21:10 (WEA_G1)
29	08:11 16:49	07:09 19:45	06:59 19:45		05:46 20:44	04:54 21:34	20:46 (WEA_G1)	04:45 21:54	14 20:55 (WEA_G1) 21:10 (WEA_G1)
30	08:09 16:51	07:08 19:47	06:57 19:47		05:44 20:46	04:53 21:36	21:00 (WEA_G1)	04:46 21:54	15 20:56 (WEA_G1) 21:11 (WEA_G1)
31	08:08 16:53	07:07 19:49	06:54 19:49		04:52 21:37	04:52 21:02 (WEA_G1)	20:47 (WEA_G1)		
Sonnenscheinstunden		248	272	367	421	496		513	
astr.max.mögl.Beschattung				2		106			455

**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:

SWP Windpark Großenholz

Lizenzierter Anwender:

GL Garrad Hassan Deutschland GmbH  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:

22.06.2022 20:19/3.5.584

### SHADOW - Kalender

Berechnung: Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) Schattenrezeptor: IO 22 - IO 22 Poggenpohl 4 (Cismarfelde)

#### 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

Juli		August		September		Oktober		November		Dezember	
1	04:47	20:55 (WEA_G1)	05:27	06:23		07:17	07:16	08:12			
	21:53	21:11 (WEA_G1)	21:17	20:10		18:55	16:44	15:58			
2	04:48	20:55 (WEA_G1)	05:29	06:24		07:19	07:18	08:13			
	21:53	21:11 (WEA_G1)	21:16	20:07		18:53	16:42	15:58			
3	04:48	20:55 (WEA_G1)	05:31	06:26		07:21	07:20	08:15			
	21:53	21:12 (WEA_G1)	21:14	20:05		18:50	16:40	15:57			
4	04:49	20:55 (WEA_G1)	05:33	06:28		07:22	07:22	08:16			
	21:52	21:13 (WEA_G1)	21:12	20:03		18:48	16:38	15:56			
5	04:50	20:56 (WEA_G1)	05:34	06:30		07:24	07:24	08:18			
	21:51	21:13 (WEA_G1)	21:10	20:00		18:45	16:36	15:56			
6	04:51	20:55 (WEA_G1)	05:36	06:32		07:26	07:26	08:19			
	21:51	21:13 (WEA_G1)	21:08	19:58		18:43	16:34	15:55			
7	04:52	20:55 (WEA_G1)	05:38	06:33		07:28	07:28	08:21			
	21:50	21:13 (WEA_G1)	21:06	19:55		18:40	16:32	15:55			
8	04:53	20:55 (WEA_G1)	05:40	06:35		07:30	07:30	08:22			
	21:49	21:13 (WEA_G1)	21:04	19:53		18:38	16:30	15:54			
9	04:54	20:55 (WEA_G1)	05:41	06:37		07:32	07:32	08:23			
	21:49	21:13 (WEA_G1)	21:02	19:50		18:36	16:28	15:54			
10	04:55	20:54 (WEA_G1)	05:43	06:39		07:34	07:34	08:24			
	21:48	21:12 (WEA_G1)	21:00	19:48		18:33	16:26	15:53			
11	04:56	20:54 (WEA_G1)	05:45	06:41		07:35	07:36	08:26			
	21:47	21:11 (WEA_G1)	20:58	19:45		18:31	16:25	15:53			
12	04:58	20:55 (WEA_G1)	05:47	06:42		07:37	07:38	08:27			
	21:46	21:11 (WEA_G1)	20:56	19:43		18:28	16:23	15:53			
13	04:59	20:55 (WEA_G1)	05:48	06:44		07:39	07:40	08:28			
	21:45	21:10 (WEA_G1)	20:54	19:40		18:26	16:21	15:53			
14	05:00	20:55 (WEA_G1)	05:50	06:46		07:41	07:42	08:29			
	21:44	21:09 (WEA_G1)	20:51	19:38		18:24	16:20	15:53			
15	05:01	20:55 (WEA_G1)	05:52	06:48		07:43	07:43	08:30			
	21:43	21:08 (WEA_G1)	20:49	19:35		18:21	16:18	15:53			
16	05:03	20:55 (WEA_G1)	05:54	06:50		07:45	07:45	08:31			
	21:42	21:07 (WEA_G1)	20:47	19:33		18:19	16:17	15:53			
17	05:04	20:56 (WEA_G1)	05:56	06:51		07:47	07:47	08:32			
	21:40	21:06 (WEA_G1)	20:45	19:30		18:17	16:15	15:53			
18	05:05	20:56 (WEA_G1)	05:57	06:53		07:49	07:49	08:32			
	21:39	21:05 (WEA_G1)	20:43	19:28		18:14	16:14	15:53			
19	05:07	20:56 (WEA_G1)	05:59	06:55		07:51	07:51	08:33			
	21:38	21:04 (WEA_G1)	20:40	19:25		18:12	16:12	15:54			
20	05:08	20:57 (WEA_G1)	06:01	06:57		07:53	07:53	08:34			
	21:37	21:03 (WEA_G1)	20:38	19:23		18:10	16:11	15:54			
21	05:10	20:57 (WEA_G1)	06:03	06:59		07:54	07:55	08:34			
	21:35	21:01 (WEA_G1)	20:36	19:20	1	18:50 (WEA 20 (GCS))	18:07	16:09	15:54		
						18:51 (WEA 20 (GCS))	07:56	07:57	08:35		
22	05:11	20:57 (WEA_G1)	06:05	07:00		07:56	07:57	08:35			
	21:34	21:00 (WEA_G1)	20:33	19:18	1	18:48 (WEA 20 (GCS))	18:05	16:08	15:55		
						18:49 (WEA 20 (GCS))	07:58	07:58	08:35		
23	05:13	20:58 (WEA_G1)	06:06	07:02		07:58	07:58	08:35			
	21:32	20:59 (WEA_G1)	20:31	19:15		18:03	16:07	15:55			
24	05:14		06:08	07:04		08:00	08:00	08:36			
	21:31		20:29	19:13		18:01	16:06	15:56			
25	05:16		06:10	07:06		07:02	08:02	08:36			
	21:29		20:27	19:10		16:58	16:04	15:56			
26	05:17		06:12	07:08		07:04	08:04	08:36			
	21:28		20:24	19:08		16:56	16:03	15:57			
27	05:19		06:14	07:10		07:06	08:05	08:37			
	21:26		20:22	19:05		16:54	16:02	15:58			
28	05:21		06:15	07:11		07:08	08:07	08:37			
	21:24		20:19	19:03		16:52	16:01	15:59			
29	05:22		06:17	07:13		07:10	08:09	08:37			
	21:23		20:17	19:00		16:50	16:00	16:00			
30	05:24		06:19	07:15		07:12	08:10	08:37			
	21:21		20:15	18:58		16:48	15:59	16:01			
31	05:26		06:21			07:14		08:37			
	21:19		20:12			16:46		16:02			
	Sonnenscheinstunden	515	461	383		328	257	231			
	astr.max.mögl.Beschattung	302		2							

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:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 23 - IO 23 Poggenpohl 1 (Cismarfelde)

### 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	08:37	08:06	07:08		06:52	05:41		04:51
	16:03	16:55	17:52		19:51	20:47		21:38
2	08:37	08:04	07:05		06:49	05:39		04:50
	16:04	16:57	17:54		19:53	20:49		21:40
3	08:37	08:02	07:03		06:47	05:37		04:49
	16:05	16:59	17:56		19:55	20:51		21:41
4	08:36	08:01	07:01		06:44	05:35		04:48
	16:07	17:01	17:58		19:57	20:53		21:42
5	08:36	07:59	06:58		06:42	05:33		04:48
	16:08	17:03	18:00		19:59	20:55		21:43
6	08:36	07:57	06:56		06:39	05:31		04:47
	16:09	17:05	18:02		20:01	20:57		21:44
7	08:35	07:55	06:53		06:37	05:29		04:46
	16:11	17:07	18:03		20:02	20:58		21:45
8	08:35	07:53	06:51		06:34	05:27		04:45
	16:12	17:09	18:05		20:04	21:00		21:46
9	08:34	07:51	06:48		06:32	05:25		04:45
	16:13	17:11	18:07		20:06	21:02		21:47
10	08:33	07:49	06:46		06:30	05:23		04:44
	16:15	17:13	18:09		20:08	21:04		21:48
11	08:33	07:47	06:44		06:27	05:22		04:44
	16:16	17:15	18:11		20:10	21:06		21:49
12	08:32	07:45	06:41		06:25	05:20		04:43
	16:18	17:17	18:13		20:12	21:07		21:49
13	08:31	07:43	06:39		06:22	05:18		04:43
	16:20	17:19	18:15		20:14	21:09		21:50
14	08:30	07:41	06:36		06:20	05:16		04:43
	16:21	17:22	18:17		20:16	21:11		21:51
15	08:29	07:39	06:34		06:18	05:14		04:43
	16:23	17:24	18:19		20:17	21:13		21:51
16	08:28	07:37	06:31		06:15	05:13		04:42
	16:25	17:26	18:21		20:19	21:14		21:52
17	08:27	07:35	06:29		06:13	05:11		04:42
	16:26	17:28	18:23		20:21	21:16		21:53
18	08:26	07:33	06:26		06:10	05:09		04:42
	16:28	17:30	18:25		20:23	21:18		21:53
19	08:25	07:30	06:24		06:08	05:08		04:42
	16:30	17:32	18:27		20:25	21:19		21:53
20	08:24	07:28	06:21		06:06	05:06		04:42
	16:32	17:34	18:28		20:27	21:21		21:54
21	08:22	07:26	06:19		06:04	05:05		04:42
	16:34	17:36	18:30		20:29	21:23		21:54
22	08:21	07:24	06:16		06:01	05:03		04:43
	16:36	17:38	18:32		20:31	21:24		21:54
23	08:20	07:21	06:14		05:59	05:02		04:43
	16:37	17:40	18:34		20:32	21:26		21:54
24	08:18	07:19	06:11		05:57	05:00		04:43
	16:39	17:42	18:36		20:34	21:27		21:54
25	08:17	07:17	06:09		05:54	04:59		04:44
	16:41	17:44	18:38		20:36	21:29		21:54
26	08:16	07:15	06:06		05:52	04:58		04:44
	16:43	17:46	18:40		20:38	21:30		21:54
27	08:14	07:12	06:04		05:50	04:57		04:44
	16:45	17:48	18:42		20:40	21:32		21:54
28	08:13	07:10	06:02		05:48	04:55		04:45
	16:47	17:50	18:44		20:42	21:33		21:54
29	08:11		06:59		05:46	04:54		04:45
	16:49		19:45	1	19:19 (WEA 20 (GCS))	20:44		21:54
30	08:09		06:57		19:19 (WEA 20 (GCS))	05:44		04:46
	16:51		19:47	1	19:20 (WEA 20 (GCS))	20:46	1	21:00 (WEA_G1)
31	08:08		06:54					21:00 (WEA_G1)
	16:53		19:49				2	21:02 (WEA_G1)
Sonnenscheinstunden	248	272	367		421	496		513
astr.max.mögl.Beschattung				2			3	351

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:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 23 - IO 23 Poggenpohl 1 (Cismarfelde)

### 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

	Juli	August	September		Oktober	November	Dezember	
1	04:47	21:04 (WEA_G1)	05:27	06:23	07:17	07:16	08:12	
	21:53	21:17 (WEA_G1)	21:17	20:10	18:55	16:44	15:58	
2	04:48	21:05 (WEA_G1)	05:29	06:24	07:19	07:18	08:13	
	21:53	21:17 (WEA_G1)	21:16	20:07	18:53	16:42	15:58	
3	04:48	21:05 (WEA_G1)	05:31	06:26	07:21	07:20	08:15	
	21:53	21:16 (WEA_G1)	21:14	20:05	18:50	16:40	15:57	
4	04:49	21:06 (WEA_G1)	05:33	06:28	07:22	07:22	08:16	
	21:52	21:16 (WEA_G1)	21:12	20:03	18:48	16:38	15:56	
5	04:50	21:06 (WEA_G1)	05:34	06:30	07:24	07:24	08:18	
	21:51	21:16 (WEA_G1)	21:10	20:00	18:45	16:36	15:56	
6	04:51	21:05 (WEA_G1)	05:36	06:32	07:26	07:26	08:19	
	21:51	21:14 (WEA_G1)	21:08	19:58	18:43	16:34	15:55	
7	04:52	21:06 (WEA_G1)	05:38	06:33	07:28	07:28	08:21	
	21:50	21:14 (WEA_G1)	21:06	19:55	18:40	16:32	15:55	
8	04:53	21:06 (WEA_G1)	05:40	06:35	07:30	07:30	08:22	
	21:49	21:13 (WEA_G1)	21:04	19:53	18:38	16:30	15:54	
9	04:54	21:06 (WEA_G1)	05:41	06:37	07:32	07:32	08:23	
	21:49	21:13 (WEA_G1)	21:02	19:50	18:36	16:28	15:54	
10	04:55	21:06 (WEA_G1)	05:43	06:39	07:34	07:34	08:24	
	21:48	21:12 (WEA_G1)	21:00	19:48	18:33	16:26	15:53	
11	04:56	21:07 (WEA_G1)	05:45	06:41	07:35	07:36	08:26	
	21:47	21:11 (WEA_G1)	20:58	19:45	18:31	16:25	15:53	
12	04:58	21:08 (WEA_G1)	05:47	06:42	07:37	07:38	08:27	
	21:46	21:11 (WEA_G1)	20:56	19:43	18:28	16:23	15:53	
13	04:59	21:08 (WEA_G1)	05:48	06:44	19:11 (WEA 20 (GCS))	07:39	07:40	08:28
	21:45	21:10 (WEA_G1)	20:54	19:40	19:12 (WEA 20 (GCS))	18:26	16:21	15:53
14	05:00		05:50	06:46		07:41	07:42	08:29
	21:44		20:51	19:38		18:24	16:20	15:53
15	05:01		05:52	06:48		07:43	07:43	08:30
	21:43		20:49	19:35		18:21	16:18	15:53
16	05:03		05:54	06:50		07:45	07:45	08:31
	21:42		20:47	19:33		18:19	16:17	15:53
17	05:04		05:56	06:51		07:47	07:47	08:32
	21:40		20:45	19:30		18:17	16:15	15:53
18	05:05		05:57	06:53		07:49	07:49	08:32
	21:39		20:43	19:28		18:14	16:14	15:53
19	05:07		05:59	06:55		07:51	07:51	08:33
	21:38		20:40	19:25		18:12	16:12	15:54
20	05:08		06:01	06:57		07:53	07:53	08:34
	21:37		20:38	19:23		18:10	16:11	15:54
21	05:10		06:03	06:59		07:54	07:55	08:34
	21:35		20:36	19:20		18:07	16:09	15:54
22	05:11		06:05	07:00		07:56	07:57	08:35
	21:34		20:33	19:18		18:05	16:08	15:55
23	05:13		06:06	07:02		07:58	07:58	08:35
	21:32		20:31	19:15		18:03	16:07	15:55
24	05:14		06:08	07:04		08:00	08:00	08:36
	21:31		20:29	19:13		18:01	16:06	15:56
25	05:16		06:10	07:06		07:02	08:02	08:36
	21:29		20:27	19:10		16:58	16:04	15:56
26	05:17		06:12	07:08		07:04	08:04	08:36
	21:28		20:24	19:08		16:56	16:03	15:57
27	05:19		06:14	07:10		07:06	08:05	08:37
	21:26		20:22	19:05		16:54	16:02	15:58
28	05:21		06:15	07:11		07:08	08:07	08:37
	21:24		20:19	19:03		16:52	16:01	15:59
29	05:22		06:17	07:13		07:10	08:09	08:37
	21:23		20:17	19:00		16:50	16:00	16:00
30	05:24		06:19	07:15		07:12	08:10	08:37
	21:21		20:15	18:58		16:48	15:59	16:01
31	05:26		06:21			07:14		08:37
	21:19		20:12			16:46		16:02
	Sonnenscheinstunden	514	461	383	328	257	231	
	astr.max.mögl.Beschattung	102		1				

**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) Schatteneende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 24 - IO 24 Wintersberg  
**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 Sonneneinfallrichtung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April		Mai		Juni
1	08:37 16:03	08:06 16:55	07:08 17:52	06:52 19:51		05:41 20:47		04:51 21:38
2	08:37 16:04	08:04 16:57	07:05 17:54	06:49 19:53		05:39 20:49		04:50 21:39
3	08:36 16:05	08:02 16:59	07:03 17:56	06:47 19:55		05:37 20:51		04:49 21:41
4	08:36 16:06	08:01 17:01	07:00 17:58	06:44 19:57		05:35 20:53	20:21 (WEA 16 (GCN))	04:48 21:42
5	08:36 16:08	07:59 17:03	06:58 17:59	06:42 19:59		05:33 20:55	20:22 (WEA 16 (GCN))	04:47 21:43
6	08:35 16:09	07:57 17:05	06:56 18:01	06:39 20:00		05:31 20:57	20:24 (WEA 16 (GCN))	04:47 21:44
7	08:35 16:10	07:55 17:07	06:53 18:03	06:37 20:02		05:29 20:58	20:26 (WEA 16 (GCN))	04:46 21:45
8	08:34 16:12	07:53 17:09	06:51 18:05	06:34 20:04		05:27 21:00	20:23 (WEA 16 (GCN))	04:45 21:46
9	08:34 16:13	07:51 17:11	06:48 18:07	06:32 20:06		05:25 21:02	20:27 (WEA 16 (GCN))	04:45 21:47
10	08:33 16:15	07:49 17:13	06:46 18:09	06:29 20:08		05:23 21:04		04:44 21:48
11	08:32 16:16	07:47 17:15	06:44 18:11	06:27 20:10		05:22 21:06		04:44 21:49
12	08:32 16:18	07:45 17:17	06:41 18:13	06:25 20:12	19:43 (WEA 17 (GCN))	05:20 21:07		04:43 21:49
13	08:31 16:20	07:43 17:19	06:39 18:15	06:22 20:14	19:44 (WEA 17 (GCN))	05:18 21:09		04:43 21:50
14	08:30 16:21	07:41 17:21	06:36 18:17	06:20 20:15	19:45 (WEA 17 (GCN))	05:16 21:11		04:43 21:51
15	08:29 16:23	07:39 17:23	06:34 18:19	06:17 20:17	19:44 (WEA 17 (GCN))	05:14 21:13		04:42 21:51
16	08:28 16:25	07:37 17:26	06:31 18:21	06:15 20:19	19:47 (WEA 17 (GCN))	05:13 21:14		04:42 21:52
17	08:27 16:26	07:35 17:28	06:29 18:23	06:13 20:21	19:46 (WEA 17 (GCN))	05:11 21:16		04:42 21:52
18	08:26 16:28	07:32 17:30	06:26 18:25	06:10 20:23	19:48 (WEA 17 (GCN))	05:09 21:18		04:42 21:53
19	08:25 16:30	07:30 17:32	06:24 18:26	06:08 20:25		05:08 21:19		04:42 21:53
20	08:24 16:32	07:28 17:34	06:21 18:28	06:06 20:27		05:06 21:21		04:42 21:54
21	08:22 16:34	07:26 17:36	06:19 18:30	06:03 20:29		05:05 21:22		04:42 21:54
22	08:21 16:35	07:24 17:38	06:16 18:32	06:01 20:31		05:03 21:24		04:43 21:54
23	08:20 16:37	07:21 17:40	06:14 18:34	05:59 20:32		05:02 21:26		04:43 21:54
24	08:18 16:39	07:19 17:42	06:11 18:36	05:57 20:34		05:00 21:27		04:43 21:54
25	08:17 16:41	07:17 17:44	06:09 18:38	05:54 20:36	20:04 (WEA 18 (GCN))	04:59 21:29		04:43 21:54
26	08:15 16:43	07:15 17:46	06:06 18:40	05:52 20:38	20:07 (WEA 18 (GCN))	04:58 21:30		04:44 21:54
27	08:14 16:45	07:12 17:48	06:04 18:42	05:50 20:40	20:04 (WEA 18 (GCN))	04:56 21:32		04:44 21:54
28	08:12 16:47	07:10 17:50	06:01 18:43	05:48 20:42	20:10 (WEA 18 (GCN))	04:55 21:33		04:45 21:54
29	08:11 16:49		06:59 19:45	05:46 20:44	20:04 (WEA 18 (GCN))	04:54 21:34		04:45 21:54
30	08:09 16:51		06:56 19:47	05:43 20:45	20:06 (WEA 18 (GCN))	04:53 21:36		04:46 21:54
31	08:08 16:53		06:54 19:49		20:11 (WEA 18 (GCN))	04:52 21:37		
Sonnenscheinstunden		248	272	367	421	496		513
astr.max.mögl.Beschattung					35		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	Zeitpunkt (SS:MM) Schatteneinde	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 24 - IO 24 Wintersberg  
**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

	July	August	September	Oktober	November	Dezember	
1	04:47 21:53	05:27 21:17	06:23 20:10	07:17 18:55	07:16 16:44	08:12 15:58	
2	04:47 21:53	05:29 21:15	06:24 20:07	07:19 18:53	07:18 16:42	08:13 15:58	
3	04:48 21:52	05:31 21:14	06:26 20:05	07:20 18:50	07:20 16:40	08:15 15:57	
4	04:49 21:52	05:32 21:12	06:28 20:02	07:22 18:48	07:22 16:38	08:16 15:56	
5	04:50 21:51	05:34 21:10	20:34 (WEA 16 (GCN)) 20:37 (WEA 16 (GCN))	06:30 20:00	07:24 18:45	07:24 16:36	08:18 15:56
6	04:51 21:51	05:36 21:08	20:32 (WEA 16 (GCN)) 20:36 (WEA 16 (GCN))	06:32 19:58	07:26 18:43	07:26 16:34	08:19 15:55
7	04:52 21:50	05:38 21:06	20:31 (WEA 16 (GCN)) 20:35 (WEA 16 (GCN))	06:33 19:55	07:28 18:40	07:28 16:32	08:21 15:54
8	04:53 21:49	05:39 21:04	20:31 (WEA 16 (GCN)) 20:33 (WEA 16 (GCN))	06:35 19:53	07:30 18:38	07:30 16:30	08:22 15:54
9	04:54 21:49	05:41 21:02	20:30 (WEA 16 (GCN)) 20:31 (WEA 16 (GCN))	06:37 19:50	07:32 18:35	07:32 16:28	08:23 15:54
10	04:55 21:48	05:43 21:00	1 20:31 (WEA 16 (GCN))	19:50 06:39	18:35 07:33	16:28 07:34	15:54 08:24
11	04:56 21:47	05:45 20:58		19:48 06:41	18:33 07:35	16:26 07:36	15:53 08:26
12	04:57 21:46	05:47 20:56		19:45 06:42	18:31 07:37	16:25 07:38	15:53 08:27
13	04:59 21:45	05:48 20:53		19:43 06:44	18:28 07:39	16:23 07:40	15:53 08:28
14	05:00 21:44	05:50 20:51		19:40 06:46	18:26 07:41	16:21 07:41	15:53 08:29
15	05:01 21:43	05:52 20:49	6 20:14 (WEA 18 (GCN)) 20:20 (WEA 18 (GCN))	06:48 19:38	07:43 18:24	07:43 16:20	08:30 15:53
16	05:03 21:42	05:54 20:47	7 20:12 (WEA 18 (GCN)) 20:19 (WEA 18 (GCN))	06:48 19:35	07:43 18:21	07:43 16:18	08:30 15:53
17	05:04 21:40	05:56 20:45	6 20:11 (WEA 18 (GCN)) 20:17 (WEA 18 (GCN))	06:50 19:33	07:45 18:19	07:45 16:16	08:31 15:53
18	05:05 21:39	05:57 20:42	4 20:11 (WEA 18 (GCN)) 20:15 (WEA 18 (GCN))	06:51 19:30	07:47 18:16	07:47 16:15	08:31 15:53
19	05:07 21:38	05:59 20:40	2 20:10 (WEA 18 (GCN)) 20:12 (WEA 18 (GCN))	06:53 19:28	07:49 18:14	07:49 16:13	08:32 15:53
20	05:08 21:36	06:01 20:38		06:55 19:25	07:51 18:12	07:51 16:12	08:33 15:53
21	05:10 21:35	06:03 20:36		06:57 19:23	07:52 18:10	07:53 16:11	08:34 15:54
22	05:11 21:34	06:05 20:33		06:59 19:20	07:54 18:07	07:55 16:09	08:34 15:54
23	05:13 21:32	06:06 20:31		07:00 19:18	07:56 18:05	07:56 16:08	08:35 15:55
24	05:14 21:31	06:08 20:29		07:02 19:15	07:58 18:03	07:58 16:07	08:35 15:55
25	05:16 21:29	06:10 20:26		07:04 19:13	08:00 18:01	08:00 16:05	08:36 15:56
26	05:17 21:28	06:12 20:24		07:06 19:10	08:02 16:58	08:02 16:04	08:36 15:56
27	05:19 21:26	06:14 20:22		07:08 19:08	08:04 16:56	08:04 16:03	08:36 15:57
28	05:21 21:24	06:15 20:19		07:09 19:05	08:05 16:54	08:05 16:02	08:37 15:58
29	05:22 21:23	06:17 20:17	2 19:47 (WEA 17 (GCN)) 19:49 (WEA 17 (GCN))	07:11 19:03	08:07 16:52	08:07 16:01	08:37 15:59
30	05:24 21:21	06:19 20:15	4 19:44 (WEA 17 (GCN)) 19:48 (WEA 17 (GCN))	07:13 19:00	08:09 16:50	08:09 16:00	08:37 16:00
31	05:26 21:19	06:21 20:12	3 19:43 (WEA 17 (GCN)) 19:46 (WEA 17 (GCN))	07:15 18:58	08:10 16:48	08:10 15:59	08:37 16:01
	Sonnenscheinstunden   515	461		383	328	257	231
	astr.max.mögl.Beschattung	49					

**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) Schatteneende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 28 - IO 28 Cismarfelde 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 Sonneneinstrahlungsrichtung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:37	14:30 (WEA 20 (GCS))	08:06	07:08	06:52	07:15 (WEA 18 (GCN))
	16:03	31 15:01 (WEA 19 (GCS))	16:55	17:52	19:51	11 19:24 (WEA 12 (GRS))
2	08:37	14:30 (WEA 20 (GCS))	08:04	07:05	06:49	07:13 (WEA 18 (GCN))
	16:04	30 15:00 (WEA 19 (GCS))	16:57	17:54	19:53	15 19:26 (WEA 12 (GRS))
3	08:37	14:31 (WEA 20 (GCS))	08:03	07:03	06:47	07:11 (WEA 18 (GCN))
	16:05	29 15:00 (WEA 19 (GCS))	16:59	17:56	19:55	18 19:28 (WEA 12 (GRS))
4	08:36	14:33 (WEA 20 (GCS))	08:01	07:01	06:44	07:08 (WEA 18 (GCN))
	16:07	25 14:58 (WEA 20 (GCS))	17:01	17:58	19:57	19 19:30 (WEA 11 (GRS))
5	08:36	14:33 (WEA 20 (GCS))	07:59	06:58	06:42	07:08 (WEA 18 (GCN))
	16:08	25 14:58 (WEA 20 (GCS))	17:03	18:00	19:59	9 07:17 (WEA 18 (GCN))
6	08:36	14:33 (WEA 20 (GCS))	07:57	06:56	06:39	07:09 (WEA 18 (GCN))
	16:09	25 14:58 (WEA 20 (GCS))	17:05	18:02	20:01	5 07:14 (WEA 18 (GCN))
7	08:35	14:35 (WEA 20 (GCS))	07:55	06:53	06:37	05:29
	16:11	23 14:58 (WEA 20 (GCS))	17:07	18:04	20:02	20:59
8	08:35	14:35 (WEA 20 (GCS))	07:53	06:51	06:34	05:27
	16:12	23 14:58 (WEA 20 (GCS))	17:09	18:05	20:04	21:00
9	08:34	14:36 (WEA 20 (GCS))	07:51	06:49	06:32	05:25
	16:13	22 14:58 (WEA 20 (GCS))	17:11	18:07	20:06	21:02
10	08:33	14:37 (WEA 20 (GCS))	07:49	06:46	06:30	05:24
	16:15	21 14:58 (WEA 20 (GCS))	17:13	18:09	20:08	21:04
11	08:33	14:38 (WEA 20 (GCS))	07:47	06:44	06:27	05:22
	16:17	19 14:57 (WEA 20 (GCS))	17:15	18:11	20:10	21:06
12	08:32	14:39 (WEA 20 (GCS))	07:45	06:41	06:25	05:20
	16:18	18 14:57 (WEA 20 (GCS))	17:18	18:13	20:12	21:07
13	08:31	14:40 (WEA 20 (GCS))	07:43	06:39	06:22	05:18
	16:20	16 14:56 (WEA 20 (GCS))	17:20	18:15	20:14	21:09
14	08:30	14:42 (WEA 20 (GCS))	07:41	06:36	06:20	05:16
	16:21	14 14:56 (WEA 20 (GCS))	17:22	18:17	20:16	21:11
15	08:29	14:44 (WEA 20 (GCS))	07:39	06:34	06:18	05:15
	16:23	11 14:55 (WEA 20 (GCS))	17:24	18:19	20:18	21:13
16	08:28	14:46 (WEA 20 (GCS))	07:37	06:31	06:15	05:13
	16:25	4 14:52 (WEA 20 (GCS))	17:26	18:21	20:19	21:14
17	08:27		07:35	06:29	06:13	05:11
	16:27		17:28	18:23	20:21	21:16
18	08:26		07:33	06:26	06:11	05:10
	16:28		17:30	18:25	20:23	21:18
19	08:25		07:30	06:24	06:08	05:08
	16:30		17:32	18:27	20:25	21:19
20	08:24		07:28	06:21	06:06	05:06
	16:32		17:34	18:29	20:27	21:21
21	08:23		07:26	06:19	06:04	05:05
	16:34		17:36	18:30	20:29	21:23
22	08:21		07:24	06:17	06:01	05:03
	16:36		17:38	18:32	20:31	21:24
23	08:20		07:22	06:14	05:59	05:02
	16:37		17:40	18:34	20:33	21:26
24	08:19		07:19	06:12	05:57	05:01
	16:39		17:42	18:36	20:34	21:27
25	08:17		07:17	06:09	05:55	04:59
	16:41		17:44	18:38	20:36	21:29
26	08:16		07:15	06:07	05:52	04:58
	16:43		17:46	18:40	20:38	21:30
27	08:14		07:12	06:04	05:50	04:57
	16:45		17:48	18:42	20:40	21:32
28	08:13		07:10	06:02	05:48	04:55
	16:47		17:50	18:44	20:42	21:33
29	08:11		06:59		05:46	04:54
	16:49		17:52		20:44	21:35
30	08:09		06:57	19:18 (WEA 12 (GRS))	05:44	04:53
	16:51		17:54	2 19:20 (WEA 12 (GRS))	20:46	21:36
31	08:08		06:54	07:18 (WEA 18 (GCN))		04:52
	16:53		17:56	6 19:22 (WEA 12 (GRS))		21:37
	Sonnenscheinstunden	248	272	367	421	496
	astr.max.mögl.Beschattung	336		145	154	437

**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:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 28 - IO 28 Cismarfelde 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 Sonneneinstrahlungsrichtung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	July	August	September	Oktober	November	Dezember
1	04:47	05:27	06:06 (WEA 15 (GON))	06:23	07:17	07:16
	21:53	21:17	20:30 (WEA 15 (GON))	20:10	18:55	16:44
2	04:48	05:29	06:06 (WEA 15 (GON))	06:25	07:19	07:18
	21:53	21:16	20:31 (WEA 15 (GON))	20:07	18:53	16:42
3	04:48	05:31	06:07 (WEA 15 (GON))	06:26	07:21	07:20
	21:53	21:14	20:31 (WEA 15 (GON))	20:05	18:50	16:40
4	04:49	05:33	06:06 (WEA 15 (GON))	06:28	07:22	07:22
	21:52	21:12	20:30 (WEA 15 (GON))	20:03	18:46	16:38
5	04:50	05:34	06:07 (WEA 15 (GON))	06:30	07:24	07:24
	21:52	21:10	20:30 (WEA 15 (GON))	20:00	18:45	16:36
6	04:51	05:36	06:07 (WEA 15 (GON))	06:32	07:26	07:26
	21:51	21:08	20:29 (WEA 15 (GON))	19:58	18:43	16:34
7	04:52	05:38	06:08 (WEA 15 (GON))	06:34	07:28	07:28
	21:50	21:06	20:29 (WEA 15 (GON))	19:55	18:41	16:32
8	04:53	05:40	06:10 (WEA 15 (GON))	06:35	07:03 (WEA 18 (GON))	07:30
	21:50	21:04	19:53 (WEA 15 (GON))	19:53	18:38	16:30
9	04:54	05:41	06:11 (WEA 15 (GON))	06:37	07:04 (WEA 18 (GON))	07:32
	21:49	21:02	19:50 (WEA 15 (GON))	19:50	18:36	16:28
10	04:55	05:43	06:13 (WEA 15 (GON))	06:39	07:06 (WEA 18 (GON))	07:34
	21:48	21:00	19:48 (WEA 15 (GON))	19:48	18:33	16:27
11	04:56	05:45	06:15 (WEA 15 (GON))	06:41	07:08 (WEA 18 (GON))	07:35
	21:47	20:58	19:45 (WEA 15 (GON))	19:45	18:31	16:25
12	04:58	05:47	06:43	07:09 (WEA 18 (GON))	07:37	07:38
	21:46	20:56	19:43	7	19:14 (WEA 12 (GRS))	18:28
13	04:59	05:48	06:44	7	19:14 (WEA 12 (GRS))	18:28
	21:45	20:54	19:40	2	19:12 (WEA 12 (GRS))	18:26
14	05:00	05:50	06:46	2	19:12 (WEA 12 (GRS))	18:26
	21:44	20:51	19:38	18:24	16:20	15:54
15	05:01	05:52	06:48	07:29 (WEA 17 (GON))	07:43	07:44
	21:43	20:49	19:35	8	07:37 (WEA 17 (GON))	18:21
16	05:03	05:54	06:50	07:26 (WEA 17 (GON))	07:45	07:45
	21:42	20:47	19:33	12	07:38 (WEA 17 (GON))	18:19
17	05:04	05:56	06:51	07:25 (WEA 17 (GON))	07:47	07:47
	21:41	20:45	6	06:40 (WEA 16 (GON))	19:30	18:17
18	05:05	05:57	06:53	14	07:39 (WEA 17 (GON))	18:17
	21:39	20:43	10	06:41 (WEA 16 (GON))	19:28	18:14
19	05:07	05:59	06:55	16	07:40 (WEA 17 (GON))	18:14
	21:38	20:40	12	06:42 (WEA 16 (GON))	19:25	18:12
20	05:08	06:01	06:57	17	07:40 (WEA 17 (GON))	18:12
	21:37	20:38	13	06:43 (WEA 16 (GON))	19:23	18:10
21	05:10	06:03	06:59	16	07:25 (WEA 17 (GON))	07:55
	21:35	20:36	12	06:44 (WEA 16 (GON))	19:20	18:07
22	05:11	06:05	07:01	17	07:27 (WEA 17 (GON))	07:57
	21:34	20:34	10	06:43 (WEA 16 (GON))	19:18	18:05
23	05:13	06:06	07:02	12	07:39 (WEA 17 (GON))	07:58
	21:32	20:31	8	06:43 (WEA 16 (GON))	19:15	18:03
24	05:14	06:09	07:04	9	07:38 (WEA 17 (GON))	18:03
	21:31	20:29	6	06:43 (WEA 16 (GON))	19:13	18:01
25	05:16	06:09	07:06	5	07:36 (WEA 17 (GON))	18:01
	21:29	20:27	3	06:41 (WEA 16 (GON))	19:10	18:00
26	05:18	06:08	07:08	1	07:34 (WEA 17 (GON))	18:00
	21:28	20:24	19:08	16:56	16:03	14:27 (WEA 20 (GCS))
27	05:19	06:08	07:10	18:32 (WEA 14 (GRS))	07:06	08:05
	21:26	20:22	19:05	4	18:36 (WEA 14 (GRS))	16:02
28	05:21	06:07	07:11	18:30 (WEA 14 (GRS))	07:08	08:07
	21:24	20:20	19:03	4	18:34 (WEA 14 (GRS))	16:01
29	05:22	06:07	07:13	18:29 (WEA 14 (GRS))	07:10	08:09
	21:23	20:17	19:00	3	18:32 (WEA 14 (GRS))	16:00
30	05:24	06:06	07:15	07:12	08:10	14:21 (WEA 20 (GCS))
	21:21	20:15	18:58	16:48	15:59	18
31	05:26	06:07	07:14	16:46	15:59	18
	21:19	20:12	16:46	328	257	60
Sonnenscheinstunden	515	461	383	221	257	60
astr.max.mögl.Beschattung	224	296	221	60	231	936

**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:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 31 - IO 31 Rütting Söhlen 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 Sonneneinfallrichtung
- Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni					
1	08:37	08:06		07:08	17:13 (WEA 14 (GRS))	06:52	18:59 (WEA 12 (GRS))	05:42	06:07 (WEA_G3)	04:51	05:44 (WEA_G2)				
	16:03	16:55		17:52	17:25 (WEA 14 (GRS))	19:51	25	19:24 (WEA 11 (GRS))	20:48	14	06:21 (WEA_G3)	21:38	33	06:17 (WEA_G2)	
2	08:37	08:04		07:05	17:12 (WEA 14 (GRS))	06:49		18:59 (WEA 12 (GRS))	05:39		06:06 (WEA_G3)	04:50		32	05:45 (WEA_G2)
	16:04	16:57		17:54	17:26 (WEA 14 (GRS))	19:53		19:26 (WEA 11 (GRS))	20:49		06:23 (WEA_G3)	21:40		32	06:17 (WEA_G2)
3	08:37	08:03		07:03	17:13 (WEA 14 (GRS))	06:47		18:59 (WEA 12 (GRS))	05:37		06:04 (WEA_G3)	04:49		30	05:46 (WEA_G2)
	16:05	16:59		17:56	17:29 (WEA 14 (GRS))	19:55	29	19:28 (WEA 11 (GRS))	20:51	19	06:23 (WEA_G3)	21:41	31	06:17 (WEA_G2)	
4	08:36	08:01		07:01	17:12 (WEA 14 (GRS))	06:44		18:59 (WEA 12 (GRS))	05:35		06:02 (WEA_G3)	04:48		30	05:46 (WEA_G2)
	16:07	17:01		17:58	17:30 (WEA 14 (GRS))	19:57	31	19:30 (WEA 11 (GRS))	20:53	21	06:23 (WEA_G3)	21:42	31	06:17 (WEA_G2)	
5	08:36	07:59		06:58	17:13 (WEA 14 (GRS))	06:42		18:59 (WEA 12 (GRS))	05:33		06:00 (WEA_G3)	04:48		30	05:46 (WEA_G2)
	16:06			18:00	17:30 (WEA 14 (GRS))	19:59	32	19:31 (WEA 11 (GRS))	20:55	23	06:23 (WEA_G3)	21:43	30	06:16 (WEA_G2)	
6	08:36	07:57		06:56	17:13 (WEA 14 (GRS))	06:39		18:59 (WEA 12 (GRS))	05:31		05:58 (WEA_G3)	04:47		30	05:47 (WEA_G2)
	16:09	17:05		18:02	17:29 (WEA 14 (GRS))	20:01	30	19:29 (WEA 11 (GRS))	20:57	24	06:22 (WEA_G3)	21:44	30	06:17 (WEA_G2)	
7	08:35	07:55		06:53	17:14 (WEA 14 (GRS))	06:37		07:01 (WEA 16 (GCN))	05:29		05:56 (WEA_G3)	04:46		30	05:47 (WEA_G2)
	16:11	17:07		18:04	17:28 (WEA 14 (GRS))	20:03	29	19:28 (WEA 11 (GRS))	20:59	26	06:22 (WEA_G3)	21:45	29	06:16 (WEA_G2)	
8	08:35	07:53		06:51	17:16 (WEA 14 (GRS))	06:35		06:58 (WEA 15 (GCN))	05:27		05:54 (WEA_G3)	04:46		30	05:47 (WEA_G2)
	16:12	17:09		18:06	17:25 (WEA 14 (GRS))	20:04	18	19:17 (WEA 12 (GRS))	21:00	27	06:21 (WEA_G3)	21:46	28	06:16 (WEA_G2)	
9	08:34	07:51		06:49		06:32		06:56 (WEA 15 (GCN))	05:25		05:53 (WEA_G3)	04:45		30	05:48 (WEA_G2)
	16:14	17:11		18:07		20:06	15	19:15 (WEA 12 (GRS))	21:02	29	06:22 (WEA_G3)	21:47	28	06:16 (WEA_G2)	
10	08:33	07:49		06:46		06:30		06:54 (WEA 15 (GCN))	05:24		05:51 (WEA_G3)	04:44		30	05:49 (WEA_G2)
	16:15	17:13		18:09		20:08	11	19:11 (WEA 12 (GRS))	21:04	30	06:21 (WEA_G3)	21:48	27	06:16 (WEA_G2)	
11	08:33	07:47		06:44		06:27		06:51 (WEA 15 (GCN))	05:22		05:49 (WEA_G3)	04:44		30	05:50 (WEA_G2)
	16:17	17:16		18:11		20:10	8	06:59 (WEA 15 (GCN))	21:06	31	06:20 (WEA_G3)	21:49	26	06:16 (WEA_G2)	
12	08:32	07:45		06:41		06:25		06:49 (WEA 15 (GCN))	05:20		05:47 (WEA_G3)	04:44		30	05:50 (WEA_G2)
	16:18	17:18		18:13		20:12	10	06:59 (WEA 15 (GCN))	21:08	32	06:19 (WEA_G3)	21:50	25	06:15 (WEA_G2)	
13	08:31	07:43		06:39		06:22		06:47 (WEA 15 (GCN))	05:18		05:46 (WEA_G3)	04:43		30	05:47 (WEA_G2)
	16:20	17:20		18:15		20:14	11	06:58 (WEA 15 (GCN))	21:09	33	06:19 (WEA_G3)	21:50	24	06:15 (WEA_G2)	
14	08:30	07:41		06:36		06:20		06:48 (WEA 15 (GCN))	05:16		05:44 (WEA_G3)	04:43		30	05:51 (WEA_G2)
	16:21	17:22		18:17		20:16	8	06:56 (WEA 15 (GCN))	21:11	34	06:18 (WEA_G3)	21:51	24	06:15 (WEA_G2)	
15	08:29	07:39		06:34	17:51 (WEA 13 (GRS))	06:18		05:43 (WEA_G3)	05:15		05:43 (WEA_G3)	04:43		30	05:52 (WEA_G2)
	16:23	17:24		18:19	1	17:52 (WEA 13 (GRS))	20:18	21:13	35	06:18 (WEA_G3)	21:52	23	06:15 (WEA_G2)		
16	08:28	07:37		06:31	17:50 (WEA 13 (GRS))	06:15		05:13			05:41 (WEA_G3)	04:42		30	05:53 (WEA_G2)
	16:25	17:26		18:21	4	17:54 (WEA 13 (GRS))	20:19	21:14	37	06:18 (WEA_G3)	21:52	23	06:16 (WEA_G2)		
17	08:27	07:35		06:29	17:50 (WEA 13 (GRS))	06:13		05:11			05:42 (WEA_G3)	04:42		30	05:53 (WEA_G2)
	16:27	17:28		18:23	6	17:56 (WEA 13 (GRS))	20:21	21:16	37	06:19 (WEA_G3)	21:53	23	06:16 (WEA_G2)		
18	08:26	07:33		06:26	17:49 (WEA 13 (GRS))	06:11		05:10			05:41 (WEA_G3)	04:42		30	05:53 (WEA_G2)
	16:28	17:30		18:25	9	17:58 (WEA 13 (GRS))	20:23	21:18	37	06:18 (WEA_G3)	21:53	23	06:16 (WEA_G2)		
19	08:25	07:31		06:24	06:46 (WEA 17 (GCN))	06:08		05:08			05:41 (WEA_G3)	04:42		30	05:54 (WEA_G2)
	16:30	17:32		18:27	12	18:00 (WEA 13 (GRS))	20:25	21:19	38	06:19 (WEA_G3)	21:54	22	06:16 (WEA_G2)		
20	08:24	07:28		06:22	06:45 (WEA 17 (GCN))	06:06		05:06			05:41 (WEA_G3)	04:42		30	05:54 (WEA_G2)
	16:32	17:34		18:29	15	18:01 (WEA 13 (GRS))	20:27	21:21	37	06:18 (WEA_G3)	21:54	22	06:16 (WEA_G2)		
21	08:23	07:26		06:19	06:43 (WEA 17 (GCN))	06:04		05:05			05:41 (WEA_G3)	04:43		30	05:54 (WEA_G2)
	16:34	17:36		18:30	11	17:59 (WEA 13 (GRS))	20:29	21:23	38	06:19 (WEA_G3)	21:54	22	06:16 (WEA_G2)		
22	08:21	07:24		06:17		06:01		05:03			05:42 (WEA_G3)	04:43		30	05:54 (WEA_G2)
	16:36	17:38		18:32		20:31		21:24	37	06:19 (WEA_G3)	21:54	22	06:16 (WEA_G2)		
23	08:20	07:22		06:14		05:59		05:02			05:41 (WEA_G3)	04:43		30	05:55 (WEA_G2)
	16:38	17:40		18:34		20:33		21:26	37	06:18 (WEA_G3)	21:54	22	06:17 (WEA_G2)		
24	08:19	07:19		06:12		05:57		05:01			05:41 (WEA_G3)	04:43		30	05:54 (WEA_G2)
	16:39	17:42		18:36		20:34		21:27	37	06:18 (WEA_G3)	21:55	23	06:17 (WEA_G2)		
25	08:17	07:17		06:09		05:55		04:59			05:42 (WEA_G3)	04:44		30	05:54 (WEA_G2)
	16:41	17:44		18:38		20:36		21:29	36	06:18 (WEA_G3)	21:55	23	06:17 (WEA_G2)		
26	08:16	07:15		06:07	17:17 (WEA 14 (GRS))	06:07		04:58			05:42 (WEA_G3)	04:44		30	05:55 (WEA_G2)
	16:43	17:46	1	17:18 (WEA 14 (GRS))	18:40	20:38		21:30	36	06:18 (WEA_G3)	21:55	23	06:18 (WEA_G2)		
27	08:14	07:12		06:04	18:08 (WEA 12 (GRS))	05:50		04:57			05:43 (WEA_G3)	04:44		30	05:54 (WEA_G2)
	16:45	17:46	6	17:20 (WEA 14 (GRS))	18:42	7	18:15 (WEA 12 (GRS))	20:40	3	06:19 (WEA_G3)	21:52	23	06:17 (WEA_G2)		
28	08:13	07:10		06:02	06:25 (WEA 18 (GCN))	05:48		04:55			05:43 (WEA_G3)	04:45		30	05:55 (WEA_G2)
	16:47	17:50	8	17:22 (WEA 14 (GRS))	18:44	12	18:16 (WEA 12 (GRS))	20:42	6	06:20 (WEA_G3)	21:53	23	06:18 (WEA_G2)		
29	08:11			06:59	19:03 (WEA 12 (GRS))	05:46		06:12 (WEA_G3)	04:54		05:43 (WEA_G3)	04:46		30	05:54 (WEA_G2)
	16:49			19:46	19:19 (WEA 12 (GRS))	20:44		06:21 (WEA_G3)	21:35	35	06:18 (WEA_G3)	21:54	24	06:18 (WEA_G2)	
30	08:09			06:57	19:01 (WEA 12 (GRS))	05:44		06:09 (WEA_G3)	04:53		05:44 (WEA_G3)	04:46		30	05:54 (WEA_G2)
	16:51			19:47	19:20 (WEA 12 (GRS))	20:46		06:21 (WEA_G3)	21:36	34	06:18 (WEA_G3)	21:54	25	06:19 (WEA_G2)	
31	08:06			06:54	19:01 (WEA 12 (GRS))			04:52			05:44 (WEA_G3)				
	16:53			19:49	19:22 (WEA 12 (GRS))			21:37	33	06:17 (WEA_G3)					
Sonnenscheinstunden		248			367		421		496				513		764
astr.max.mögl.Beschattung			15		249		314		974						

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:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0

**DNV**

Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 31 - IO 31 Rütting Söhlen 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 Sonneneinstrahlungsrichtung
- Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember	
1	04:47	05:55 (WEA_G2)	05:27	05:58 (WEA_G2)	06:23	06:50 (WEA 15 (GCN))	07:17		07:16	08:12	
	21:54	25	06:20 (WEA_G2)	21:17	32	06:30 (WEA_G3)	20:10	8	06:58 (WEA 15 (GCN))	18:55	
2	04:48	05:54 (WEA_G2)	05:29	06:00 (WEA_G2)	06:25	06:52 (WEA 15 (GCN))	07:19		16:44	15:59	
	21:53	26	06:20 (WEA_G2)	21:16	31	06:31 (WEA_G3)	20:08	11	19:09 (WEA 12 (GRS))	18:53	
3	04:48	05:54 (WEA_G2)	05:31	06:02 (WEA_G2)	06:26	06:54 (WEA 15 (GCN))	07:21		16:42	15:58	
	21:53	27	06:21 (WEA_G2)	21:14	30	06:32 (WEA_G3)	20:05	15	19:13 (WEA 12 (GRS))	18:50	
4	04:49	05:54 (WEA_G2)	05:33	06:03 (WEA_G2)	06:28	06:56 (WEA 15 (GCN))	07:22		16:40	15:57	
	21:52	27	06:21 (WEA_G2)	21:12	28	06:31 (WEA_G3)	20:03	18	19:15 (WEA 12 (GRS))	18:48	
5	04:50	05:54 (WEA_G2)	05:34	06:05 (WEA_G2)	06:30	06:57 (WEA 16 (GCN))	07:24		16:38	15:56	
	21:52	28	06:22 (WEA_G2)	21:10	27	06:32 (WEA_G3)	20:00	29	19:24 (WEA 11 (GRS))	18:45	
6	04:51	05:54 (WEA_G2)	05:36	06:07 (WEA_G3)	06:32	18:55 (WEA 12 (GRS))	07:26	6	17:51 (WEA 14 (GRS))	18:43	
	21:51	29	06:23 (WEA_G2)	21:08	25	06:32 (WEA_G3)	19:58	30	19:25 (WEA 11 (GRS))	18:43	
7	04:52	05:54 (WEA_G2)	05:38	06:08 (WEA_G3)	06:34	18:54 (WEA 12 (GRS))	07:28		17:49 (WEA 14 (GRS))	18:41	
	21:50	29	06:23 (WEA_G2)	21:06	24	06:32 (WEA_G3)	19:55	32	19:26 (WEA 11 (GRS))	18:41	
8	04:53	05:53 (WEA_G2)	05:40	06:10 (WEA_G3)	06:35	18:54 (WEA 12 (GRS))	07:30	15	18:04 (WEA 14 (GRS))	18:32	
	21:50	30	06:23 (WEA_G2)	21:04	22	06:32 (WEA_G3)	19:53	31	19:25 (WEA 11 (GRS))	18:38	
9	04:54	05:52 (WEA_G2)	05:41	06:11 (WEA_G3)	06:37	18:53 (WEA 12 (GRS))	07:32		17:47 (WEA 14 (GRS))	18:30	
	21:49	32	06:24 (WEA_G2)	21:02	20	06:31 (WEA_G3)	19:50	29	19:22 (WEA 11 (GRS))	18:36	
10	04:55	05:53 (WEA_G2)	05:43	06:13 (WEA_G3)	06:39	18:53 (WEA 12 (GRS))	07:34	18	18:05 (WEA 14 (GRS))	18:28	
	21:48	32	06:25 (WEA_G2)	21:00	18	06:31 (WEA_G3)	19:48	26	19:19 (WEA 11 (GRS))	18:33	
11	04:56	05:53 (WEA_G2)	05:45	06:15 (WEA_G3)	06:41	18:53 (WEA 12 (GRS))	07:36	17	17:47 (WEA 14 (GRS))	18:26	
	21:47	32	06:25 (WEA_G2)	20:58	16	06:31 (WEA_G3)	19:45	24	19:17 (WEA 11 (GRS))	18:31	
12	04:58	05:53 (WEA_G2)	05:47	06:16 (WEA_G3)	06:43	18:53 (WEA 12 (GRS))	07:37	15	18:02 (WEA 14 (GRS))	18:25	
	21:46	33	06:26 (WEA_G2)	20:56	14	06:30 (WEA_G3)	19:43	22	19:15 (WEA 11 (GRS))	18:28	
13	04:59	05:52 (WEA_G2)	05:49	06:18 (WEA_G3)	06:44	18:52 (WEA 12 (GRS))	07:39	13	17:59 (WEA 14 (GRS))	18:23	
	21:45	34	06:26 (WEA_G2)	20:54	11	06:29 (WEA_G3)	19:40	20	19:12 (WEA 12 (GRS))	18:26	
14	05:00	05:52 (WEA_G2)	05:50	06:20 (WEA_G3)	06:46	18:52 (WEA 12 (GRS))	07:41	10	17:57 (WEA 14 (GRS))	18:21	
	21:44	34	06:26 (WEA_G2)	20:52	9	06:29 (WEA_G3)	19:38	16	19:09 (WEA 12 (GRS))	18:24	
15	05:01	05:52 (WEA_G2)	05:52	06:21 (WEA_G3)	06:48	18:51 (WEA 12 (GRS))	07:43	7	17:54 (WEA 14 (GRS))	18:20	
	21:43	35	06:27 (WEA_G2)	20:49	6	06:27 (WEA_G3)	19:35	13	19:07 (WEA 12 (GRS))	18:21	
16	05:03	05:51 (WEA_G2)	05:54	06:23 (WEA_G3)	06:50	18:51 (WEA 12 (GRS))	07:45	4	17:52 (WEA 14 (GRS))	18:18	
	21:42	36	06:27 (WEA_G2)	20:47	2	06:25 (WEA_G3)	19:33	8	19:05 (WEA 12 (GRS))	18:19	
17	05:04	05:52 (WEA_G2)	05:56						17:47	18:17	
	21:41	36	06:28 (WEA_G2)	20:45		19:30			16:15	15:53	
18	05:05	05:52 (WEA_G2)	05:57			06:53			17:49	18:14	
	21:39	36	06:28 (WEA_G2)	20:43		19:28			16:14	15:53	
19	05:07	05:51 (WEA_G2)	05:59			06:55			17:51	18:14	
	21:38	37	06:28 (WEA_G2)	20:40		19:25			16:12	15:54	
20	05:08	05:52 (WEA_G2)	06:01			06:57			17:53	18:12	
	21:37	37	06:29 (WEA_G2)	20:38		19:23			16:11	15:54	
21	05:10	05:51 (WEA_G2)	06:03			06:59			17:55	18:11	
	21:35	38	06:29 (WEA_G2)	20:36		19:20			16:09	15:54	
22	05:11	05:51 (WEA_G2)	06:05			07:01			17:57	18:10	
	21:34	38	06:28 (WEA_G2)	20:34		19:18			16:08	15:55	
23	05:13	05:51 (WEA_G2)	06:07			07:02			17:58	18:11	
	21:32	38	06:29 (WEA_G2)	20:31		19:15			16:07	15:55	
24	05:14	05:51 (WEA_G2)	06:08			07:04			18:00	18:12	
	21:31	38	06:29 (WEA_G2)	20:29		19:13			16:06	15:56	
25	05:16	05:52 (WEA_G2)	06:10			07:06			18:02	18:13	
	21:29	37	06:29 (WEA_G2)	20:27		19:10			16:04	15:57	
26	05:18	05:51 (WEA_G2)	06:12			07:08			18:04	18:14	
	21:28	38	06:29 (WEA_G2)	20:24		19:08			16:03	15:57	
27	05:19	05:52 (WEA_G2)	06:14			07:10			18:05	18:15	
	21:26	37	06:29 (WEA_G2)	20:22		19:05			16:02	15:58	
28	05:21	05:52 (WEA_G2)	06:16			07:11			18:07	18:16	
	21:24	36	06:28 (WEA_G2)	20:20		19:03			16:01	15:59	
29	05:22	05:54 (WEA_G2)	06:17			07:13			18:09	18:17	
	21:23	35	06:29 (WEA_G2)	20:17	7	06:49 (WEA 15 (GCN))	07:13		16:00	16:00	
30	05:24	05:55 (WEA_G2)	06:19			06:57 (WEA 15 (GCN))	07:15		18:10	18:17	
	21:21	33	06:28 (WEA_G3)	20:15	11	06:58 (WEA 15 (GCN))	18:58		16:01	15:59	
31	05:26	05:57 (WEA_G2)	06:21			06:49 (WEA 15 (GCN))			17:14	18:21	
	21:19	32	06:29 (WEA_G3)	20:12	10	06:59 (WEA 15 (GCN))			16:46	16:02	
	Sonnenscheinstunden	515	461	383					257	231	
	astr.max.mögl.Beschattung	1034	343	393				134			

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:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 32 - IO 32 Rütting Söhlen 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 Sonneneinstrahlungsrichtung
  - Die Windenergieanlage/n ist/sind immer in Betrieb

Januar	Februar	März	April	Mai	Juni
1 08:37 16:03 2 08:37 16:04 3 08:37 16:05 4 08:36 16:07 5 08:36 16:08 6 08:36 16:09 7 08:35 16:11 8 08:35 16:12 9 08:34 16:14 10 08:33 16:15 11 08:33 16:17 12 08:32 16:18 13 08:31 16:20 14 08:30 16:21 15 08:29 16:23 16 08:28 16:25 17 08:27 16:27 18 08:26 16:28 19 08:25 16:30 20 08:24 16:32 21 08:23 16:34 22 08:21 16:36 23 08:20 16:38 24 08:19 16:39 25 08:17 16:41 26 08:16 16:43 27 08:14 16:45 28 08:13 16:47 29 08:11 16:49 30 08:09 16:51 31 08:08 16:53	09:12 (WEA 19 (GCS)) 10:06 09:47 (WEA 21 (GCS)) 11:55 09:12 (WEA 19 (GCS)) 10:04 09:47 (WEA 21 (GCS)) 11:57 09:12 (WEA 19 (GCS)) 10:50 09:47 (WEA 21 (GCS)) 11:03 09:11 (WEA 19 (GCS)) 10:57 09:46 (WEA 21 (GCS)) 11:05 09:12 (WEA 19 (GCS)) 10:55 09:46 (WEA 21 (GCS)) 11:07 09:12 (WEA 19 (GCS)) 10:53 09:45 (WEA 21 (GCS)) 11:09 09:12 (WEA 19 (GCS)) 10:51 09:43 (WEA 21 (GCS)) 11:11 09:12 (WEA 19 (GCS)) 10:49 09:39 (WEA 19 (GCS)) 11:13 09:12 (WEA 19 (GCS)) 10:47 09:40 (WEA 19 (GCS)) 11:16 09:12 (WEA 19 (GCS)) 10:45 09:40 (WEA 19 (GCS)) 11:18 09:12 (WEA 19 (GCS)) 10:43 09:41 (WEA 19 (GCS)) 11:20 09:12 (WEA 19 (GCS)) 10:41 09:41 (WEA 19 (GCS)) 11:22 09:13 (WEA 19 (GCS)) 10:39 09:42 (WEA 19 (GCS)) 11:24 09:13 (WEA 19 (GCS)) 10:37 09:43 (WEA 19 (GCS)) 11:26 09:14 (WEA 19 (GCS)) 10:35 09:43 (WEA 19 (GCS)) 11:28 09:13 (WEA 19 (GCS)) 10:33 09:43 (WEA 19 (GCS)) 11:30 09:14 (WEA 19 (GCS)) 10:31 09:44 (WEA 19 (GCS)) 11:32 09:14 (WEA 19 (GCS)) 10:28 09:43 (WEA 19 (GCS)) 11:34 09:15 (WEA 19 (GCS)) 10:26 09:44 (WEA 19 (GCS)) 11:36 09:16 (WEA 19 (GCS)) 10:24 09:45 (WEA 19 (GCS)) 11:38 09:16 (WEA 19 (GCS)) 10:22 09:44 (WEA 19 (GCS)) 11:40 09:16 (WEA 19 (GCS)) 10:19 09:43 (WEA 19 (GCS)) 11:42 09:17 (WEA 19 (GCS)) 10:17 09:43 (WEA 19 (GCS)) 11:46 09:19 (WEA 19 (GCS)) 10:14 09:42 (WEA 19 (GCS)) 11:48 09:21 (WEA 19 (GCS)) 10:10 09:42 (WEA 19 (GCS)) 11:50 09:22 (WEA 19 (GCS)) 1 09:41 (WEA 19 (GCS)) 1 09:24 (WEA 19 (GCS)) 1 09:30 (WEA 19 (GCS)) 1 09:26 (WEA 19 (GCS)) 1 09:37 (WEA 19 (GCS)) 1	07:08 17:52 07:05 17:54 06:58 17:56 07:01 17:58 06:58 18:00 06:56 18:02 06:53 18:04 06:51 18:06 06:49 18:07 06:46 18:09 06:44 18:11 06:41 18:13 06:39 18:15 06:36 18:17 06:34 18:19 06:31 18:21 06:29 18:23 06:27 06:27 18:25 06:24 18:27 06:22 18:29 06:19 18:30 06:17 18:32 06:14 18:34 06:12 18:36 06:09 18:38 06:07 18:40 06:04 18:42 06:02 18:44 06:50 19:46 06:57 19:47 06:54 19:49 367	07:33 (WEA 20 (GCS)) 10:62 07:57 (WEA 20 (GCS)) 11:31 07:32 (WEA 20 (GCS)) 10:69 07:57 (WEA 20 (GCS)) 11:33 07:32 (WEA 20 (GCS)) 10:67 07:58 (WEA 20 (GCS)) 11:35 07:31 (WEA 20 (GCS)) 10:64 07:57 (WEA 20 (GCS)) 11:37 07:31 (WEA 20 (GCS)) 10:62 07:56 (WEA 20 (GCS)) 11:01 07:31 (WEA 20 (GCS)) 10:67 07:56 (WEA 20 (GCS)) 12:03 07:31 (WEA 20 (GCS)) 10:63 07:55 (WEA 20 (GCS)) 12:04 07:32 (WEA 20 (GCS)) 10:62 07:54 (WEA 20 (GCS)) 12:06 07:33 (WEA 20 (GCS)) 10:60 07:52 (WEA 20 (GCS)) 12:08 07:34 (WEA 20 (GCS)) 10:67 07:51 (WEA 20 (GCS)) 12:10 07:30 (WEA 20 (GCS)) 10:62 07:47 (WEA 20 (GCS)) 12:12 10:62 12:14 10:60 12:16 10:58 12:18 10:56 12:20 10:54 12:22 10:52 12:24 10:50 12:26 10:48 12:28 10:46 12:30 10:44 12:32 10:42 12:34 10:40 12:36 10:38 12:38 10:36 12:40 10:34 12:42 10:32 12:44 10:30 12:46 10:28 12:48 10:26 12:50 10:24 12:52 10:22 12:54 10:20 12:56 10:18 12:58 10:16 13:00 10:14 13:02 10:12 13:04 10:10 13:06 10:08 13:08 10:06 13:10 10:04 13:12 10:02 13:14 10:00 13:16 9:58 13:18 9:56 13:20 9:54 13:22 9:52 13:24 9:50 13:26 9:48 13:28 9:46 13:30 9:44 13:32 9:42 13:34 9:40 13:36 9:38 13:38 9:36 13:40 9:34 13:42 9:32 13:44 9:30 13:46 9:28 13:48 9:26 13:50 9:24 13:52 9:22 13:54 9:20 13:56 9:18 13:58 9:16 14:00 9:14 14:02 9:12 14:04 9:10 14:06 9:08 14:08 9:06 14:10 9:04 14:12 9:02 14:14 9:00 14:16 8:58 14:18 8:56 14:20 8:54 14:22 8:52 14:24 8:50 14:26 8:48 14:28 8:46 14:30 8:44 14:32 8:42 14:34 8:40 14:36 8:38 14:38 8:36 14:40 8:34 14:42 8:32 14:44 8:30 14:46 8:28 14:48 8:26 14:50 8:24 14:52 8:22 14:54 8:20 14:56 8:18 14:58 8:16 15:00 8:14 15:02 8:12 15:04 8:10 15:06 8:08 15:08 8:06 15:10 8:04 15:12 8:02 15:14 8:00 15:16 7:58 15:18 7:56 15:20 7:54 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21:26 1:48 21:28 1:46 21:30 1:44 21:32 1:42 21:34 1:40 21:36 1:38 21:38 1:36 21:40 1:34 21:42 1:32 21:44 1:30 21:46 1:28 21:48 1:26 21:50 1:24 21:52 1:22 21:54 1:20 21:56 1:18 21:58 1:16 22:00 1:14 22:02 1:12 22:04 1:10 22:06 1:08 22:08 1:06 22:10 1:04 22:12 1:02 22:14 1:00 22:16 9:58 22:18 9:56 22:20 9:54 22:22 9:52 22:24 9:50 22:26 9:48 22:28 9:46 22:30 9:44 22:32 9:42 22:34 9:40 22:36 9:38 22:38 9:36 22:40 9:34 22:42 9:32 22:44 9:30 22:46 9:28 22:48 9:26 22:50 9:24 22:52 9:22 22:54 9:20 22:56 9:18 22:58 9:16 23:00 9:14 23:02 9:12 23:04 9:10 23:06 9:08 23:08 9:06 23:10 9:04 23:12 9:02 23:14 9:00 23:16 8:58 23:18 8:56 23:20 8:54 23:22 8:52 23:24 8:50 23:26 8:48 23:28 8:46 23:30 8:44 23:32 8:42 23:34 8:40 23:36 8:38 23:38 8:36 23:40 8:34 23:42 8:32 23:44 8:30 23:46 8:28 23:48 8:26 23:50 8:24 23:52 8:22 23:54 8:20 23:56 8:18 23:58 8:16 24:00 8:14 24:02 8:12 24:04 8:10 24:06 8:08 24:08 8:06 24:10 8:04 24:12 8:02 24:14 8:00 24:16 7:58 24:18 7:56 24:20 7:54 24:22 7:52 24:24 7:50 24:26 7:48 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27:30 4:44 27:32 4:42 27:34 4:40 27:36 4:38 27:38 4:36 27:40 4:34 27:42 4:32 27:44 4:30 27:46 4:28 27:48 4:26 27:50 4:24 27:52 4:22 27:54 4:20 27:56 4:18 27:58 4:16 28:00 4:14 28:02 4:12 28:04 4:10 28:06 4:08 28:08 4:06 28:10 4:04 28:12 4:02 28:14 4:00 28:16 3:58 28:18 3:56 28:20 3:54 28:22 3:52 28:24 3:50 28:26 3:48 28:28 3:46 28:30 3:44 28:32 3:42 28:34 3:40 28:36 3:38 28:38 3:36 28:40 3:34 28:42 3:32 28:44 3:30 28:46 3:28 28:48 3:26 28:50 3:24 28:52 3:22 28:54 3:20 28:56 3:18 28:58 3:16 29:00 3:14 29:02 3:12 29:04 3:10 29:06 3:08 29:08 3:06 29:10 3:04 29:12 3:02 29:14 3:00 29:16 2:58 29:18 2:56 29:20 2:54 29:22 2:52 29:24 2:50 29:26 2:48 29:28 2:46 29:30 2:44 29:32 2:42 29:34 2:40 29:36 2:38 29:38 2:36 29:40 2:34 29:42 2:32 29:44 2:30 29:46 2:28 29:48 2:26 29:50 2:24 29:52 2:22 29:54 2:20 29:56 2:18 29:58 2:16 30:00 2:14 30:02 2:12 30:04 2:10 30:06 2:08 30:08 2:06 30:10 2:04 30:12 2:02 30:14 2:00 30:16 1:58 30:18 1:56 30:20 1:54 30:22 1:52 30:24 1:50 30:26 1:48 30:28 1:46 30:30 1:44 30:32 1:42 30:34 1:40 30:36 1:38 30:38 1:36 30:40 1:34 30:42 1:32 30:44 1:30 30:46 1:28 30:48 1:26 30:50 1:24 30:52 1:22 30:54 1:20 30:56 1:18 30:58 1:16 31:00 1:14 31:02 1:12 31:04 1:10 31:06 1:08 31:08 1:06 31:10 1:04 31:12 1:02 31:14 1:00 31:16 9:58 31:18 9:56 31:20 9:54 31:22 9:52 31:24 9:50 31:26 9:48 31:28 9:46 31:30 9:44 31:32 9:42 31:34 9:40 31:36 9:38 31:38 9:36 31:40 9:34 31:42 9:32 31:44 9:30 31:46 9:28 31:48 9:26 31:50 9:24 31:52 9:22 31:54 9:20 31:56 9:18 31:58 9:16 32:00 9:14 32:02 9:12 32:04 9:10 32:06 9:08 32:08 9:06 32:10 9:04 32:12 9:02 32:14 9:00 32:16 8:58 32:18 8:56 32:20 8:54 32:22 8:52 32:24 8:50 32:26 8:48 32:28 8:46 32:30 8:44 32:32 8:42 32:34 8:40 32:36 8:38 32:38 8:36 32:40 8:34 32:42 8:32 32:44 8:30 32:46 8:28 32:48 8:26 32:50 8:24 32:52 8:22 32:54 8:20 32:56 8:18 32:58 8:16 33:00 8:14 33:02 8:12 33:04 8:10 33:06 8:08 33:08 8:06 33:10 8:04 33:12 8:02 33:14 8:00 33:16 7:58 33:18 7:56 33:20 7:54 33:22 7:52 33:24 7:50 33:26 7:48 33:28 7:46 33:30 7:44 33:32 7:42 33:34 7:40 33:36 7:38 33:38 7:36 33:40 7:34 33:42 7:32 33:44 7:30 33:46 7:28 33:48 7:26 33:50 7:24 33:52 7:22 33:54 7:20 33:56 7:18 33:58 7:16 34:00 7:14 34:02 7:12 34:04 7:10 34:06 7:08 34:08 7:06 34:10 7:04 34:12 7:02 34:14 7:00 34:16 6:58 34:18 6:56 34:20 6:54 34:22 6:52 34:24 6:50 34:26 6:48 34:28 6:46 34:30 6:44 34:32 6:42 34:34 6:40 34:36 6:38 34:38 6:36 34:40 6:34 34:42 6:32 34:44 6:30 34:46 6:28 34:48 6:26 34:50 6:24 34:52 6:22 34:54 6:20 34:56 6:18 34:58 6:16 35:00 6:14 35:02 6:12 35:04 6:10 35:06 6:08 35:08 6:06 35:10 6:04 35:12 		

Projekt:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0

Berechnet:

22.06.2022 20:19/3.5.584

### SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 32 - IO 32 Rütting Söhlen 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 Sonneneinstrahlungsrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember		
1	04:47	05:21 (WEA_G2)	105:28		06:23		07:17		08:18 (WEA 20 (GCS))	07:16	08:12	
2	04:48	21:06 (WEA 11 (GRS))	121:18		20:10		18:55	7	08:25 (WEA 20 (GCS))	16:44	15:59	
2	04:48	05:21 (WEA_G2)	105:29		20:32 (WEA 10 (GRS))	06:25	07:19		08:13 (WEA 20 (GCS))	07:18	08:14	
3	04:48	21:06 (WEA 11 (GRS))	121:16	7	20:29 (WEA 10 (GRS))	20:08	18:53	15	08:26 (WEA 20 (GCS))	16:42	15:58	
3	04:48	05:21 (WEA_G2)	105:31		20:36 (WEA 10 (GRS))	06:26	07:22		08:11 (WEA 20 (GCS))	07:20	08:15	
4	04:49	21:06 (WEA 11 (GRS))	121:14	11	20:41 (WEA 10 (GRS))	20:05	18:50	18	08:29 (WEA 20 (GCS))	16:40	15:57	
4	04:49	05:23 (WEA_G2)	105:33		20:29 (WEA 10 (GRS))	06:28	07:22		08:10 (WEA 20 (GCS))	07:22	08:17	
5	04:50	21:07 (WEA 11 (GRS))	121:12	11	20:48 (WEA 10 (GRS))	20:03	18:48	21	08:31 (WEA 20 (GCS))	16:38	15:56	
5	04:50	05:24 (WEA_G2)	105:34		19:49 (WEA 14 (GRS))	06:30	07:24		08:08 (WEA 20 (GCS))	07:24	08:18	
6	04:51	21:07 (WEA 11 (GRS))	121:10	16	20:39 (WEA 10 (GRS))	20:00	18:45	24	08:32 (WEA 20 (GCS))	16:36	15:56	
6	04:51	05:25 (WEA_G2)	105:36		19:46 (WEA 14 (GRS))	06:32	07:26		08:08 (WEA 20 (GCS))	07:26	08:19	
7	04:51	21:08 (WEA 11 (GRS))	121:08	21	20:37 (WEA 10 (GRS))	19:58	18:43	24	08:32 (WEA 20 (GCS))	16:34	15:55	
7	04:52	05:26 (WEA_G2)	105:38		19:43 (WEA 14 (GRS))	06:34	07:28		08:07 (WEA 20 (GCS))	07:28	08:21	
8	04:53	21:08 (WEA 11 (GRS))	121:06	25	20:35 (WEA 10 (GRS))	19:55	18:41	25	08:32 (WEA 20 (GCS))	16:32	15:55	
8	04:53	05:27 (WEA_G2)	105:40		19:41 (WEA 14 (GRS))	06:35	07:30		08:06 (WEA 20 (GCS))	07:30	08:22	
9	04:53	21:09 (WEA 11 (GRS))	121:04	25	20:32 (WEA 10 (GRS))	19:53	18:38	26	08:32 (WEA 20 (GCS))	16:30	15:54	
9	04:54	05:28 (WEA_G2)	105:41		19:39 (WEA 14 (GRS))	06:37	07:32		08:06 (WEA 20 (GCS))	07:32	08:23	
10	04:54	21:09 (WEA 11 (GRS))	121:02	27	20:31 (WEA 10 (GRS))	19:50	18:36	26	08:32 (WEA 20 (GCS))	16:28	15:54	
10	04:55	05:29 (WEA_G2)	105:43		19:38 (WEA 14 (GRS))	06:39	07:34		08:06 (WEA 20 (GCS))	07:34	08:23	
11	04:56	21:09 (WEA 11 (GRS))	121:00	33	20:29 (WEA 10 (GRS))	19:48	18:33	26	08:32 (WEA 20 (GCS))	16:27	15:54	
11	04:56	05:30 (WEA_G2)	105:45		19:38 (WEA 14 (GRS))	06:41	07:36		08:06 (WEA 20 (GCS))	07:36	08:26	
12	04:57	21:09 (WEA 11 (GRS))	120:58	37	20:13 (WEA 13 (GRS))	19:49	18:31	26	08:32 (WEA 20 (GCS))	16:25	15:53	
12	04:58	05:31 (WEA_G2)	105:47		06:36 (WEA 15 (GCR))	06:43	07:37		08:06 (WEA 20 (GCS))	07:38	08:25	
12	04:58	21:10 (WEA 11 (GRS))	120:56	44	20:16 (WEA 13 (GRS))	19:43	18:28	25	08:31 (WEA 20 (GCS))	16:23	15:53	
13	04:59	05:32 (WEA_G2)	105:49		06:38 (WEA 15 (GCR))	06:44	07:39		08:07 (WEA 20 (GCS))	07:40	08:24	
13	04:59	21:10 (WEA 11 (GRS))	120:54	44	20:17 (WEA 13 (GRS))	19:40	18:26	23	08:30 (WEA 20 (GCS))	16:21	15:53	
14	05:00	05:33 (WEA_G2)	105:50		06:29 (WEA 15 (GCR))	06:46	07:41		08:09 (WEA 20 (GCS))	07:42	08:29	
14	05:00	21:10 (WEA 11 (GRS))	120:52	45	20:18 (WEA 13 (GRS))	19:38	18:24	20	08:29 (WEA 20 (GCS))	16:20	15:53	
15	05:01	05:34 (WEA_G2)	105:52		06:21 (WEA 15 (GCR))	06:48	07:43		08:11 (WEA 20 (GCS))	07:44	08:30	
15	05:01	21:10 (WEA 11 (GRS))	120:49	44	20:17 (WEA 13 (GRS))	19:35	18:21	17	08:28 (WEA 20 (GCS))	16:18	15:53	
16	05:03	05:35 (WEA_G2)	105:54		19:34 (WEA 14 (GRS))	06:50	07:45		08:13 (WEA 20 (GCS))	07:46	08:31	
16	05:03	21:10 (WEA 11 (GRS))	120:47	43	20:17 (WEA 13 (GRS))	19:33	18:19	13	08:26 (WEA 20 (GCS))	16:17	15:53	
17	05:04	05:36 (WEA_G2)	105:56		19:34 (WEA 14 (GRS))	06:52	07:47		08:15 (WEA 20 (GCS))	07:47	08:32	
17	05:04	21:10 (WEA 11 (GRS))	120:45	41	20:15 (WEA 13 (GRS))	19:30	18:17	8	08:23 (WEA 20 (GCS))	16:15	15:53	
18	05:06	05:38 (WEA_G2)	105:58		19:34 (WEA 14 (GRS))	06:53	07:49		08:15 (WEA 20 (GCS))	07:49	08:33	
18	05:06	21:10 (WEA 11 (GRS))	120:43	39	20:13 (WEA 13 (GRS))	19:28	18:14		16:14	27	08:17 (WEA 20 (GCS))	15:53
19	05:07	05:39 (WEA_G2)	105:59		19:33 (WEA 14 (GRS))	06:55	07:51		08:16 (WEA 20 (GCS))	07:51	08:33	
19	05:07	21:11 (WEA 11 (GRS))	120:40	38	20:11 (WEA 13 (GRS))	19:25	18:12		16:12	28	08:18 (WEA 20 (GCS))	15:54
20	05:08	05:41 (WEA_G2)	106:01		19:33 (WEA 14 (GRS))	06:57	07:53		08:17 (WEA 20 (GCS))	07:53	08:34	
20	05:08	21:11 (WEA 11 (GRS))	120:38	36	20:09 (WEA 13 (GRS))	19:23	18:10		16:11	29	08:19 (WEA 20 (GCS))	15:54
21	05:10	05:42 (WEA_G2)	106:03		19:34 (WEA 14 (GRS))	06:59	07:55		08:18 (WEA 20 (GCS))	07:55	08:34	
21	05:10	21:11 (WEA 11 (GRS))	120:36	33	20:07 (WEA 13 (GRS))	19:20	18:08		16:09	29	08:20 (WEA 20 (GCS))	15:54
22	05:11	05:44 (WEA_G2)	106:05		19:33 (WEA 14 (GRS))	07:01	07:57		08:19 (WEA 20 (GCS))	07:57	08:35	
22	05:11	21:11 (WEA 11 (GRS))	120:34	31	20:04 (WEA 13 (GRS))	19:18	18:05		16:08	29	08:21 (WEA 20 (GCS))	15:55
23	05:12	05:45 (WEA_G2)	106:07		19:34 (WEA 14 (GRS))	07:02	07:59		08:20 (WEA 20 (GCS))	07:59	08:36	
23	05:12	21:11 (WEA 11 (GRS))	120:32	28	20:02 (WEA 13 (GRS))	19:15	18:03		16:07	30	08:22 (WEA 20 (GCS))	15:55
24	05:14	05:46 (WEA_G2)	106:08		19:35 (WEA 14 (GRS))	07:04	08:00		16:06	30	08:23 (WEA 20 (GCS))	15:56
24	05:14	21:11 (WEA 11 (GRS))	120:29	25	20:00 (WEA 13 (GRS))	19:13	18:01		16:00	29	08:24 (WEA 20 (GCS))	15:56
25	05:16	05:48 (WEA_G2)	106:10		19:35 (WEA 14 (GRS))	07:06	08:02		16:05	30	08:25 (WEA 20 (GCS))	15:57
25	05:16	21:11 (WEA 11 (GRS))	120:27	22	19:57 (WEA 14 (GRS))	19:10	17:59		16:04	30	08:25 (WEA 20 (GCS))	15:57
26	05:18	05:49 (WEA_G2)	106:12		19:36 (WEA 14 (GRS))	07:08	08:04		16:04	30	08:26 (WEA 20 (GCS))	15:57
26	05:18	21:11 (WEA 11 (GRS))	120:24	19	19:54 (WEA 14 (GRS))	19:08	18:06		16:03	30	08:27 (WEA 20 (GCS))	15:57
27	05:19	05:50 (WEA_G2)	106:14		19:38 (WEA 14 (GRS))	07:10	08:06		16:03	30	08:28 (WEA 20 (GCS))	15:58
27	05:19	21:11 (WEA 11 (GRS))	120:22	15	19:53 (WEA 14 (GRS))	19:05	18:04		16:02	29	08:29 (WEA 20 (GCS))	15:58
28	05:21	05:52 (WEA_G2)	106:16		19:41 (WEA 14 (GRS))	07:11	08:07		16:02	29	08:30 (WEA 20 (GCS))	15:58
28	05:21	21:11 (WEA 11 (GRS))	120:20	10	19:51 (WEA 14 (GRS))	19:03	18:02		16:01	29	08:31 (WEA 20 (GCS))	15:59
29	05:22	05:54 (WEA_G2)	106:17			07:13	08:10		16:00	29	08:32 (WEA 20 (GCS))	15:59
29	05:22	21:11 (WEA 11 (GRS))	120:18			19:00	18:00		16:00	29	08:33 (WEA 20 (GCS))	15:59
30	05:24	05:55 (WEA_G2)	106:19			07:15	08:12		16:00	29	08:34 (WEA 20 (GCS))	15:59
30	05:24	21:11 (WEA 11 (GRS))	120:15			18:58	18:00		15:59	28	08:35 (WEA 20 (GCS))	15:59
31	05:26	05:57 (WEA_G2)	106:21				08:14				08:37	
31	05:26	21:11 (WEA 11 (GRS))	120:12				18:46				16:02	
							18:38				15:57	
							18:30				15:51	
							18:22				15:45	
							18:14				15:39	
							18:06				15:33	
							17:58				15:27	
							17:50				15:21	
							17:42				15:15	
							17:34				15:09	
							17:26				15:03	
							17:18				14:57	
							17:10				14:51	
							17:02				14:45	
							16:54				14:39	
							16:46				14:33	
							16:38				14:27	
							16:30				14:21	
							16:22				14:15	
							16:14				14:09	
							16:06				14:03	
							15:58				13:57	
							15:50				13:51	
							15:42				13:45	
							15:34				13:39	
							15:26				13:33	
							15:18				13:27	
							15:10				13:21	
							15:02				13:15	
							14:54				13:09	
							14:46				13:03	
							14:38				12:57	
							14:30				12:51	
							14:22				12:45	

Projekt:  
**SWP Windpark Großenholz**

Lizenzierter Anwender:  
**GL Garrad Hassan Deutschland GmbH**  
 Sommerdeich 14 b  
 DE-25709 Kaiser-Wilhelm-Koog  
 (0 48 56)901-0

Berechnet:  
 22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 33 - IO 33 Rütting Söhlen 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 Sonneneinstrahlungsrichtung
- Die Windenergieanlage/n ist/sind immer in Betrieb

Januar	Februar	März	April	Mai	Juni
1 08:37	1 08:06	08:33 (WEA 21 (GCS))   07:08	1 06:52	07:41 (WEA 20 (GCS))   05:42	1 04:51
1 16:03	1 16:55	14 09:07 (WEA 21 (GCS))   17:52	1 19:31	10 07:51 (WEA 20 (GCS))   20:48	21:38
2 08:37	2 08:04	08:55 (WEA 21 (GCS))   07:05	2 06:49	05:39	04:30
1 16:04	1 16:57	11 09:06 (WEA 21 (GCS))   17:54	1 19:53	20:49	21:40
3 08:37	3 08:03	08:59 (WEA 21 (GCS))   07:03	3 06:47	05:37	04:49
1 16:05	1 16:59	3 09:02 (WEA 21 (GCS))   17:56	1 19:55	20:51	21:41
4 08:36	4 08:01	10:01	4 06:44	05:35	04:48
1 16:07	1 17:01	11:58	1 19:57	20:53	21:42
5 08:36	5 08:00	10:38	5 06:42	05:33	04:48
1 16:08	1 17:03	18:00	1 19:59	20:55	21:43
6 08:36	6 07:57	10:56	6 06:39	05:31	04:47
1 16:09	1 17:05	18:03	1 20:01	20:57	21:44
7 08:35	7 07:55	08:22 (WEA 19 (GCS))   06:53	7 06:37	05:29	04:46
1 16:11	1 17:07	8 08:30 (WEA 19 (GCS))   18:04	1 20:03	20:59	21:45
8 08:35	8 07:53	08:20 (WEA 19 (GCS))   06:51	8 06:35	05:27	04:46
1 16:12	1 17:09	13 08:33 (WEA 19 (GCS))   18:06	1 20:04	21:00	21:46
9 08:34	9 07:51	08:18 (WEA 19 (GCS))   06:49	9 06:32	05:25	04:45
1 16:14	1 17:11	17 08:35 (WEA 19 (GCS))   18:08	1 20:06	21:02	21:47
10 08:33	10 07:49	08:16 (WEA 19 (GCS))   06:46	10 06:30	05:24	04:44
1 16:15	1 17:14	21 08:37 (WEA 19 (GCS))   18:09	1 20:08	21:04	21:48
11 08:33	11 07:47	08:15 (WEA 19 (GCS))   06:44	11 06:27	05:22	04:44
1 16:17	1 17:16	23 08:38 (WEA 19 (GCS))   18:11	1 20:10	21:06	21:49
12 08:32	12 07:45	08:14 (WEA 19 (GCS))   06:41	12 06:25	05:20	04:44
1 16:18	1 17:18	25 08:39 (WEA 19 (GCS))   18:13	1 20:12	21:08	21:50
13 08:31	13 07:43	08:13 (WEA 19 (GCS))   06:39	13 06:22	05:19	04:43
1 16:20	1 17:20	27 08:40 (WEA 19 (GCS))   18:15	1 20:14	21:09	21:50
14 08:30	14 07:41	08:12 (WEA 19 (GCS))   06:36	14 06:20	05:16	04:43
1 16:21	1 17:22	28 08:40 (WEA 19 (GCS))   18:17	1 20:16	21:11	21:51
15 08:29	15 07:39	08:12 (WEA 19 (GCS))   06:34	15 06:18	05:15	04:43
1 16:23	1 17:24	29 08:41 (WEA 19 (GCS))   18:19	1 20:18	21:13	21:52
16 08:28	16 07:37	08:12 (WEA 19 (GCS))   06:31	16 06:15	05:13	04:43
1 16:25	1 17:26	30 08:41 (WEA 19 (GCS))   18:21	1 20:19	21:14	21:52
17 08:27	17 07:35	08:12 (WEA 19 (GCS))   06:29	17 06:13	05:11	04:42
1 16:27	1 17:28	29 08:41 (WEA 19 (GCS))   18:23	1 20:21	21:16	21:53
18 08:26	18 07:33	08:11 (WEA 19 (GCS))   06:27	18 06:11	05:10	04:42
1 16:28	1 17:30	30 08:41 (WEA 19 (GCS))   18:25	1 20:23	21:18	21:53
19 08:25	19 07:31	08:11 (WEA 19 (GCS))   06:24	19 06:08	05:08	04:42
1 16:30	1 17:32	30 08:41 (WEA 19 (GCS))   18:27	1 20:25	21:19	21:54
20 08:24	20 07:28	08:12 (WEA 19 (GCS))   06:22	20 06:06	05:06	04:42
1 16:32	1 17:34	28 08:40 (WEA 19 (GCS))   18:29	1 20:27	21:21	21:54
21 08:23	21 07:26	08:13 (WEA 19 (GCS))   06:19	21 06:04	05:05	04:42
1 16:34	1 17:36	27 08:40 (WEA 19 (GCS))   18:30	1 20:29	21:23	21:54
22 08:21	22 07:24	08:13 (WEA 19 (GCS))   06:17	22 06:01	05:03	04:42
1 16:36	1 17:38	26 08:39 (WEA 19 (GCS))   18:32	1 20:31	21:24	21:54
23 08:20	23 07:22	08:14 (WEA 19 (GCS))   06:14	23 06:00	05:02	04:42
1 16:38	1 17:40	24 08:38 (WEA 19 (GCS))   18:34	1 20:33	21:26	21:54
24 08:19	24 07:19	08:15 (WEA 19 (GCS))   06:12	24 06:00	05:01	04:42
25 08:19	25 07:17	08:17 (WEA 19 (GCS))   18:36	25 06:00	05:02	04:43
1 16:41	1 17:44	19 08:25 (WEA 19 (GCS))   18:38	1 20:36	21:29	21:55
26 08:16	26 07:15	08:18 (WEA 19 (GCS))   06:07	26 06:00	05:01	04:42
1 16:43	1 17:46	15 08:33 (WEA 19 (GCS))   18:40	1 20:38	21:30	21:55
27 08:14	27 07:12	08:21 (WEA 19 (GCS))   06:04	27 06:00	05:00	04:42
1 16:45	1 17:48	7 08:28 (WEA 19 (GCS))   18:42	1 20:40	21:32	21:55
28 08:13	28 07:10	10:02	28 06:00	05:00	04:42
1 16:47	1 17:50	18:44	1 20:42	21:33	21:55
29 08:11	29 07:08	10:59	29 06:00	05:00	04:42
1 16:49	1 17:52	19:46	1 20:44	21:35	21:54
30 08:09	30 07:06	10:57	30 06:00	05:00	04:42
1 16:51	1 17:54	19:47	1 20:46	21:36	21:54
31 08:08	31 07:04	10:54	31 06:00	05:00	04:42
1 16:53	1 17:56	19:49	1 20:48	21:37	21:54
Sonnenrechenstunden mit max mögl. Beschattung	248 260	272 305	367 421	496 513	513 511

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

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



Projekt:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0

DNV

Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 33 - IO 33 Rütting Söhlen 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 Sonneneinstrahlungsrichtung
  - Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli		August		September		Oktober		November		Dezember				
1	04:47	05:21 (WEA G2)	05:28		06:23		07:17		07:16		07:46 (WEA 19 (GCS))	08:12			
	21:54	45 21:15 (WEA 14 (GRS))	21:18		20:10		18:55		16:44	20	08:06 (WEA 19 (GCS))	15:59			
2	04:48	05:21 (WEA G2)	05:29		06:25		07:19		07:18		07:46 (WEA 19 (GCS))	08:14			
	21:53	43 21:14 (WEA 14 (GRS))	21:16		20:08		18:53		16:42	16	08:04 (WEA 19 (GCS))	15:58			
3	04:48	05:22 (WEA G2)	05:31		06:26		07:21		07:20		07:50 (WEA 19 (GCS))	08:15			
	21:53	43 21:14 (WEA 14 (GRS))	21:14		20:05		18:50		16:40	12	08:02 (WEA 19 (GCS))	15:57			
4	04:49	05:23 (WEA G2)	05:33		06:28		07:23		07:22		07:53 (WEA 19 (GCS))	08:17			
	21:52	41 21:14 (WEA 14 (GRS))	21:12		20:03		18:48		16:38	5	07:58 (WEA 19 (GCS))	15:56			
5	04:50	05:24 (WEA G2)	05:34		06:30		07:24		07:24			08:18			
	21:52	40 21:14 (WEA 14 (GRS))	21:10		20:00		18:45		16:36			15:56			
6	04:51	05:25 (WEA G2)	05:36		06:32		07:26		07:26			08:19			
	21:51	38 21:14 (WEA 14 (GRS))	21:08	2	06:09 (WEA 15 (GCH))	19:58	18:43		16:34			15:55			
7	04:52	05:26 (WEA G2)	05:38		06:34		07:28		07:28			08:21			
	21:50	36 21:14 (WEA 14 (GRS))	21:06	1	06:08 (WEA 15 (GCH))	19:55	18:41		16:32			15:55			
8	04:53	05:27 (WEA G2)	05:40		06:35		07:30		07:30			08:22			
	21:50	35 21:14 (WEA 14 (GRS))	21:04		19:53		18:38		16:30	5	08:29 (WEA 21 (GCS))	15:54			
9	04:54	05:28 (WEA G2)	05:41		06:37		07:32		07:32		08:26 (WEA 21 (GCS))	08:23			
	21:49	34 21:14 (WEA 14 (GRS))	21:02		19:50		18:36		16:28	11	08:37 (WEA 21 (GCS))	15:54			
10	04:55	05:29 (WEA G2)	05:43		06:39		07:34		07:34		08:24 (WEA 21 (GCS))	08:25			
	21:48	33 21:13 (WEA 10 (GRS))	21:00		19:48		18:33		16:27	14	08:36 (WEA 21 (GCS))	15:54			
11	04:56	05:30 (WEA G2)	05:45		06:41		07:36		07:36		08:24 (WEA 21 (GCS))	08:26			
	21:47	31 21:12 (WEA 10 (GRS))	20:58		19:45	10	07:33 (WEA 20 (GCS))	18:31	16:25	17	08:41 (WEA 21 (GCS))	15:53			
12	04:58	05:31 (WEA G2)	05:47		06:43		07:37		07:38		08:23 (WEA 21 (GCS))	08:27			
	21:46	29 21:11 (WEA 10 (GRS))	20:56		19:43	14	07:45 (WEA 20 (GCS))	18:29	16:23	18	08:41 (WEA 21 (GCS))	15:53			
13	04:59	05:32 (WEA G2)	05:49		06:44		07:39		07:40		08:23 (WEA 21 (GCS))	08:28			
	21:45	28 21:10 (WEA 10 (GRS))	20:54		19:40	18	07:46 (WEA 20 (GCS))	18:26	16:21	19	08:42 (WEA 21 (GCS))	15:53			
14	05:00	20:43 (WEA 13 (GRS))	05:50		06:46		07:41		07:42		08:22 (WEA 21 (GCS))	08:29			
	21:44	26 21:09 (WEA 10 (GRS))	20:52		19:38	20	07:47 (WEA 20 (GCS))	18:24	16:20	21	08:43 (WEA 21 (GCS))	15:53			
15	05:01	20:42 (WEA 13 (GRS))	05:52		06:48		07:43		07:44		08:22 (WEA 21 (GCS))	08:30			
	21:43	26 21:08 (WEA 10 (GRS))	20:49		19:35	22	07:48 (WEA 20 (GCS))	18:21	10	09:03 (WEA 19 (GCS))	16:18	21	08:44 (WEA 21 (GCS))	15:53	
16	05:03	20:43 (WEA 13 (GRS))	05:54		06:50		07:45		07:46		08:22 (WEA 21 (GCS))	08:31			
	21:42	25 21:08 (WEA 10 (GRS))	20:47		19:33	23	07:46 (WEA 20 (GCS))	18:19	17	09:06 (WEA 19 (GCS))	16:17	21	08:43 (WEA 21 (GCS))	15:53	
17	05:04	20:43 (WEA 13 (GRS))	05:56		06:52		07:47		07:47		08:22 (WEA 21 (GCS))	08:32			
	21:41	23 21:06 (WEA 10 (GRS))	20:45		19:30	23	07:47 (WEA 20 (GCS))	18:17	20	09:07 (WEA 19 (GCS))	16:15	21	08:43 (WEA 21 (GCS))	15:53	
18	05:06	20:42 (WEA 13 (GRS))	05:58		06:53		07:49		07:49		08:22 (WEA 21 (GCS))	08:32			
	21:39	23 21:05 (WEA 10 (GRS))	20:43		19:28	23	07:47 (WEA 20 (GCS))	18:14	23	09:09 (WEA 19 (GCS))	16:14	22	08:44 (WEA 21 (GCS))	15:53	
19	05:07	20:42 (WEA 13 (GRS))	05:59		06:55		07:51		07:51		08:24 (WEA 21 (GCS))	08:33			
	21:38	22 21:04 (WEA 10 (GRS))	20:40		19:25	23	07:47 (WEA 20 (GCS))	18:12	25	09:10 (WEA 19 (GCS))	16:12	20	08:44 (WEA 21 (GCS))	15:54	
20	05:08	20:42 (WEA 13 (GRS))	06:01		06:57		07:53		07:53		08:26 (WEA 21 (GCS))	08:34			
	21:37	21 21:03 (WEA 10 (GRS))	20:38		19:23	23	07:47 (WEA 20 (GCS))	18:10	26	09:14 (WEA 19 (GCS))	16:11	18	08:44 (WEA 21 (GCS))	15:54	
21	05:10	20:42 (WEA 13 (GRS))	06:03		06:59		07:55		07:55		08:29 (WEA 21 (GCS))	08:34			
	21:35	19 21:01 (WEA 10 (GRS))	20:36		19:20	20	07:45 (WEA 20 (GCS))	18:08	28	09:11 (WEA 19 (GCS))	16:09	16	08:45 (WEA 21 (GCS))	15:54	
22	05:11	20:42 (WEA 13 (GRS))	06:05		07:01		07:57		07:57		08:31 (WEA 21 (GCS))	08:35			
	21:34	19 21:01 (WEA 10 (GRS))	20:34		19:18	17	07:44 (WEA 20 (GCS))	18:05	29	09:11 (WEA 19 (GCS))	16:08	13	08:44 (WEA 21 (GCS))	15:55	
23	05:13	20:42 (WEA 13 (GRS))	06:07		07:02		07:59		07:58		08:33 (WEA 21 (GCS))	08:36			
	21:32	17 20:59 (WEA 13 (GRS))	20:31		19:15	14	07:43 (WEA 20 (GCS))	18:03	29	09:11 (WEA 19 (GCS))	16:07	11	08:44 (WEA 21 (GCS))	15:55	
24	05:14	20:42 (WEA 13 (GRS))	06:08		07:04		08:00		08:00		08:34 (WEA 21 (GCS))	08:36			
	21:31	15 20:57 (WEA 13 (GRS))	20:29		19:13	10	07:31 (WEA 20 (GCS))	18:01	30	09:11 (WEA 19 (GCS))	16:06	9	08:43 (WEA 21 (GCS))	15:56	
25	05:16	20:43 (WEA 13 (GRS))	06:10		07:06		07:02		07:02		08:36 (WEA 21 (GCS))	08:36			
	21:29	13 20:56 (WEA 13 (GRS))	20:27		19:10	5	07:38 (WEA 20 (GCS))	17:59	30	09:11 (WEA 19 (GCS))	16:05	7	08:43 (WEA 21 (GCS))	15:57	
26	05:18	20:43 (WEA 13 (GRS))	06:12		07:08		07:04		07:04		08:38 (WEA 21 (GCS))	08:37			
	21:28	11 20:54 (WEA 13 (GRS))	20:24		19:08		16:56		16:56		08:40 (WEA 21 (GCS))	15:57			
27	05:19	20:44 (WEA 13 (GRS))	06:14		07:10		07:06		07:06		08:40 (WEA 21 (GCS))	08:37			
	21:26	10 20:54 (WEA 13 (GRS))	20:22		19:05		16:54		16:54	29	08:10 (WEA 19 (GCS))	16:02	2	08:42 (WEA 21 (GCS))	15:58
28	05:21	20:44 (WEA 13 (GRS))	06:16		07:11		07:08		07:08		08:42 (WEA 21 (GCS))	08:37			
	21:24	7 20:51 (WEA 13 (GRS))	20:20		19:03		16:52		16:52	27	08:09 (WEA 19 (GCS))	16:01		15:59	
29	05:23	20:45 (WEA 13 (GRS))	06:17		07:13		07:10		07:10		07:43 (WEA 19 (GCS))	08:09		08:37	
	21:23	5 20:50 (WEA 13 (GRS))	20:17		19:00		16:50		16:50	27	08:10 (WEA 19 (GCS))	16:00		16:00	
30	05:24	20:45 (WEA 13 (GRS))	06:19		07:15		07:12		07:12		07:44 (WEA 19 (GCS))	08:10		08:37	
	21:21	3 20:48 (WEA 13 (GRS))	20:15		18:58		16:48		16:48	25	08:09 (WEA 19 (GCS))	15:59		16:01	
31	05:26		20:12				07:14		07:14		07:44 (WEA 19 (GCS))	08:10		08:37	
	21:19						16:46		16:46	24	08:08 (WEA 19 (GCS))	15:58		16:02	
		Sonnenscheinstunden					328		328					231	
		astr. max. mögl. Beschattung													
		761	461	3	383	265	428	257	343						

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) Schattende		

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 34 - IO 34 Rütting Söhlen 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 Sonneneinstrahlungsrichtung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:37 16:03	08:06 16:55	07:08 17:52	07:54 (WEA 21 (GCS)) 08:04 (WEA 21 (GCS))	06:52 19:51	05:42 21:38
2	08:37 16:04	08:04 16:57	07:05 17:54	06:49 19:53	05:40 20:49	21:50 21:40
3	08:37 16:06	08:03 16:59	07:03 17:56	06:47 19:55	05:37 20:51	21:49 21:41
4	08:36 16:07	08:01 17:01	07:01 17:58	06:44 19:57	05:35 20:53	21:48 21:42
5	08:36 16:08	07:59 17:03	06:58 18:00	06:42 19:59	05:33 20:55	21:48 21:43
6	08:36 16:09	07:57 17:05	06:56 18:02	06:39 20:01	05:31 20:57	21:47 21:44
7	08:35 16:11	07:55 17:07	06:53 18:04	06:37 20:03	05:29 20:59	21:46 21:45
8	08:35 16:12	07:53 17:09	06:51 18:06	06:35 20:04	05:27 21:00	21:46 21:46
9	08:34 16:14	07:51 17:11	06:49 18:08	06:32 20:06	05:26 21:02	21:45 21:47
10	08:33 16:15	07:49 17:14	06:46 18:09	06:30 20:08	06:54 (WEA 20 (GCS)) 06:58 (WEA 20 (GCS))	05:24 21:04
11	08:33 16:17	07:47 17:16	06:44 18:11	06:27 20:10	06:51 (WEA 20 (GCS)) 06:59 (WEA 20 (GCS))	05:22 21:06
12	08:32 16:18	07:45 17:18	06:41 18:13	06:25 20:12	06:49 (WEA 20 (GCS)) 07:01 (WEA 20 (GCS))	05:20 21:08
13	08:31 16:20	07:43 17:20	06:39 18:15	06:22 20:14	06:47 (WEA 20 (GCS)) 07:02 (WEA 20 (GCS))	05:18 21:09
14	08:30 16:21	07:41 17:22	06:36 18:17	06:20 20:16	06:44 (WEA 20 (GCS)) 07:01 (WEA 20 (GCS))	05:16 21:11
15	08:29 16:23	07:39 17:24	06:34 18:19	06:18 20:18	06:42 (WEA 20 (GCS)) 07:02 (WEA 20 (GCS))	05:15 21:13
16	08:28 16:25	07:37 17:26	06:31 18:21	06:15 20:19	06:42 (WEA 20 (GCS)) 07:02 (WEA 20 (GCS))	05:13 21:14
17	08:27 16:27	07:35 17:28	06:29 18:23	06:13 20:21	06:41 (WEA 20 (GCS)) 07:01 (WEA 20 (GCS))	05:11 21:16
18	08:26 16:28	07:33 17:30	06:27 18:25	06:11 20:23	06:42 (WEA 20 (GCS)) 07:00 (WEA 20 (GCS))	05:10 21:18
19	08:25 16:30	07:31 17:32	06:24 18:27	06:08 20:25	06:42 (WEA 20 (GCS)) 07:00 (WEA 20 (GCS))	05:08 21:19
20	08:24 16:32	07:28 17:34	06:22 18:29	06:06 20:27	06:43 (WEA 20 (GCS)) 06:59 (WEA 20 (GCS))	05:06 21:21
21	08:23 16:34	07:26 17:36	06:19 18:30	06:04 20:29	06:44 (WEA 20 (GCS)) 06:58 (WEA 20 (GCS))	05:05 21:23
22	08:21 16:36	07:24 17:38	06:17 18:32	06:01 20:31	06:45 (WEA 20 (GCS)) 06:55 (WEA 20 (GCS))	05:03 21:24
23	08:20 16:38	07:22 17:40	06:14 18:34	05:59 20:33	06:45 (WEA 19 (GCS)) 07:15 (WEA 19 (GCS))	05:02 21:26
24	08:19 16:39	07:19 17:42	06:12 18:36	05:57 20:34	06:48 (WEA 19 (GCS)) 07:14 (WEA 19 (GCS))	05:01 21:27
25	08:17 16:41	07:17 17:44	06:09 18:38	05:55 20:36	06:49 (WEA 19 (GCS)) 07:14 (WEA 19 (GCS))	05:00 21:29
26	08:16 16:43	07:15 17:46	06:07 18:40	05:52 20:38	06:49 (WEA 19 (GCS)) 07:12 (WEA 19 (GCS))	05:00 21:30
27	08:14 16:45	07:12 17:48	06:04 18:42	05:50 20:40	06:50 (WEA 19 (GCS)) 07:11 (WEA 19 (GCS))	05:00 21:32
28	08:13 16:47	07:10 17:50	06:02 18:44	05:48 20:42	06:50 (WEA 19 (GCS)) 07:09 (WEA 19 (GCS))	05:00 21:33
29	08:11 16:49		06:59 19:46	05:46 20:44	07:52 (WEA 19 (GCS)) 08:07 (WEA 19 (GCS))	05:00 21:35
30	08:09 16:51		06:57 19:47	05:44 20:46	07:54 (WEA 19 (GCS)) 08:04 (WEA 19 (GCS))	05:00 21:36
31	08:08 16:53		06:54 19:49	05:42 20:48		05:00 21:37
	Sonnenscheinstunden astr.max.mögl.Beschattung	248 272	191 367	347 421	192 496	513 18

**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:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 34 - IO 34 Rütting Söhlen 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 Sonneneinstrahlungsrichtung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli	August	September	Oktober	November	Dezember			
1	04:47	05:28	06:23	06:51 (WEA 20 (GCS))	07:17	07:16	08:12		
	21:53	21:18	20:10	8 06:59 (WEA 20 (GCS))	18:55	16:44	15:59		
2	04:48	05:29	06:25	06:52 (WEA 20 (GCS))	07:19	07:18	08:14		
	21:53	21:16	20:08	4 06:56 (WEA 20 (GCS))	18:53	16:42	15:58		
3	04:48	05:31	06:26		07:21	07:20	08:15		
	21:53	21:14	20:05		18:50	16:40	15:57		
4	04:49	05:33	06:28		07:23	07:22	08:17		
	21:52	21:12	20:03		18:48	16:38	15:56		
5	04:50	05:34	06:30		07:24	07:24	08:18		
	21:52	21:10	20:00		18:45	16:36	15:56		
6	04:51	05:36	06:32		07:26	07:26	08:19		
	21:51	21:08	19:58		18:43	16:34	15:55		
7	04:52	05:38	06:34		07:28	07:28	08:21		
	21:50	21:06	19:55		18:41	16:32	15:55		
8	04:53	05:40	06:35		07:30	07:30	08:22		
	21:50	21:04	19:53		18:38	16:30	15:54		
9	04:54	05:41	06:37		07:32	07:32	08:23		
	21:49	21:02	19:50		18:36	16:28	15:54		
10	04:55	05:43	06:39		07:34	07:34	08:25		
	21:48	21:00	19:48		18:33	16:27	15:54		
11	04:56	05:45	06:41		07:36	07:36	08:26		
	21:47	20:58	19:45		18:31	16:25	15:53		
12	04:58	05:47	06:43		07:37	07:37	08:27		
	21:46	20:56	19:43		18:29	6 08:29 (WEA 21 (GCS))	16:23	15:53	
13	04:59	05:49	06:44	07:46 (WEA 19 (GCS))	07:39	6 08:35 (WEA 21 (GCS))	16:23	15:53	
	21:45	20:54	19:40	8 07:54 (WEA 19 (GCS))	18:26	12 08:26 (WEA 21 (GCS))	16:23	15:53	
14	05:00	05:50	06:46	07:43 (WEA 19 (GCS))	07:41	12 08:38 (WEA 21 (GCS))	16:22	15:53	
	21:44	20:52	19:38	14 07:57 (WEA 19 (GCS))	18:24	16 08:24 (WEA 21 (GCS))	16:22	15:53	
15	05:01	05:52	06:48	07:41 (WEA 19 (GCS))	07:43	16 08:40 (WEA 21 (GCS))	16:20	15:53	
	21:43	20:49	19:35	18 07:59 (WEA 19 (GCS))	18:21	17 08:23 (WEA 21 (GCS))	16:18	15:53	
16	05:03	05:54	06:50	07:40 (WEA 19 (GCS))	07:45	17 08:40 (WEA 21 (GCS))	16:18	15:53	
	21:42	20:47	19:33	20 08:00 (WEA 19 (GCS))	18:19	19 08:22 (WEA 21 (GCS))	16:17	15:53	
17	05:04	05:56	06:52	07:38 (WEA 19 (GCS))	07:47	19 08:41 (WEA 21 (GCS))	16:17	15:53	
	21:41	20:45	19:30	22 08:00 (WEA 19 (GCS))	18:17	20 08:21 (WEA 21 (GCS))	16:15	15:53	
18	05:06	05:58	06:53	07:37 (WEA 19 (GCS))	07:49	20 08:41 (WEA 21 (GCS))	16:14	15:53	
	21:39	20:43	19:28	24 08:01 (WEA 19 (GCS))	18:14	20 08:21 (WEA 21 (GCS))	16:14	15:53	
19	05:07	05:59	06:55	07:36 (WEA 19 (GCS))	07:51	20 08:41 (WEA 21 (GCS))	16:12	15:54	
	21:38	20:40	19:25	25 08:01 (WEA 19 (GCS))	18:12	20 08:21 (WEA 21 (GCS))	16:12	15:54	
20	05:08	06:01	06:57	07:36 (WEA 19 (GCS))	07:53	20 08:41 (WEA 21 (GCS))	16:11	15:54	
	21:37	20:38	4 06:57 (WEA 20 (GCS))	19:23	26 08:02 (WEA 19 (GCS))	18:10	20 08:21 (WEA 21 (GCS))	16:11	15:54
21	05:10	06:03	06:50 (WEA 20 (GCS))	06:59	26 08:34 (WEA 19 (GCS))	07:55	20 08:23 (WEA 21 (GCS))	16:11	15:54
	21:35	20:36	11 07:01 (WEA 20 (GCS))	19:20	26 08:00 (WEA 19 (GCS))	18:08	17 08:40 (WEA 21 (GCS))	16:09	15:54
22	05:11	06:05	06:48 (WEA 20 (GCS))	07:01	26 07:34 (WEA 19 (GCS))	07:57	17 08:25 (WEA 21 (GCS))	16:09	15:54
	21:34	20:34	14 07:02 (WEA 20 (GCS))	19:18	26 08:00 (WEA 19 (GCS))	18:05	14 08:39 (WEA 21 (GCS))	16:08	15:55
23	05:13	06:07	06:46 (WEA 20 (GCS))	07:02	25 07:35 (WEA 19 (GCS))	07:59	14 08:27 (WEA 21 (GCS))	16:08	15:55
	21:32	20:31	17 07:03 (WEA 20 (GCS))	19:15	25 08:00 (WEA 19 (GCS))	18:03	11 08:38 (WEA 21 (GCS))	16:07	15:55
24	05:14	06:08	06:46 (WEA 20 (GCS))	07:04	25 07:35 (WEA 19 (GCS))	08:00	11 08:29 (WEA 21 (GCS))	16:07	15:55
	21:31	20:29	18 07:04 (WEA 20 (GCS))	19:13	24 07:59 (WEA 19 (GCS))	18:01	8 08:37 (WEA 21 (GCS))	16:06	15:56
25	05:16	06:10	06:44 (WEA 20 (GCS))	07:06	24 07:35 (WEA 19 (GCS))	07:02	8 07:31 (WEA 21 (GCS))	16:06	15:56
	21:29	20:27	19 07:03 (WEA 20 (GCS))	19:10	23 07:58 (WEA 19 (GCS))	16:59	3 07:34 (WEA 21 (GCS))	16:05	15:57
26	05:18	06:12	06:44 (WEA 20 (GCS))	07:08	23 07:35 (WEA 19 (GCS))	07:04		16:05	15:57
	21:28	20:24	20 07:04 (WEA 20 (GCS))	19:08	21 07:56 (WEA 19 (GCS))	16:56		16:03	15:57
27	05:19	06:14	06:44 (WEA 20 (GCS))	07:10	21 07:37 (WEA 19 (GCS))	07:06		16:03	15:57
	21:26	20:22	20 07:04 (WEA 20 (GCS))	19:05	18 07:55 (WEA 19 (GCS))	16:54		16:02	15:58
28	05:21	06:16	06:44 (WEA 20 (GCS))	07:11	18 07:38 (WEA 19 (GCS))	07:08		16:02	15:58
	21:24	20:20	20 07:04 (WEA 20 (GCS))	19:03	14 07:52 (WEA 19 (GCS))	16:52		16:01	15:59
29	05:23	06:17	06:45 (WEA 20 (GCS))	07:13	14 07:42 (WEA 19 (GCS))	07:10		16:01	15:59
	21:23	20:17	17 07:02 (WEA 20 (GCS))	19:00	7 07:49 (WEA 19 (GCS))	16:50		16:00	16:00
30	05:24	06:19	06:47 (WEA 20 (GCS))	07:15		07:12		16:00	16:00
	21:21	20:15	15 07:02 (WEA 20 (GCS))	18:58		16:48		16:00	16:00
31	05:26	06:21	06:49 (WEA 20 (GCS))			07:14		16:00	16:00
	21:19	20:12	12 07:01 (WEA 20 (GCS))			16:46		16:00	16:00
Sonnenscheinstunden		514	461	383	353	328	257	231	
astr.max.mögl.Beschattung			187			203			

**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) Schatteneende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 35 - IO 35 Rütting Chaussee 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 08:37 15:19 (WEA 14 (GRS)) 08:06	15:52 (WEA 12 (GRS)) 07:08	17:19 (WEA 10 (GRS)) 06:52	07:16 (WEA G3) 05:42		04:51 05:23 (WEA 06 (GRN))
16:03 6 15:25 (WEA 14 (GRS)) 16:55	21 16:13 (WEA 12 (GRS)) 17:52	6 17:25 (WEA 10 (GRS)) 19:51	63 08:19 (WEA G1) 20:40		21:39 26 05:49 (WEA 06 (GRN))
2 08:37 15:20 (WEA 14 (GRS)) 08:04	15:52 (WEA 12 (GRS)) 07:05	17:20 (WEA 10 (GRS)) 06:49	07:16 (WEA G3) 05:39		04:50 05:22 (WEA 06 (GRN))
16:04 6 15:26 (WEA 14 (GRS)) 16:57	21 16:13 (WEA 12 (GRS)) 17:54	5 17:25 (WEA 10 (GRS)) 19:53	62 08:19 (WEA G1) 20:49		21:40 27 05:49 (WEA 06 (GRN))
3 08:37 15:19 (WEA 14 (GRS)) 08:03	15:54 (WEA 12 (GRS)) 07:03	06:47	07:17 (WEA G3) 05:37		04:49 05:23 (WEA 06 (GRN))
16:05 8 15:27 (WEA 14 (GRS)) 16:59	19 16:13 (WEA 12 (GRS)) 17:56	19:55	61 08:18 (WEA G1) 20:51		21:41 27 05:50 (WEA 06 (GRN))
4 08:36 15:20 (WEA 14 (GRS)) 08:01	15:55 (WEA 12 (GRS)) 07:01	06:44	07:17 (WEA G3) 05:35		04:48 05:23 (WEA 06 (GRN))
16:07 9 15:29 (WEA 14 (GRS)) 17:01	18 16:13 (WEA 12 (GRS)) 17:58	19:57	61 08:18 (WEA G1) 20:53		21:42 27 05:50 (WEA 06 (GRN))
5 08:36 15:20 (WEA 14 (GRS)) 07:59	15:56 (WEA 12 (GRS)) 06:58	06:42	07:19 (WEA G3) 05:33		04:48 05:23 (WEA 06 (GRN))
16:08 10 15:30 (WEA 14 (GRS)) 17:03	18 16:32 (WEA 13 (GRS)) 18:00	19:59	59 08:18 (WEA G1) 20:55		21:43 27 05:50 (WEA 06 (GRN))
6 08:36 15:20 (WEA 14 (GRS)) 07:57	15:58 (WEA 12 (GRS)) 06:56	06:39	07:19 (WEA G1) 05:31		04:47 05:24 (WEA 06 (GRN))
16:09 11 15:31 (WEA 14 (GRS)) 17:05	17 16:35 (WEA 13 (GRS)) 18:02	20:01	58 08:17 (WEA G1) 20:57		21:44 27 05:51 (WEA 06 (GRN))
7 08:35 15:22 (WEA 14 (GRS)) 07:55	16:00 (WEA 12 (GRS)) 06:53	06:37	07:20 (WEA G3) 05:29		04:46 05:23 (WEA 06 (GRN))
16:11 11 15:33 (WEA 14 (GRS)) 17:07	14 16:36 (WEA 13 (GRS)) 18:04	20:03	57 08:17 (WEA G1) 20:59		21:45 27 05:50 (WEA 06 (GRN))
8 08:35 15:22 (WEA 14 (GRS)) 07:53	16:30 (WEA 13 (GRS)) 06:51	07:15 (WEA 15 (GCN)) 06:35	07:19 (WEA G1) 05:27		04:45 05:24 (WEA 06 (GRN))
16:12 13 16:35 (WEA 14 (GRS)) 17:09	8 16:38 (WEA 13 (GRS)) 18:06	2 07:17 (WEA 15 (GCN)) 20:04	56 08:15 (WEA G1) 21:00		21:46 27 05:51 (WEA 06 (GRN))
9 08:34 15:22 (WEA 14 (GRS)) 07:51	16:31 (WEA 13 (GRS)) 06:49	07:13 (WEA 15 (GCN)) 06:32	07:19 (WEA G1) 05:25		04:45 05:24 (WEA 06 (GRN))
16:14 14 15:36 (WEA 14 (GRS)) 17:11	10 16:41 (WEA 13 (GRS)) 18:07	4 07:17 (WEA 15 (GCN)) 20:06	56 08:15 (WEA G1) 21:02		21:47 27 05:51 (WEA 06 (GRN))
10 08:33 15:23 (WEA 14 (GRS)) 07:49	16:33 (WEA 13 (GRS)) 06:46	07:10 (WEA 15 (GCN)) 06:30	07:20 (WEA G1) 05:24		04:44 05:24 (WEA 06 (GRN))
16:15 15 15:38 (WEA 14 (GRS)) 17:13	8 16:41 (WEA 13 (GRS)) 18:09	6 07:16 (WEA 15 (GCN)) 20:08	55 08:15 (WEA G1) 21:04		21:48 27 05:51 (WEA 06 (GRN))
11 08:33 15:24 (WEA 14 (GRS)) 07:47	16:44	07:08 (WEA 15 (GCN)) 06:27	07:19 (WEA G1) 05:22		04:44 05:24 (WEA 06 (GRN))
16:17 14 15:38 (WEA 14 (GRS)) 17:16	18:11	7 07:15 (WEA 15 (GCN)) 20:10	54 08:13 (WEA G1) 21:06		21:49 27 05:51 (WEA 06 (GRN))
12 08:32 15:24 (WEA 14 (GRS)) 07:45	06:41	07:09 (WEA 15 (GCN)) 06:25	07:20 (WEA G1) 05:20		04:44 05:24 (WEA 06 (GRN))
16:18 14 15:38 (WEA 14 (GRS)) 17:18	18:13	2 07:11 (WEA 15 (GCN)) 20:12	53 08:11 (WEA G1) 21:08		21:50 27 05:51 (WEA 06 (GRN))
13 08:31 15:25 (WEA 14 (GRS)) 07:43	06:39	06:22	07:20 (WEA G1) 05:18		04:43 05:25 (WEA 06 (GRN))
16:20 13 15:38 (WEA 14 (GRS)) 17:20	18:15	20:14	52 08:12 (WEA G1) 21:09		21:50 27 05:52 (WEA 06 (GRN))
14 08:30 15:27 (WEA 14 (GRS)) 07:41	06:36	06:20	07:20 (WEA G1) 05:16		04:43 05:25 (WEA 06 (GRN))
16:21 11 15:38 (WEA 14 (GRS)) 17:22	18:17	20:16	51 08:11 (WEA G1) 21:11		21:51 27 05:52 (WEA 06 (GRN))
15 08:29 15:28 (WEA 14 (GRS)) 07:39	06:34	06:18	07:21 (WEA G1) 05:15		04:43 05:26 (WEA 06 (GRN))
16:23 10 15:38 (WEA 14 (GRS)) 17:24	18:19	20:18	49 08:10 (WEA G1) 21:13		21:52 26 05:52 (WEA 06 (GRN))
16 08:28 15:30 (WEA 14 (GRS)) 07:37	16:54 (WEA 11 (GRS)) 06:31	06:55 (WEA G2) 06:15	07:22 (WEA G1) 05:13		04:42 05:26 (WEA 06 (GRN))
16:25 7 15:37 (WEA 14 (GRS)) 17:26	2 16:56 (WEA 11 (GRS)) 18:21	9 07:00 (WEA G2) 20:19	47 08:09 (WEA G1) 21:14		21:52 26 05:52 (WEA 06 (GRN))
17 08:27 15:27 (WEA 14 (GRS)) 07:35	06:29	06:53 (WEA G2) 06:13	07:22 (WEA G1) 05:11		04:42 05:26 (WEA 06 (GRN))
16:27 16 15:39 (WEA 14 (GRS)) 17:28	6 16:59 (WEA 11 (GRS)) 18:23	5 07:02 (WEA G2) 20:21	45 08:07 (WEA G1) 21:16		21:53 27 05:53 (WEA 06 (GRN))
18 08:26 15:27 (WEA 14 (GRS)) 07:33	06:27	06:50 (WEA G1) 06:11	07:23 (WEA G1) 05:10		04:42 05:26 (WEA 06 (GRN))
16:28 16 15:39 (WEA 14 (GRS)) 17:30	8 17:00 (WEA 11 (GRS)) 18:25	13 07:03 (WEA G2) 20:23	42 08:05 (WEA G1) 21:18		21:53 27 05:53 (WEA 06 (GRN))
19 08:25 15:27 (WEA 14 (GRS)) 07:31	06:24	06:48 (WEA G1) 06:08	07:24 (WEA G1) 05:08	05:37 (WEA 06 (GRN)) 04:42	05:27 (WEA 06 (GRN))
16:30 16 15:39 (WEA 14 (GRS)) 17:32	11 17:03 (WEA 11 (GRS)) 18:27	17 07:05 (WEA G2) 20:25	40 08:04 (WEA G1) 21:19	3 05:40 (WEA 06 (GRN)) 21:54	26 05:53 (WEA 06 (GRN))
20 08:24 15:54 (WEA 12 (GRS)) 07:28	16:53 (WEA 11 (GRS)) 06:22	06:45 (WEA G1) 06:06	07:26 (WEA G1) 05:06	05:35 (WEA 06 (GRN)) 04:42	05:27 (WEA 06 (GRN))
16:32 3 15:57 (WEA 12 (GRS)) 17:34	12 17:05 (WEA 11 (GRS)) 18:29	22 07:07 (WEA G1) 20:27	36 08:02 (WEA G1) 21:21	6 05:41 (WEA 06 (GRN)) 21:54	26 05:53 (WEA 06 (GRN))
21 08:23 15:53 (WEA 12 (GRS)) 07:26	06:19	06:43 (WEA G1) 06:04	07:26 (WEA G1) 05:05	05:34 (WEA 06 (GRN)) 04:42	05:27 (WEA 06 (GRN))
16:34 6 15:59 (WEA 12 (GRS)) 17:36	15 17:06 (WEA 11 (GRS)) 18:30	30 07:10 (WEA G1) 20:29	33 07:59 (WEA G1) 21:23	9 05:43 (WEA 06 (GRN)) 21:54	26 05:53 (WEA 06 (GRN))
22 08:21 15:53 (WEA 12 (GRS)) 07:24	06:17	06:40 (WEA G1) 06:01	07:28 (WEA G1) 05:03	05:33 (WEA 06 (GRN)) 04:43	05:27 (WEA 06 (GRN))
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23 08:20 15:52 (WEA 12 (GRS)) 07:22	06:14	06:38 (WEA G1) 06:00	07:31 (WEA G1) 05:02	05:31 (WEA 06 (GRN)) 04:43	05:27 (WEA 06 (GRN))
16:38 11 16:03 (WEA 12 (GRS)) 17:40	11 17:06 (WEA 11 (GRS)) 18:34	35 07:13 (WEA G1) 20:33	23 07:54 (WEA G1) 21:26	14 05:45 (WEA 06 (GRN)) 21:54	26 05:53 (WEA 06 (GRN))
24 08:19 15:51 (WEA 12 (GRS)) 07:19	06:12	06:35 (WEA G3) 05:57	07:34 (WEA G1) 05:01	05:30 (WEA 06 (GRN)) 04:43	05:27 (WEA 06 (GRN))
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25 08:17 15:51 (WEA 12 (GRS)) 07:17	06:09	06:33 (WEA G3) 05:55	07:34 (WEA G1) 05:01	05:29 (WEA 06 (GRN)) 04:44	05:27 (WEA 06 (GRN))
16:41 17 16:08 (WEA 12 (GRS)) 17:44	18:38	42 07:15 (WEA G1) 20:36	21:29	17 05:46 (WEA 06 (GRN)) 21:55	27 05:54 (WEA 06 (GRN))
26 08:16 15:51 (WEA 12 (GRS)) 07:15	17:17 (WEA 10 (GRS)) 06:07	06:30 (WEA G3) 05:52	04:58	05:28 (WEA 06 (GRN)) 04:44	05:28 (WEA 06 (GRN))
16:43 19 16:10 (WEA 12 (GRS)) 17:46	1 17:18 (WEA 10 (GRS)) 18:40	46 07:16 (WEA G1) 20:38	21:30	19 05:47 (WEA 06 (GRN)) 21:55	27 05:55 (WEA 06 (GRN))
27 08:14 15:50 (WEA 12 (GRS)) 07:12	06:04	06:28 (WEA G3) 05:50	04:57	05:27 (WEA 06 (GRN)) 04:44	05:28 (WEA 06 (GRN))
16:45 21 16:11 (WEA 12 (GRS)) 17:48	3 17:20 (WEA 10 (GRS)) 18:42	49 07:17 (WEA G1) 20:40	21:32	21 05:48 (WEA 06 (GRN)) 21:55	26 05:54 (WEA 06 (GRN))
28 08:13 15:51 (WEA 12 (GRS)) 07:10	06:02	06:25 (WEA G3) 05:48	04:55	05:26 (WEA 06 (GRN)) 04:45	05:28 (WEA 06 (GRN))
16:47 22 16:13 (WEA 12 (GRS)) 17:50	4 17:22 (WEA 10 (GRS)) 18:44	52 07:17 (WEA G1) 20:42	21:33	22 05:48 (WEA 06 (GRN)) 21:54	27 05:55 (WEA 06 (GRN))
29 08:11 15:51 (WEA 12 (GRS)) 07:07	06:59	07:23 (WEA G3) 05:46	04:54	05:25 (WEA 06 (GRN)) 04:46	05:28 (WEA 06 (GRN))
16:49 22 16:13 (WEA 12 (GRS)) 17:51	19:46	55 08:18 (WEA G1) 20:44	21:35	24 05:49 (WEA 06 (GRN)) 21:54	27 05:55 (WEA 06 (GRN))
30 08:09 15:51 (WEA 12 (GRS)) 07:05	06:57	07:20 (WEA G3) 05:44	04:53	05:24 (WEA 06 (GRN)) 04:46	05:29 (WEA 06 (GRN))
16:51 23 16:14 (WEA 12 (GRS)) 17:52	19:47	57 08:17 (WEA G1) 20:46	21:36	25 05:49 (WEA 06 (GRN)) 21:54	26 05:55 (WEA 06 (GRN))
31 08:08 15:51 (WEA 12 (GRS)) 07:03	06:54	07:18 (WEA G3) 05:42	04:52	05:23 (WEA 06 (GRN)) 04:46	
16:53 22 16:13 (WEA 12 (GRS)) 17:53	19:49	60 08:18 (WEA G1) 20:48	21:37	26 05:49 (WEA 06 (GRN)) 21:54	
Sommereinheiten   248	272		421	1159	214
astr. max. mögl. Beschattung   361	247	367	591	1159	800

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

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
 Sommerdeich 14 b  
 DE-25709 Kaiser-Wilhelm-Koog  
 (0 48 56)901-0

Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 35 - IO 35 Rütig Chaussee 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

Juli		August		September		Oktober		November		Dezember																																																																															
1	04:47	05:29 (WEA 08 (GRN))	05:27	06:23	07:18 (WEA_G1)	07:17		07:16	16:02 (WEA_13 (GRS))	08:12	15:06 (WEA_14 (GRS))																																																																														
	12:54	05:56 (WEA_08 (GRN))	12:18	20:10	54	08:12 (WEA_G1)	18:55	16:44	9	16:11 (WEA_13 (GRS))	15:59	15:21 (WEA_14 (GRS))																																																																													
2	04:48	05:28 (WEA_08 (GRN))	05:29	06:25	07:18 (WEA_G1)	07:19		07:18	16:01 (WEA_13 (GRS))	08:14	15:06 (WEA_14 (GRS))																																																																														
	12:53	05:55 (WEA_08 (GRN))	12:16	20:08	55	08:13 (WEA_G1)	18:53	7	07:52 (WEA_15 (GON))	16:42	9	16:10 (WEA_13 (GRS))	15:58	15:21 (WEA_14 (GRS))																																																																											
3	04:48	05:29 (WEA_08 (GRN))	05:31	06:26	07:17 (WEA_G1)	07:21		07:17	16:00 (WEA_13 (GRS))	08:15	15:07 (WEA_14 (GRS))																																																																														
	12:53	05:56 (WEA_08 (GRN))	12:14	20:05	56	08:13 (WEA_G1)	18:50	6	07:53 (WEA_15 (GON))	16:40	7	16:07 (WEA_13 (GRS))	15:57	15:20 (WEA_14 (GRS))																																																																											
4	04:49	05:29 (WEA_08 (GRN))	05:33	06:28	07:17 (WEA_G1)	07:22		07:17	16:00 (WEA_13 (GRS))	08:17	15:06 (WEA_14 (GRS))																																																																														
	12:52	05:56 (WEA_08 (GRN))	12:12	20:03	57	08:14 (WEA_G1)	18:48	5	07:54 (WEA_15 (GON))	16:38	14	16:05 (WEA_13 (GRS))	15:56	15:19 (WEA_14 (GRS))																																																																											
5	04:50	05:30 (WEA_08 (GRN))	05:34	06:30	07:16 (WEA_G1)	07:24		07:24	16:00 (WEA_13 (GRS))	08:18	15:07 (WEA_14 (GRS))																																																																														
	12:52	05:57 (WEA_08 (GRN))	12:10	20:00	57	08:13 (WEA_G1)	18:45	3	07:54 (WEA_15 (GON))	16:36	17	16:04 (WEA_13 (GRS))	15:56	15:19 (WEA_14 (GRS))																																																																											
6	04:51	05:30 (WEA_08 (GRN))	05:36	06:32	07:15 (WEA_G1)	07:26		07:26	16:00 (WEA_13 (GRS))	08:19	15:07 (WEA_14 (GRS))																																																																														
	12:51	05:57 (WEA_08 (GRN))	12:08	19:58	58	08:13 (WEA_G1)	18:43	16:34	18	16:02 (WEA_13 (GRS))	15:55	10	15:17 (WEA_14 (GRS))																																																																												
7	04:52	05:29 (WEA_08 (GRN))	05:38	06:34	07:14 (WEA_G1)	07:28		07:28	16:00 (WEA_13 (GRS))	08:21	15:07 (WEA_14 (GRS))																																																																														
	12:50	05:56 (WEA_08 (GRN))	12:06	19:55	59	08:12 (WEA_G1)	18:41	16:32	19	16:01 (WEA_13 (GRS))	15:55	10	15:17 (WEA_14 (GRS))																																																																												
8	04:53	05:29 (WEA_08 (GRN))	05:40	06:35	07:12 (WEA_G1)	07:30		07:30	16:00 (WEA_13 (GRS))	08:22	15:07 (WEA_14 (GRS))																																																																														
	12:50	05:56 (WEA_08 (GRN))	12:04	19:53	61	08:13 (WEA_G1)	18:38	16:30	20	16:00 (WEA_13 (GRS))	15:54	9	15:16 (WEA_14 (GRS))																																																																												
9	04:54	05:30 (WEA_08 (GRN))	05:41	06:37	07:10 (WEA_G1)	07:32		07:32	16:00 (WEA_13 (GRS))	08:23	15:09 (WEA_14 (GRS))																																																																														
	12:49	05:57 (WEA_08 (GRN))	12:02	19:50	61	08:11 (WEA_G1)	18:36	16:28	21	16:00 (WEA_13 (GRS))	15:54	7	15:16 (WEA_14 (GRS))																																																																												
10	04:55	05:31 (WEA_08 (GRN))	05:43	06:39	07:09 (WEA_G1)	07:34		07:34	16:00 (WEA_13 (GRS))	08:25	15:09 (WEA_14 (GRS))																																																																														
	12:48	05:58 (WEA_08 (GRN))	12:00	19:48	62	08:11 (WEA_G1)	18:33	16:27	22	16:00 (WEA_13 (GRS))	15:54	7	15:16 (WEA_14 (GRS))																																																																												
11	04:56	05:31 (WEA_08 (GRN))	05:45	06:41	07:08 (WEA_G1)	07:36		07:36	16:00 (WEA_13 (GRS))	08:26	15:09 (WEA_14 (GRS))																																																																														
	12:47	05:58 (WEA_08 (GRN))	12:00	19:45	63	08:11 (WEA_G1)	18:31	16:25	22	16:00 (WEA_13 (GRS))	15:53	6	15:15 (WEA_14 (GRS))																																																																												
12	04:58	05:31 (WEA_08 (GRN))	05:47	06:43	07:10 (WEA_G1)	07:37		07:37	17:53 (WEA_10 (GRS))	07:38	15:23 (WEA_12 (GRS))	08:27	15:09 (WEA_14 (GRS))																																																																												
	12:46	05:58 (WEA_08 (GRN))	12:06	19:43	60	08:10 (WEA_G1)	18:28	6	17:59 (WEA_10 (GRS))	16:23	22	16:00 (WEA_13 (GRS))	15:53	6	15:15 (WEA_14 (GRS))																																																																										
13	04:59	05:32 (WEA_08 (GRN))	05:49	06:44	07:11 (WEA_G1)	07:39		07:39	17:51 (WEA_10 (GRS))	07:40	15:23 (WEA_12 (GRS))	08:28	15:10 (WEA_14 (GRS))																																																																												
	12:45	05:57 (WEA_08 (GRN))	12:04	19:40	58	08:09 (WEA_G1)	18:26	6	17:57 (WEA_10 (GRS))	16:21	22	16:00 (WEA_13 (GRS))	15:53	4	15:14 (WEA_14 (GRS))																																																																										
14	05:00	05:33 (WEA_08 (GRN))	05:50	06:46	07:12 (WEA_G1)	07:41		07:42	17:50 (WEA_10 (GRS))	07:42	15:23 (WEA_12 (GRS))	08:29	15:10 (WEA_14 (GRS))																																																																												
	12:44	05:57 (WEA_08 (GRN))	12:02	19:38	55	08:08 (WEA_G1)	18:24	4	17:54 (WEA_10 (GRS))	16:20	22	16:00 (WEA_13 (GRS))	15:53	4	15:14 (WEA_14 (GRS))																																																																										
15	05:01	05:34 (WEA_08 (GRN))	05:52	06:48	07:15 (WEA_G1)	07:43		07:44	17:50 (WEA_10 (GRS))	07:44	15:23 (WEA_12 (GRS))	08:30	15:11 (WEA_14 (GRS))																																																																												
	12:43	05:57 (WEA_08 (GRN))	12:04	19:35	52	08:07 (WEA_G1)	18:21	2	17:52 (WEA_10 (GRS))	16:18	21	16:00 (WEA_13 (GRS))	15:53	3	15:14 (WEA_14 (GRS))																																																																										
16	05:03	05:35 (WEA_08 (GRN))	05:54	06:50	07:17 (WEA_G1)	07:45		07:46	17:50 (WEA_10 (GRS))	07:46	15:24 (WEA_12 (GRS))	08:31	15:11 (WEA_14 (GRS))																																																																												
	12:42	05:56 (WEA_08 (GRN))	12:04	19:33	49	08:06 (WEA_G1)	18:19	16:17	18	16:00 (WEA_13 (GRS))	15:53	3	15:14 (WEA_14 (GRS))																																																																												
17	05:04	05:37 (WEA_08 (GRN))	05:56	06:52	07:18 (WEA_G1)	07:47		07:47	17:50 (WEA_10 (GRS))	07:47	15:24 (WEA_12 (GRS))	08:32	15:12 (WEA_14 (GRS))																																																																												
	12:41	05:57 (WEA_08 (GRN))	12:04	19:30	46	08:04 (WEA_G1)	18:17	16:15	17	16:00 (WEA_13 (GRS))	15:53	2	15:14 (WEA_14 (GRS))																																																																												
18	05:05	05:38 (WEA_08 (GRN))	05:57	06:53	07:20 (WEA_G1)	07:49		07:49	17:28 (WEA_11 (GRS))	07:49	15:25 (WEA_12 (GRS))	08:32	15:13 (WEA_14 (GRS))																																																																												
	12:39	05:56 (WEA_08 (GRN))	12:04	19:28	43	08:03 (WEA_G1)	18:14	8	17:26 (WEA_11 (GRS))	16:14	14	16:00 (WEA_13 (GRS))	15:53	2	15:15 (WEA_14 (GRS))																																																																										
19	05:07	05:39 (WEA_08 (GRN))	05:59	06:55	07:22 (WEA_G1)	07:51		07:51	17:26 (WEA_11 (GRS))	07:51	15:26 (WEA_12 (GRS))	08:33	15:13 (WEA_14 (GRS))																																																																												
	12:38	05:56 (WEA_08 (GRN))	12:04	19:25	40	08:02 (WEA_G1)	18:12	12	17:38 (WEA_11 (GRS))	16:12	11	16:00 (WEA_13 (GRS))	15:54	2	15:15 (WEA_14 (GRS))																																																																										
20	05:08	05:41 (WEA_08 (GRN))	06:01	07:36 (WEA_G1)	06:57	07:24 (WEA_G1)	07:53		17:24 (WEA_11 (GRS))	07:53	15:28 (WEA_12 (GRS))	08:34	15:13 (WEA_14 (GRS))																																																																												
	12:37	05:56 (WEA_08 (GRN))	12:03	19:23	36	08:00 (WEA_G1)	18:10	14	17:38 (WEA_11 (GRS))	16:11	9	16:00 (WEA_13 (GRS))	15:54	2	15:13 (WEA_14 (GRS))																																																																										
21	05:10	05:42 (WEA_08 (GRN))	06:03	07:24 (WEA_G1)	06:59	07:25 (WEA_G1)	07:55		17:23 (WEA_11 (GRS))	07:55	15:29 (WEA_12 (GRS))	08:35	15:14 (WEA_14 (GRS))																																																																												
	12:35	05:55 (WEA_08 (GRN))	12:03	19:20	32	07:57 (WEA_G1)	18:07	14	17:37 (WEA_11 (GRS))	16:09	6	16:00 (WEA_13 (GRS))	15:54	2	15:14 (WEA_14 (GRS))																																																																										
22	05:11	05:43 (WEA_08 (GRN))	06:05	07:27 (WEA_G1)	07:01	07:27 (WEA_G1)	07:57		17:23 (WEA_11 (GRS))	07:57	15:30 (WEA_12 (GRS))	08:35	15:14 (WEA_14 (GRS))																																																																												
	12:34	05:53 (WEA_08 (GRN))	12:04	19:18	28	07:55 (WEA_G1)	18:05	12	17:35 (WEA_11 (GRS))	16:08	4	16:00 (WEA_13 (GRS))	15:55	2	15:16 (WEA_14 (GRS))																																																																										
23	05:13	05:45 (WEA_08 (GRN))	06:07	07:29 (WEA_G1)	07:02	07:29 (WEA_G1)	07:59		17:23 (WEA_11 (GRS))	07:59	15:30 (WEA_12 (GRS))	08:36	15:15 (WEA_14 (GRS))																																																																												
	12:32	05:53 (WEA_08 (GRN))	12:03	19:15	24	07:53 (WEA_G1)	18:03	9	17:32 (WEA_11 (GRS))	16:07	15:55	2	15:17 (WEA_14 (GRS))																																																																												
24	05:14	05:46 (WEA_08 (GRN))	06:08	07:28 (WEA_G1)	07:04	07:31 (WEA_G1)	08:00		17:23 (WEA_11 (GRS))	08:00	15:36	2	15:15 (WEA_14 (GRS))																																																																												
	12:31	05:51 (WEA_08 (GRN))	12:02	19:13	18	07:49 (WEA_G1)	18:01	7	17:30 (WEA_11 (GRS))	16:06	15:56	2	15:17 (WEA_14 (GRS))																																																																												
25	05:16	05:48 (WEA_08 (GRN))	06:10	07:26 (WEA_G1)	07:06	07:33 (WEA_G1)	08:02		16:23 (WEA_11 (GRS))	08:02	15:38	2	15:16 (WEA_14 (GRS))																																																																												
	12:29	05:49 (WEA_08 (GRN))	12:02	19:10	15	07:48 (WEA_G1)	17:59	5	16:28 (WEA_11 (GRS))	16:04	15:57	2	15:18 (WEA_14 (GRS))																																																																												
26	05:18	06:12	07:08	07:34 (WEA_G2)	07:04	07:34 (WEA_G2)	08:04		16:23 (WEA_11 (GRS))	08:04	15:09 (WEA_14 (GRS))	08:37	15:16 (WEA_14 (GRS))																																																																												
	12:28	06:14	19:08	11	07:45 (WEA_G2)	16:56	2	16:25 (WEA_11 (GRS))	16:03	6	16:00 (WEA_13 (GRS))	15:57	2	15:18 (WEA_14 (GRS))																																																																											
27	05:19	06:14	19:10	07:23 (WEA_G1)	07:10	07:36 (WEA_G2)	08:06		16:00 (WEA_13 (GRS))	16:06	15:07 (WEA_14 (GRS))	08:37	15:17 (WEA_14 (GRS))																																																																												
	12:26	06:11 (WEA_G1)	19:05	6	07:42 (WEA_G2)	16:54	16:02	10	15:17 (WEA_14 (GRS))	15:58	3	15:20 (WEA_14 (GRS))																																																																													
28	05:21	06:16	19:11	07:23 (WEA_G1)	07:11	07:38 (WEA_G2)	08:08		16:00 (WEA_13 (GRS))	16:07	15:07 (WEA_14 (GRS))	08:37	15:17 (WEA_14 (GRS))																																																																												
	12:25	06:17	19:03	1	07:39 (WEA_G2)	16:52	16:01	11	15:18 (WEA_14 (GRS))	15:59	4	15:21 (WEA_14 (GRS))																																																																													
29	05:22	06:17	19:13	07:21 (WEA_G1)	07:13	07:10	16:09		16:00 (WEA_13 (GRS))	16:09	15:07 (WEA_14 (GRS))	08:37	15:18 (WEA_14 (GRS))																																																																												
	12:23	06:19	19:00	07:20 (WEA_G1)	07:15	07:12	16:00	12	15:19 (WEA_14 (GRS))	16:00	15:07 (WEA_14 (GRS))	08:37	15:17 (WEA_14 (GRS))																																																																												
30	05:24	06:19	19:07	07:20 (WEA_G1)	07:15	07:12	16:00		16:00 (WEA_13 (GRS))	16:00	15:07 (WEA_14 (GRS))	08:37	15:17 (WEA_14 (GRS))																																																																												
	12:21	06:21	19:00	07:19 (WEA_G1)	18:58	16:48	16:00	13	15:20 (WEA_14 (GRS))	16:01	15:07 (WEA_14 (GRS))	08:37	15:17 (WEA_14 (GRS))																																																																												
31	05:26	06:21	19:00	07:19 (WEA_G1)	18:58	16:48	16:00		16:00 (WEA_13 (GRS))	16:01	15:07 (WEA_14 (GRS))	08:37	15:18 (WEA_14 (GRS))																																																																												
	12:19	06:21	19:00	07:19 (WEA_G1)	18:58	16:48	16:00	3	16:00 (WEA_13 (GRS))	16:01	15:07 (WEA_14 (GRS))	08:37	15:18 (WEA_14 (GRS))																																																																												
Sonnenscheinstunden	515	524	530	538	546	554	562	570	578	586	594	602	610	618	626	634	642	650	658	666	674	682	690	698	706	714	722	730	738	746	754	762	770	778	786	794	802	810	818	826	834	842	850	858	866	874	882	890	898	906	914	922	930	938	946	954	962	970	978	986	994	1002	1010	1018	1026	1034	1042	1050	1058	1066	1074	1082	1090	1098	1106	1114	1122	1130	1138	1146	1154	1162	1170	1178	1186	1194	1202	1210	1218

Projekt:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0

**DNV**

Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 36 - IO 36 Kathenkamp 1 (Rütiger Hof)

### 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	08:37	15:10 (WEA 13 (GRS))   08:06	16:22 (WEA 10 (GRS))   07:08	07:33 (WEA_G1)   06:52	05:42	04:51
2	08:37	15:11 (WEA 13 (GRS))   08:04	16:22 (WEA 10 (GRS))   07:05	07:30 (WEA_G1)   06:49	20:48	21:39
3	08:37	15:11 (WEA 13 (GRS))   08:03	16:23 (WEA 10 (GRS))   07:03	07:39 (WEA_G1)   06:49	20:49	21:40
4	08:36	15:12 (WEA 13 (GRS))   08:01	16:23 (WEA 10 (GRS))   07:01	07:25 (WEA_G1)   06:44	20:51	21:41
5	08:36	15:12 (WEA 13 (GRS))   08:01	16:23 (WEA 10 (GRS))   07:01	07:25 (WEA_G1)   06:44	20:51	21:41
6	08:36	15:12 (WEA 13 (GRS))   08:01	16:23 (WEA 10 (GRS))   07:01	07:25 (WEA_G1)   06:44	20:51	21:41
7	08:35	15:12 (WEA 13 (GRS))   07:55	16:24 (WEA 10 (GRS))   06:53	07:18 (WEA_G1)   06:37	20:52	21:42
8	08:35	15:12 (WEA 13 (GRS))   07:55	16:24 (WEA 10 (GRS))   06:53	07:18 (WEA_G1)   06:37	20:52	21:42
9	08:34	15:12 (WEA 13 (GRS))   07:51	16:24 (WEA 10 (GRS))   06:49	07:13 (WEA_G1)   06:32	20:53	21:43
10	08:33	15:12 (WEA 13 (GRS))   07:49	16:24 (WEA 10 (GRS))   06:46	07:10 (WEA_G1)   06:30	20:54	21:44
11	08:33	15:12 (WEA 13 (GRS))   07:47	16:24 (WEA 10 (GRS))   06:44	07:08 (WEA_G2)   06:27	20:54	21:44
12	08:32	15:12 (WEA 13 (GRS))   07:45	16:24 (WEA 10 (GRS))   06:41	07:05 (WEA_G2)   06:25	20:55	21:45
13	08:31	15:12 (WEA 13 (GRS))   07:43	16:24 (WEA 10 (GRS))   06:39	07:03 (WEA_G2)   06:22	20:55	21:45
14	08:30	15:12 (WEA 13 (GRS))   07:41	16:24 (WEA 10 (GRS))   06:36	07:00 (WEA_G3)   06:20	20:56	21:46
15	08:29	15:12 (WEA 13 (GRS))   07:39	16:24 (WEA 10 (GRS))   06:34	06:58 (WEA_G3)   06:18	20:56	21:46
16	08:28	15:12 (WEA 13 (GRS))   07:37	16:24 (WEA 10 (GRS))   06:31	06:55 (WEA_G3)   06:15	20:57	21:47
17	08:27	15:12 (WEA 13 (GRS))   07:35	16:24 (WEA 10 (GRS))   06:29	06:53 (WEA_G3)   06:13	20:57	21:47
18	08:26	15:12 (WEA 13 (GRS))   07:33	16:24 (WEA 10 (GRS))   06:27	06:50 (WEA_G3)   06:11	20:58	21:48
19	08:25	15:12 (WEA 13 (GRS))   07:31	16:24 (WEA 10 (GRS))   06:24	06:48 (WEA_G3)   06:08	20:58	21:48
20	08:24	15:12 (WEA 13 (GRS))   07:28	16:24 (WEA 10 (GRS))   06:22	06:45 (WEA_G3)   06:06	20:59	21:49
21	08:23	15:12 (WEA 13 (GRS))   07:26	16:24 (WEA 10 (GRS))   06:19	06:43 (WEA_G3)   06:04	20:59	21:49
22	08:21	15:12 (WEA 13 (GRS))   07:24	16:24 (WEA 10 (GRS))   06:17	06:40 (WEA_G3)   06:01	20:59	21:49
23	08:20	15:12 (WEA 13 (GRS))   07:22	16:24 (WEA 10 (GRS))   06:14	06:38 (WEA_G3)   05:59	20:59	21:49
24	08:19	15:12 (WEA 13 (GRS))   07:19	16:24 (WEA 10 (GRS))   06:12	06:36 (WEA_G3)   05:57	20:59	21:49
25	08:17	15:12 (WEA 13 (GRS))   07:17	16:24 (WEA 10 (GRS))   06:09	06:33 (WEA_G3)   05:55	20:59	21:49
26	08:16	15:12 (WEA 13 (GRS))   07:15	16:24 (WEA 10 (GRS))   06:07	06:31 (WEA_G3)   05:53	20:59	21:49
27	08:14	15:12 (WEA 13 (GRS))   07:12	16:24 (WEA 10 (GRS))   06:04	06:28 (WEA_G3)   05:50	20:59	21:49
28	08:13	15:12 (WEA 13 (GRS))   07:10	16:24 (WEA 10 (GRS))   06:02	06:26 (WEA_G3)   05:48	20:59	21:49
29	08:11	15:12 (WEA 13 (GRS))   07:07	16:24 (WEA 10 (GRS))   06:00	06:24 (WEA_G3)   05:46	20:59	21:49
30	08:09	15:12 (WEA 13 (GRS))   07:05	16:24 (WEA 10 (GRS))   05:59	06:22 (WEA_G3)   05:44	20:59	21:49
31	08:08	15:12 (WEA 13 (GRS))   07:04	16:24 (WEA 10 (GRS))   05:58	06:21 (WEA_G3)   05:43	20:59	21:49
	16:53	17:42	18:36	19:24	20:13	21:01
	248	272	367	421	496	513
Sonnenscheinstunden	367	272	367	421	496	513
astr.max.mögl.Beschattung	367	60	742	141	424	

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:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0

DNV

Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 37 - IO 37 Rütiger Klosterkamp 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 Sonneneinstrahlungsrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar	Februar	März	April	Mai	Juni
1 08:37	15:17 (WEA 11 (GRS)) 108:06	107:08	106:52	105:42	104:31
1 16:03	8 15:25 (WEA 13 (GRS)) 116:55	117:32	119:51	120:48	121:39
2 08:37	15:17 (WEA 13 (GRS)) 108:04	107:05	106:49	105:39	104:30
3 16:04	9 15:26 (WEA 13 (GRS)) 116:57	117:34	119:53	120:49	121:40
3 108:37	15:17 (WEA 13 (GRS)) 108:03	107:03	106:47	105:37	104:29
4 16:05	10 15:27 (WEA 13 (GRS)) 116:59	117:36	119:55	120:51	121:41
4 108:36	15:18 (WEA 11 (GRS)) 108:01	107:01	106:44	105:34	104:28
1 16:07	11 15:29 (WEA 13 (GRS)) 117:01	117:38	119:57	120:53	121:42
5 108:36	15:18 (WEA 11 (GRS)) 107:50	106:50	106:42	105:31	104:28
1 16:08	12 15:30 (WEA 13 (GRS)) 117:03	118:00	119:59	120:53	121:43
6 108:36	15:20 (WEA 11 (GRS)) 107:57	106:56	106:50	105:31	104:27
1 16:09	12 15:32 (WEA 13 (GRS)) 117:05	118:02	119:59	120:57	121:44
7 108:35	15:20 (WEA 11 (GRS)) 107:55	106:53	106:47	105:29	104:26
1 16:10	13 15:33 (WEA 13 (GRS)) 117:07	118:04	119:58	120:59	121:45
8 108:35	15:20 (WEA 11 (GRS)) 107:53	106:51	106:45	105:27	104:26
1 16:12	15 15:35 (WEA 13 (GRS)) 117:09	118:06	119:56	120:57	121:46
9 108:34	15:21 (WEA 11 (GRS)) 107:51	106:49	106:43	105:25	104:25
1 16:14	15 15:36 (WEA 13 (GRS)) 117:11	118:08	119:57	120:52	121:47
10 108:33	15:21 (WEA 11 (GRS)) 107:49	106:46	106:40	105:24	104:24
1 16:15	15 15:36 (WEA 13 (GRS)) 117:13	118:09	119:59	120:54	121:48
11 108:33	15:22 (WEA 11 (GRS)) 107:47	106:44	106:38	105:22	104:24
1 16:17	14 15:36 (WEA 13 (GRS)) 117:15	118:11	119:58	120:56	121:49
1 16:18	13 15:36 (WEA 13 (GRS)) 117:16	118:12	119:59	120:56	121:50
17 108:31	15:24 (WEA 13 (GRS)) 107:43	106:39	106:33	105:18	104:23
1 16:20	14 15:43 (WEA 11 (GRS)) 117:20	118:15	119:57	120:58	121:50
14 108:30	15:25 (WEA 11 (GRS)) 107:41	106:36	106:30	105:16	104:23
1 16:21	15 15:45 (WEA 13 (GRS)) 117:22	118:17	119:58	120:59	121:51
15 108:29	15:27 (WEA 11 (GRS)) 107:39	106:34	106:28	105:15	104:23
1 16:23	14 15:47 (WEA 13 (GRS)) 117:24	118:19	119:59	120:59	121:52
16 108:28	15:40 (WEA 11 (GRS)) 107:37	106:31	106:25	105:13	104:22
1 16:25	9 15:49 (WEA 11 (GRS)) 117:26	118:21	119:59	120:59	121:52
17 108:27	15:40 (WEA 11 (GRS)) 107:35	106:29	106:23	105:11	104:22
1 16:27	11 15:51 (WEA 13 (GRS)) 117:28	118:23	119:59	120:59	121:53
18 108:26	15:40 (WEA 11 (GRS)) 107:33	106:27	106:21	105:10	104:22
1 16:28	13 15:53 (WEA 13 (GRS)) 117:30	118:25	119:59	120:59	121:53
19 108:25	15:40 (WEA 11 (GRS)) 107:31	106:24	106:18	105:08	104:22
1 16:30	15 15:55 (WEA 13 (GRS)) 117:32	118:27	119:59	120:59	121:54
20 108:24	15:40 (WEA 11 (GRS)) 107:28	106:22	106:16	105:06	104:22
1 16:32	17 15:57 (WEA 13 (GRS)) 117:34	118:29	119:59	120:59	121:54
21 108:23	15:40 (WEA 11 (GRS)) 107:26	106:19	106:13	105:05	104:22
1 16:34	19 15:59 (WEA 13 (GRS)) 117:36	118:30	119:59	120:59	121:54
22 108:21	15:41 (WEA 11 (GRS)) 107:24	106:17	106:11	105:03	104:22
1 16:36	21 16:02 (WEA 13 (GRS)) 117:38	118:32	119:59	120:59	121:54
23 108:20	16:01 (WEA 11 (GRS)) 107:22	106:14	106:08	105:02	104:22
1 16:38	20 16:01 (WEA 11 (GRS)) 117:40	118:34	119:59	120:59	121:55
24 108:19	15:41 (WEA 11 (GRS)) 107:19	106:12	106:06	105:01	104:22
1 16:39	20 16:01 (WEA 11 (GRS)) 117:42	118:36	119:59	120:59	121:55
25 108:17	15:42 (WEA 11 (GRS)) 107:17	106:09	106:03	104:59	104:22
1 16:41	20 16:02 (WEA 11 (GRS)) 117:44	118:38	119:59	120:59	121:55
26 108:16	15:42 (WEA 11 (GRS)) 107:15	106:07	106:01	104:58	104:22
1 16:43	19 16:01 (WEA 11 (GRS)) 117:46	118:40	119:59	120:59	121:55
27 108:14	15:43 (WEA 11 (GRS)) 107:12	106:04	105:58	104:57	104:22
1 16:45	18 16:01 (WEA 11 (GRS)) 117:48	118:42	119:59	120:59	121:55
28 108:13	15:44 (WEA 11 (GRS)) 107:10	106:02	105:56	104:55	104:22
1 16:47	17 16:01 (WEA 11 (GRS)) 117:50	118:44	119:59	120:59	121:55
29 108:11	15:45 (WEA 11 (GRS)) 107:08	105:59	105:53	104:54	104:22
1 16:49	16 16:00 (WEA 11 (GRS)) 117:52	118:46	119:59	120:59	121:55
30 108:09	15:47 (WEA 11 (GRS)) 107:06	105:57	105:51	104:53	104:22
1 16:51	12 15:59 (WEA 11 (GRS)) 117:54	118:48	119:59	120:59	121:55
31 108:08	15:49 (WEA 11 (GRS)) 107:04	105:54	105:48	104:52	104:22
1 16:53	8 15:57 (WEA 11 (GRS)) 117:56	118:50	119:59	120:59	121:55
Sonneneinstrahlung mit max mögl. Beschattung   240		272	367	421	496
		67	722	144	330
					511
					437

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

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



### SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 37 - IO 37 Rütiger Klosterkamp 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 Sonneneinstrahlungsrichtung
- Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember						
1	04:47	05:43 (WEA 06 (GRN))	05:27	05:50 (WEA 07 (GRN))	06:23	07:17	07:44 (WEA_G1)	07:16	16:03 (WEA 10 (GRS))	08:12	15:04 (WEA 13 (GRS))					
1	21:54	15	05:50 (WEA 06 (GRN))	12:18	1	05:59 (WEA 07 (GRN))	20:10	18:55	25	08:09 (WEA_G1)	16:44	9	16:12 (WEA 10 (GRS))	15:59	14	15:10 (WEA 13 (GRS))
2	04:48	05:42 (WEA 06 (GRN))	05:29		06:25	07:19	18:53	22	08:08 (WEA_G1)	16:42	8	16:10 (WEA 10 (GRS))	15:58	15	15:10 (WEA 13 (GRS))	
3	04:48	05:42 (WEA 06 (GRN))	05:29		06:26	07:21	18:54	15	08:07 (WEA_G1)	16:40	5	16:07 (WEA 10 (GRS))	15:57	15	15:10 (WEA 13 (GRS))	
4	04:49	05:41 (WEA 06 (GRN))	05:33		06:28	07:23	18:54	19	08:06 (WEA_G1)	16:40	3	16:06 (WEA 10 (GRS))	15:56	15	15:10 (WEA 13 (GRS))	
5	04:50	05:40 (WEA 06 (GRN))	05:36		06:30	07:24	18:54	11	08:04 (WEA_G1)	16:38	1	16:04 (WEA 10 (GRS))	15:55	15	15:10 (WEA 13 (GRS))	
6	04:51	05:40 (WEA 06 (GRN))	05:36		06:32	07:26	18:54	15	08:02 (WEA_G1)	16:36			15:54	14	15:10 (WEA 13 (GRS))	
7	04:52	05:41 (WEA 06 (GRN))	05:40		06:34	07:28	18:54	6	07:59 (WEA_G1)	16:34			15:53	12	15:10 (WEA 13 (GRS))	
8	04:53	05:41 (WEA 06 (GRN))	05:40		06:35	07:30	18:54	2	07:57 (WEA 15 (GCN))	16:32			15:52	12	15:10 (WEA 13 (GRS))	
9	04:54	05:41 (WEA 06 (GRN))	05:41		06:37	07:32	18:54	1	07:57 (WEA 15 (GCN))	16:30			15:51	11	15:10 (WEA 13 (GRS))	
10	04:55	05:42 (WEA 06 (GRN))	05:43		06:39	07:34	18:54			16:28			15:50	10	15:10 (WEA 13 (GRS))	
11	04:56	05:43 (WEA 06 (GRN))	05:45		06:41	07:36	18:54			16:26			15:49	9	15:10 (WEA 13 (GRS))	
12	04:58	05:44 (WEA 06 (GRN))	05:47		06:43	07:37	18:54			16:25	8	15:29 (WEA 11 (GRS))	15:53	8	15:10 (WEA 13 (GRS))	
13	04:59	05:44 (WEA 06 (GRN))	05:49		06:44	07:39	18:54			16:24	13	15:31 (WEA 11 (GRS))	15:53	8	15:10 (WEA 13 (GRS))	
14	05:00	05:44 (WEA 06 (GRN))	05:50		06:46	07:41	18:54			16:23	13	15:31 (WEA 11 (GRS))	15:53	8	15:10 (WEA 13 (GRS))	
15	05:01	05:44 (WEA 06 (GRN))	05:52		06:48	07:43	18:54	12	08:04 (WEA_G1)	18:24	17	15:33 (WEA 11 (GRS))	15:53	6	15:10 (WEA 13 (GRS))	
16	05:03	05:44 (WEA 06 (GRN))	05:54		06:50	07:45	18:54	19	08:09 (WEA_G1)	18:21	16	15:32 (WEA 11 (GRS))	15:53	7	15:10 (WEA 13 (GRS))	
17	05:04	05:44 (WEA 06 (GRN))	05:56		06:52	07:47	18:54	31	08:10 (WEA_G1)	18:19	16	15:32 (WEA 11 (GRS))	15:53	7	15:10 (WEA 13 (GRS))	
18	05:05	05:44 (WEA 06 (GRN))	05:58		06:53	07:49	18:54	30	08:10 (WEA_G1)	18:17	19	15:34 (WEA 11 (GRS))	15:53	6	15:10 (WEA 13 (GRS))	
19	05:07	05:44 (WEA 06 (GRN))	05:59	8	06:41 (WEA 08 (GRN))	06:53	46	08:12 (WEA_G1)	18:14	18:14	20	15:35 (WEA 11 (GRS))	15:53	5	15:10 (WEA 13 (GRS))	
20	05:08	05:44 (WEA 06 (GRN))	06:01	12	06:50 (WEA 08 (GRN))	06:55	50	08:13 (WEA_G1)	18:12	18:12	20	15:35 (WEA 11 (GRS))	15:54	4	15:10 (WEA 13 (GRS))	
21	05:10	05:44 (WEA 06 (GRN))	06:03	15	06:52 (WEA 08 (GRN))	06:57	49	08:13 (WEA_G1)	18:10	18:11	21	15:37 (WEA 11 (GRS))	15:54	4	15:10 (WEA 13 (GRS))	
22	05:11	05:44 (WEA 06 (GRN))	06:05	17	06:53 (WEA 08 (GRN))	06:59	48	08:13 (WEA_G1)	18:08	18:09	19	15:35 (WEA 11 (GRS))	15:54	4	15:10 (WEA 13 (GRS))	
23	05:12	05:44 (WEA 06 (GRN))	06:07	17	06:53 (WEA 08 (GRN))	07:01	46	08:13 (WEA_G1)	18:07	18:08	18	15:34 (WEA 11 (GRS))	15:54	4	15:10 (WEA 13 (GRS))	
24	05:14	05:44 (WEA 06 (GRN))	06:08	18	06:53 (WEA 08 (GRN))	07:04	45	08:14 (WEA_G1)	18:05	18:06	15	15:32 (WEA 11 (GRS))	15:54	4	15:10 (WEA 13 (GRS))	
25	05:16	05:44 (WEA 06 (GRN))	06:10	16	06:53 (WEA 08 (GRN))	07:06	43	08:14 (WEA_G1)	18:03	18:04	13	15:31 (WEA 11 (GRS))	15:54	4	15:10 (WEA 13 (GRS))	
26	05:18	05:44 (WEA 06 (GRN))	06:12	14	06:52 (WEA 08 (GRN))	07:08	41	08:14 (WEA_G1)	18:01	18:02	11	15:28 (WEA 11 (GRS))	15:54	5	15:10 (WEA 13 (GRS))	
27	05:19	05:44 (WEA 06 (GRN))	06:14	12	06:52 (WEA 08 (GRN))	07:10	38	08:14 (WEA_G1)	18:00	18:03	9	15:27 (WEA 11 (GRS))	15:54	4	15:10 (WEA 13 (GRS))	
28	05:21	05:44 (WEA 06 (GRN))	06:16	9	06:51 (WEA 08 (GRN))	07:11	36	08:12 (WEA_G1)	17:58	18:04	13	15:26 (WEA 11 (GRS))	15:54	5	15:10 (WEA 13 (GRS))	
29	05:22	05:44 (WEA 06 (GRN))	06:17	6	06:50 (WEA 08 (GRN))	07:13	34	08:12 (WEA_G1)	17:56	18:01	14	15:25 (WEA 11 (GRS))	15:54	6	15:10 (WEA 13 (GRS))	
30	05:24	05:44 (WEA 06 (GRN))	06:19	3	06:48 (WEA 08 (GRN))	07:15	31	08:11 (WEA_G1)	17:54	18:06	14	15:24 (WEA 11 (GRS))	15:54	6	15:10 (WEA 13 (GRS))	
31	05:26	05:44 (WEA 06 (GRN))	06:21			07:17	28	08:10 (WEA_G1)	17:52	18:04	13	15:23 (WEA 11 (GRS))	15:54	7	15:10 (WEA 13 (GRS))	
	12:19	3	06:00 (WEA 07 (GRN))	20:12				16:46	11	16:14 (WEA 10 (GRS))			16:02	7	15:23 (WEA 13 (GRS))	
	Sommereinstunden	515			383			328		257			231			
	astr. max. mögl. Beschattung	550	148	635	141	336	240									

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

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0

DNV

Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 38 - IO 38 Rütiger Klosterkamp 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 Sonneneinstrahlungsrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni		
1	08:37	15:00 (WEA 13 (GRS))	08:06	16:19 (WEA 10 (GRS))	07:08	06:52		05:42			04:51	
1	16:03	25	15:25 (WEA 11 (GRS))	16:55	4	16:23 (WEA 10 (GRS))	17:52	18:51			20:48	
2	08:37	15:01 (WEA 13 (GRS))	08:04	16:18 (WEA 10 (GRS))	07:05	06:49		05:39			04:50	
	16:04	25	15:26 (WEA 11 (GRS))	16:57	7	16:25 (WEA 10 (GRS))	17:54	19:53			20:49	
3	08:37	15:02 (WEA 13 (GRS))	08:03	16:19 (WEA 10 (GRS))	07:03	06:47		05:37			04:49	
	16:05	25	15:27 (WEA 11 (GRS))	16:59	9	16:26 (WEA 10 (GRS))	17:56	19:55			20:51	
4	08:36	15:04 (WEA 13 (GRS))	08:01	16:19 (WEA 10 (GRS))	07:01	06:44		05:35			04:48	
	16:07	24	15:29 (WEA 11 (GRS))	17:01	11	16:30 (WEA 10 (GRS))	17:58	19:57			20:53	
5	08:36	15:10 (WEA 13 (GRS))	07:59	16:20 (WEA 10 (GRS))	06:58	06:42		05:33			04:48	
	16:08	20	15:30 (WEA 11 (GRS))	17:03	12	16:32 (WEA 10 (GRS))	18:00	19:59			20:55	
6	08:36	15:11 (WEA 13 (GRS))	07:57	16:20 (WEA 10 (GRS))	06:56	06:39		05:31		05:58 (WEA 06 (GRN))	04:47	
	16:09	21	15:32 (WEA 11 (GRS))	17:05	15	16:35 (WEA 10 (GRS))	18:02	20:01	5	06:01 (WEA 06 (GRN))	20:44	
7	08:35	15:12 (WEA 13 (GRS))	07:55	16:21 (WEA 10 (GRS))	06:53	06:37		05:25		05:56 (WEA 06 (GRN))	04:46	
	16:11	22	15:33 (WEA 11 (GRS))	17:07	15	16:36 (WEA 10 (GRS))	18:04	20:03	6	06:02 (WEA 06 (GRN))	21:45	
8	08:35	15:11 (WEA 13 (GRS))	07:53	16:21 (WEA 10 (GRS))	06:51	06:35		05:27		05:54 (WEA 06 (GRN))	04:46	
	16:12	23	15:34 (WEA 11 (GRS))	17:09	13	16:34 (WEA 10 (GRS))	18:06	20:04	9	06:03 (WEA 06 (GRN))	21:46	
9	08:34	15:11 (WEA 13 (GRS))	07:51	16:23 (WEA 10 (GRS))	06:49	07:13 (WEA_G1)	06:32	05:25		05:49 (WEA 07 (GRN))	04:45	
	16:14	23	15:34 (WEA 11 (GRS))	17:11	10	16:33 (WEA 10 (GRS))	18:08	20:06	11	06:05 (WEA 06 (GRN))	21:47	
10	08:33	15:11 (WEA 13 (GRS))	07:49	16:26 (WEA 10 (GRS))	06:46	07:10 (WEA_G1)	06:30	05:24		05:51 (WEA 07 (GRN))	04:44	
	16:15	24	15:35 (WEA 11 (GRS))	17:13	4	16:30 (WEA 10 (GRS))	18:09	20:08	14	06:05 (WEA 06 (GRN))	21:48	
11	08:33	15:12 (WEA 13 (GRS))	07:47	16:44		07:08 (WEA_G1)	06:27	05:22			04:44	
	16:17	23	15:35 (WEA 11 (GRS))	17:16	18:11	13	07:21 (WEA_G1)	20:10	1	06:52 (WEA 08 (GRN))	21:06	
12	08:32	15:12 (WEA 13 (GRS))	07:45	06:41		07:05 (WEA_G1)	06:25	05:20		05:47 (WEA 07 (GRN))	04:44	
	16:18	23	15:35 (WEA 11 (GRS))	17:18	18:13	17	07:22 (WEA_G1)	20:12	4	06:53 (WEA 08 (GRN))	21:08	
13	08:31	15:13 (WEA 13 (GRS))	07:43	06:39		07:03 (WEA_G1)	06:22	05:18		05:46 (WEA 07 (GRN))	04:43	
	16:20	23	15:36 (WEA 11 (GRS))	17:20	18:15	20	07:23 (WEA_G1)	20:14	7	06:54 (WEA 08 (GRN))	21:09	
14	08:30	15:13 (WEA 13 (GRS))	07:41	06:36		07:00 (WEA_G1)	06:20	05:16		05:45 (WEA 06 (GRN))	04:43	
	16:21	23	15:36 (WEA 11 (GRS))	17:22	18:17	23	07:23 (WEA_G1)	20:16	9	06:53 (WEA 08 (GRN))	21:11	
15	08:29	15:14 (WEA 13 (GRS))	07:39	06:34		06:58 (WEA_G1)	06:18	05:15		05:46 (WEA 06 (GRN))	04:43	
	16:23	22	15:36 (WEA 11 (GRS))	17:24	18:19	26	07:24 (WEA_G1)	20:18	11	06:53 (WEA 08 (GRN))	21:13	
16	08:28	15:15 (WEA 13 (GRS))	07:37	06:31		06:55 (WEA_G1)	06:15	05:13		05:45 (WEA 06 (GRN))	04:42	
	16:25	22	15:37 (WEA 11 (GRS))	17:26	18:21	29	07:24 (WEA_G1)	20:19	13	06:53 (WEA 08 (GRN))	21:14	
17	08:27	15:16 (WEA 13 (GRS))	07:35	06:29		06:53 (WEA_G1)	06:13	05:11		05:46 (WEA 06 (GRN))	04:42	
	16:27	21	15:37 (WEA 11 (GRS))	17:28	18:23	31	07:24 (WEA_G1)	20:21	15	06:52 (WEA 08 (GRN))	21:16	
18	08:26	15:16 (WEA 13 (GRS))	07:33	06:27		06:50 (WEA_G1)	06:11	05:10		05:46 (WEA 06 (GRN))	04:42	
	16:28	20	15:36 (WEA 11 (GRS))	17:30	18:25	33	07:23 (WEA_G1)	20:23	14	06:51 (WEA 08 (GRN))	21:18	
19	08:25	15:17 (WEA 13 (GRS))	07:31	06:24		06:48 (WEA_G1)	06:08	05:08		05:47 (WEA 06 (GRN))	04:42	
	16:30	19	15:36 (WEA 11 (GRS))	17:32	18:27	35	07:23 (WEA_G1)	20:25	12	06:50 (WEA 08 (GRN))	21:19	
20	08:24	15:18 (WEA 13 (GRS))	07:28	06:22		06:45 (WEA_G1)	06:06	05:06		05:47 (WEA 06 (GRN))	04:42	
	16:32	19	15:37 (WEA 11 (GRS))	17:34	18:29	37	07:22 (WEA_G1)	20:27	8	06:48 (WEA 08 (GRN))	21:21	
21	08:23	15:19 (WEA 13 (GRS))	07:26	06:19		06:43 (WEA_G1)	06:04	05:05		05:48 (WEA 06 (GRN))	04:43	
	16:34	16	15:35 (WEA 11 (GRS))	17:36	18:31	39	07:22 (WEA_G1)	20:29	11	06:02 (WEA 06 (GRN))	21:54	
22	08:21	15:21 (WEA 13 (GRS))	07:24	06:17		06:40 (WEA_G1)	06:01	05:03		05:49 (WEA 06 (GRN))	04:43	
	16:36	14	15:35 (WEA 11 (GRS))	17:38	18:32	41	07:21 (WEA_G1)	20:31	13	06:02 (WEA 06 (GRN))	21:54	
23	08:20	15:22 (WEA 13 (GRS))	07:22	06:14		06:38 (WEA_G1)	05:59	05:02		05:51 (WEA 06 (GRN))	04:43	
	16:38	11	15:33 (WEA 11 (GRS))	17:40	18:34	42	07:20 (WEA_G1)	20:33	11	06:01 (WEA 06 (GRN))	21:55	
24	08:19	15:23 (WEA 13 (GRS))	07:19	06:12		06:35 (WEA_G1)	05:57	05:01		05:52 (WEA 06 (GRN))	04:43	
	16:39	6	15:31 (WEA 11 (GRS))	17:42	18:36	42	07:18 (WEA_G1)	20:35	12	06:01 (WEA 06 (GRN))	21:55	
25	08:17			06:09		06:32 (WEA_G1)	05:55	05:00		05:53 (WEA 06 (GRN))	04:44	
	16:41			17:44		18:38	39	07:17 (WEA_G1)	20:36	11	06:02 (WEA 06 (GRN))	21:55
26	08:16			06:07		06:36 (WEA_G1)	05:52	05:00		05:49 (WEA 06 (GRN))	04:44	
	16:43			17:46		18:40	33	07:15 (WEA_G1)	20:38	13	06:02 (WEA 06 (GRN))	21:55
27	08:14			06:04		06:34 (WEA_G1)	05:50	05:00		05:47 (WEA 06 (GRN))	04:44	
	16:45			17:48		18:42	21	07:13 (WEA_G1)	20:40	11	06:01 (WEA 06 (GRN))	21:55
28	08:13			06:02		06:57 (WEA_G1)	05:48	05:00		05:52 (WEA 06 (GRN))	04:45	
	16:47			17:50		18:44	12	07:09 (WEA_G1)	20:42	12	06:01 (WEA 06 (GRN))	21:54
29	08:11			06:59		06:59		05:46		06:54		04:46
	16:49			19:46		19:46		20:44		21:35		21:54
30	08:09			06:57		06:57		05:44		21:33		04:46
	16:51			19:47		19:47		20:46		21:36		21:54
31	08:08			06:54		06:54		05:42		06:52		04:46
	16:53	1	16:20 (WEA 10 (GRS))	19:49		19:49		21:37		21:37		21:54
Sommerscheinstunden	248			272				496				513
astr. max. mögl. Beschattung	495		100		367	547		94		259		34

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

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

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 38 - IO 38 Rütiger Klosterkamp 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 Sonneneinstrahlungsrichtung
- Die Windenergieanlage/n ist/sind immer in Betrieb

Jul	August	September	Oktober	November	Dezember
1   04:47	05:27	05:58 (WEA 07 (GRN))   06:23	07:17	07:44 (WEA G1)   07:16	08:12
21:54	21:18	17 06:15 (WEA 06 (GRN))   20:10	18:55	18 08:02 (WEA G1)   16:44	7 16:01 (WEA 10 (GRS))   15:59
2   04:48	05:29	06:00 (WEA 07 (GRN))   06:25	07:19	07:46 (WEA G1)   07:18	15:52 (WEA 10 (GRS))   08:14
21:53	21:16	15 06:15 (WEA 06 (GRN))   20:06	18:53	15 08:01 (WEA G1)   16:42	11 16:02 (WEA 10 (GRS))   15:58
3   04:48	05:31	06:02 (WEA 07 (GRN))   06:26	07:21	07:47 (WEA G1)   07:20	15:51 (WEA 10 (GRS))   08:15
21:53	21:14	13 06:15 (WEA 06 (GRN))   20:05	18:50	11 07:58 (WEA G1)   16:40	13 16:04 (WEA 10 (GRS))   15:57
4   04:49	05:33	06:03 (WEA 07 (GRN))   06:28	07:23	07:49 (WEA G1)   07:22	15:51 (WEA 10 (GRS))   08:17
21:52	21:12	11 06:14 (WEA 06 (GRN))   20:03	18:48	7 07:56 (WEA G1)   16:38	15 16:06 (WEA 10 (GRS))   15:56
5   04:50	05:34	06:05 (WEA 07 (GRN))   06:30	07:24	07:51 (WEA G1)   07:24	15:50 (WEA 10 (GRS))   08:18
21:52	21:10	8 06:13 (WEA 06 (GRN))   20:00	18:45	2 07:53 (WEA G1)   16:36	14 16:04 (WEA 10 (GRS))   15:56
6   04:51	05:36	06:07 (WEA 07 (GRN))   06:32	07:26	07:26	15:49 (WEA 10 (GRS))   08:19
21:51	21:08	5 06:12 (WEA 06 (GRN))   19:58	18:43	16:34	13 16:02 (WEA 10 (GRS))   15:55
7   04:52	05:38	06:08 (WEA 07 (GRN))   06:34	07:28	07:28	15:49 (WEA 10 (GRS))   08:21
21:50	21:06	2 06:10 (WEA 06 (GRN))   19:55	18:41	16:32	11 16:00 (WEA 10 (GRS))   15:55
8   04:53	05:40	06:35	07:30	07:30	15:50 (WEA 10 (GRS))   08:22
21:50	21:04	19:53	18:38	16:30	8 15:57 (WEA 10 (GRS))   15:54
9   04:54	05:41	06:37	07:32	07:32	15:49 (WEA 10 (GRS))   08:23
21:49	21:02	19:50	18:36	16:28	6 15:55 (WEA 10 (GRS))   15:54
10   04:55	05:43	06:39	07:34	07:34	15:50 (WEA 10 (GRS))   08:25
21:48	21:00	19:48	18:33	16:27	3 15:53 (WEA 10 (GRS))   15:54
11   04:56	05:45	06:41	07:36	07:36	15:51 (WEA 10 (GRS))   08:26
21:47	20:58	19:45	18:31	16:25	1 15:52 (WEA 10 (GRS))   15:53
12   04:58	05:47	06:43	07:37	07:38	15:52 (WEA 10 (GRS))   08:27
21:46	20:56	19:43	18:28	16:23	15:53
13   04:59	05:48	06:44	07:39	07:40	15:50 (WEA 10 (GRS))   08:28
21:45	20:54	19:40	18:26	16:21	15:53
14   05:00	05:50	06:46	07:41	07:42	15:50 (WEA 10 (GRS))   08:29
21:44	20:52	19:38	18:24	16:20	15:53
15   05:01	05:52	06:48	07:48 (WEA G1)   07:43	07:44	15:50 (WEA 10 (GRS))   08:30
21:43	20:49	19:35	11 07:59 (WEA G1)   18:21	16:18	15:53
16   05:03	05:54	06:50	07:45 (WEA G1)   07:45	07:46	15:50 (WEA 10 (GRS))   08:31
21:42	20:47	19:35	17 08:02 (WEA G1)   18:19	16:17	15:53
17   05:04	05:56	06:52	07:25 (WEA G2)   07:47	07:47	15:51 (WEA 10 (GRS))   08:32
21:41	20:45	19:30	31 08:03 (WEA G1)   18:17	16:15	15:53
18   05:05	05:58	06:53	07:23 (WEA G3)   07:49	07:49	14:59 (WEA 11 (GRS))   08:33
21:39	20:43	19:28	39 08:05 (WEA G1)   18:14	16:14	6 15:05 (WEA 11 (GRS))   15:53
19   05:07	05:59	06:55	07:22 (WEA G3)   07:51	07:51	14:57 (WEA 11 (GRS))   08:33
21:38	4 06:07 (WEA 06 (GRN))   20:41	19:25	43 08:06 (WEA G1)   18:12	16:12	11 15:08 (WEA 11 (GRS))   15:54
20   05:08	06:01 (WEA 06 (GRN))   20:41	06:57	07:24 (WEA G3)   07:53	07:53	14:56 (WEA 11 (GRS))   08:34
21:37	9 06:10 (WEA 06 (GRN))   20:38	19:23	43 08:07 (WEA G1)   18:10	16:11	14 15:10 (WEA 11 (GRS))   15:54
21   05:10	06:00 (WEA 06 (GRN))   20:38	06:59	07:25 (WEA G3)   07:55	07:55	14:55 (WEA 11 (GRS))   08:35
21:35	11 06:11 (WEA 06 (GRN))   20:36	19:20	41 08:06 (WEA G1)   18:08	16:09	16 15:11 (WEA 11 (GRS))   15:54
22   05:11	05:58 (WEA 06 (GRN))   20:35	06:47 (WEA 08 (GRN))   20:01	07:27 (WEA G3)   07:57	07:57	14:54 (WEA 11 (GRS))   08:35
21:34	14 06:12 (WEA 06 (GRN))   20:34	2 06:49 (WEA 08 (GRN))   19:18	40 08:07 (WEA G1)   18:05	16:08	19 15:13 (WEA 11 (GRS))   15:55
23   05:13	05:58 (WEA 06 (GRN))   20:33	06:43 (WEA 08 (GRN))   20:02	38 08:07 (WEA G1)   18:03	16:07	19 15:13 (WEA 11 (GRS))   15:55
21:32	15 06:13 (WEA 06 (GRN))   20:31	9 06:52 (WEA 08 (GRN))   19:15	38 08:07 (WEA G1)   18:03	16:07	19 15:13 (WEA 11 (GRS))   15:55
24   05:14	05:57 (WEA 06 (GRN))   20:30	06:42 (WEA 08 (GRN))   20:04	07:31 (WEA G3)   08:00	08:00	14:54 (WEA 11 (GRS))   08:36
21:31	16 06:13 (WEA 06 (GRN))   20:29	12 06:54 (WEA 08 (GRN))   19:13	36 08:07 (WEA G1)   18:01	16:06	20 15:14 (WEA 11 (GRS))   15:56
25   05:16	05:57 (WEA 06 (GRN))   20:28	06:40 (WEA 08 (GRN))   20:06	07:33 (WEA G3)   07:52	08:02	14:53 (WEA 11 (GRS))   08:36
21:29	18 06:15 (WEA 06 (GRN))   20:27	14 06:54 (WEA 08 (GRN))   19:10	34 08:07 (WEA G1)   18:00	16:04	21 15:14 (WEA 11 (GRS))   15:57
26   05:18	05:56 (WEA 06 (GRN))   20:27	06:40 (WEA 08 (GRN))   20:08	07:34 (WEA G1)   07:54	08:04	14:53 (WEA 11 (GRS))   08:37
21:28	19 06:15 (WEA 06 (GRN))   20:24	15 06:55 (WEA 08 (GRN))   19:08	32 08:06 (WEA G1)   18:00	16:03	22 15:15 (WEA 11 (GRS))   15:57
27   05:19	05:56 (WEA 06 (GRN))   20:24	06:42 (WEA 08 (GRN))   20:10	07:36 (WEA G1)   07:56	08:06	14:53 (WEA 11 (GRS))   08:37
21:26	20 06:16 (WEA 06 (GRN))   20:22	13 06:55 (WEA 08 (GRN))   19:05	29 08:05 (WEA G1)   18:00	16:02	22 15:15 (WEA 11 (GRS))   15:58
28   05:21	05:56 (WEA 06 (GRN))   20:21	06:44 (WEA 08 (GRN))   20:11	07:38 (WEA G1)   07:58	08:07	14:53 (WEA 11 (GRS))   08:37
21:25	19 06:15 (WEA 06 (GRN))   20:20	11 06:55 (WEA 08 (GRN))   19:03	27 08:05 (WEA G1)   18:02	16:01	23 15:16 (WEA 11 (GRS))   15:59
29   05:22	05:56 (WEA 06 (GRN))   20:17	06:45 (WEA 08 (GRN))   20:13	07:40 (WEA G1)   07:10	08:09	14:54 (WEA 11 (GRS))   08:37
21:23	20 06:16 (WEA 06 (GRN))   20:17	9 06:54 (WEA 08 (GRN))   19:00	24 08:04 (WEA G1)   18:00	16:00	23 15:17 (WEA 11 (GRS))   16:00
30   05:24	05:55 (WEA 06 (GRN))   20:15	06:47 (WEA 08 (GRN))   20:15	07:42 (WEA G1)   07:12	08:11	14:54 (WEA 11 (GRS))   08:37
21:21	20 06:15 (WEA 06 (GRN))   20:15	7 06:54 (WEA 08 (GRN))   18:58	21 08:03 (WEA G1)   18:48	15:59	23 15:17 (WEA 11 (GRS))   16:01
31   05:26	05:57 (WEA 06 (GRN))   20:12	06:49 (WEA 08 (GRN))   20:12	07:14	08:14	14:58 (WEA 11 (GRS))   08:37
21:19	19 06:16 (WEA 06 (GRN))   20:12	4 06:53 (WEA 08 (GRN))   19:58	16:46	16:46	16:02
Sonnenscheinstunden	515	461	383	328	257
atr max.mögl.Beschattung	204	167	506	53	341
					733

**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:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0

DNV

Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 39 - IO 39 Rüttinger Kornenhof 1 (Rütting)

### 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   08:37	14:51 (WEA 11 (GRS))   08:06	07:08	07:33 (WEA_G1)   06:52	07:16 (WEA 06 (GRN))   05:42	06:06 (WEA 07 (GRN))   04:51
16:03	15:06 (WEA 11 (GRS))   16:55	17:52	07:50 (WEA_G1)   19:51	8   07:24 (WEA 06 (GRN))   20:40	26   06:37 (WEA 06 (GRN))   21:39
2   08:37	14:52 (WEA 11 (GRS))   08:04	07:05	07:30 (WEA_G1)   06:49	07:13 (WEA 06 (GRN))   05:39	06:06 (WEA 07 (GRN))   04:50
16:04	15:06 (WEA 11 (GRS))   16:57	17:54	07:50 (WEA_G1)   19:53	11   07:24 (WEA 06 (GRN))   20:49	27   06:36 (WEA 06 (GRN))   21:40
3   08:37	14:52 (WEA 11 (GRS))   08:03	07:03	07:28 (WEA_G1)   06:47	07:11 (WEA 06 (GRN))   05:37	06:06 (WEA 07 (GRN))   04:49
16:05	15:06 (WEA 11 (GRS))   16:59	17:56	07:51 (WEA_G1)   19:55	13   07:24 (WEA 06 (GRN))   20:51	23   06:35 (WEA 06 (GRN))   21:41
4   08:37	14:54 (WEA 11 (GRS))   08:01	07:01	07:25 (WEA_G1)   06:44	07:08 (WEA 06 (GRN))   05:35	06:08 (WEA 07 (GRN))   04:48
16:07	15:06 (WEA 11 (GRS))   17:01	17:58	07:51 (WEA_G1)   19:57	15   07:23 (WEA 06 (GRN))   20:53	16   06:33 (WEA 06 (GRN))   21:42
5   08:36	14:54 (WEA 11 (GRS))   07:59	06:56	07:23 (WEA_G1)   06:42	07:07 (WEA 06 (GRN))   05:33	06:24 (WEA 06 (GRN))   04:48
16:08	15:05 (WEA 11 (GRS))   17:03	18:00	07:51 (WEA_G1)   19:59	16   07:23 (WEA 06 (GRN))   20:55	6   06:30 (WEA 06 (GRN))   21:43
6   08:36	14:56 (WEA 11 (GRS))   07:57	06:56	07:20 (WEA_G1)   06:39	07:07 (WEA 06 (GRN))   05:31	04:47
16:09	15:05 (WEA 11 (GRS))   17:05	18:02	07:51 (WEA_G1)   20:01	14   07:21 (WEA 06 (GRN))   20:57	21:44
7   08:35	14:58 (WEA 11 (GRS))   07:53	06:53	07:18 (WEA_G1)   06:37	07:09 (WEA 06 (GRN))   05:29	04:46
16:11	15:04 (WEA 11 (GRS))   17:07	18:04	07:51 (WEA_G1)   20:03	10   07:19 (WEA 06 (GRN))   20:59	21:45
8   08:35	15:01 (WEA 11 (GRS))   07:53	06:51	07:15 (WEA_G2)   06:35	6   07:10 (WEA 06 (GRN))   05:27	04:46
16:12	15:02 (WEA 11 (GRS))   17:09	18:06	07:50 (WEA_G1)   20:04	07:16 (WEA 06 (GRN))   21:00	21:46
9   08:34	17:11	06:49	07:13 (WEA_G2)   06:32	21:02	12   05:36 (WEA 03 (GRN))   21:47
16:14	17:11	18:08	07:50 (WEA_G1)   20:06	05:24	05:25 (WEA 03 (GRN))   21:48
10   08:33	07:49	06:46	07:10 (WEA_G2)   06:30	21:04	11   05:36 (WEA 03 (GRN))   21:48
16:15	17:13	18:09	07:49 (WEA_G1)   20:08	05:22	10   05:36 (WEA 03 (GRN))   21:49
11   08:33	07:47	06:44	07:11 (WEA_G2)   06:27	21:06	05:26 (WEA 03 (GRN))   21:49
16:17	17:16	18:11	07:49 (WEA_G1)   20:10	21:06	10   05:36 (WEA 03 (GRN))   21:49
12   08:32	07:45	06:41	07:05 (WEA_G3)   06:25	21:06	05:20
16:18	17:18	18:13	07:47 (WEA_G1)   20:12	21:08	9   05:35 (WEA 03 (GRN))   21:50
13   08:31	07:43	06:39	07:03 (WEA_G3)   06:22	05:18	04:43
16:20	17:20	18:15	07:46 (WEA_G1)   20:14	21:09	8   05:35 (WEA 03 (GRN))   21:50
14   08:30	07:41	06:36	07:00 (WEA_G3)   06:20	05:16	04:43
16:21	17:22	18:17	07:44 (WEA_G1)   20:16	21:11	7   05:35 (WEA 03 (GRN))   21:51
15   08:29	07:39	06:34	06:58 (WEA_G3)   06:18	05:15	04:43
16:23	17:24	18:19	07:43 (WEA_G1)   20:18	21:13	6   05:35 (WEA 03 (GRN))   21:52
16   08:28	07:37	06:31	06:55 (WEA_G3)   06:15	05:13	04:42
16:25	17:26	18:21	07:40 (WEA_G1)   20:19	21:14	5   05:35 (WEA 03 (GRN))   21:52
17   08:27	07:35	06:29	06:52 (WEA_G3)   06:13	05:11	04:42
16:27	17:28	18:23	07:36 (WEA_G1)   20:21	21:16	4   05:34 (WEA 03 (GRN))   21:53
18   08:26	07:33	06:27	06:50 (WEA_G3)   06:11	05:10	04:42
16:28	17:30	18:25	07:06 (WEA_G1)   20:23	21:18	3   05:34 (WEA 03 (GRN))   21:53
19   08:25	07:31	06:24	06:52 (WEA_G3)   06:08	05:08	04:42
16:30	17:32	18:27	07:05 (WEA_G3)   20:25	21:20	2   05:34 (WEA 03 (GRN))   21:54
20   08:24	15:56 (WEA 10 (GRS))   07:28	06:22	06:53 (WEA_G3)   06:06	06:31 (WEA 06 (GRN))   05:06	04:42
16:32	15:57 (WEA 10 (GRS))   17:34	18:29	07:02 (WEA_G3)   20:27	3   06:28 (WEA 06 (GRN))   21:21	21:54
21   08:23	15:56 (WEA 10 (GRS))   07:26	06:19	06:51 (WEA_G3)   06:04	06:20 (WEA 06 (GRN))   05:05	04:42
16:34	15:59 (WEA 10 (GRS))   17:36	18:31	07:02 (WEA_G3)   20:29	8   06:36 (WEA 06 (GRN))   21:23	1   05:33 (WEA 03 (GRN))   21:54
22   08:21	15:56 (WEA 10 (GRS))   07:24	06:17	06:51 (WEA_G3)   06:01	06:26 (WEA 06 (GRN))   05:03	04:43
16:36	16:02 (WEA 10 (GRS))   17:38	18:32	07:01 (WEA_G3)   20:31	11   06:37 (WEA 06 (GRN))   21:24	1   05:33 (WEA 03 (GRN))   21:54
23   08:20	15:56 (WEA 10 (GRS))   07:22	06:14	06:50 (WEA_G3)   06:00	06:24 (WEA 06 (GRN))   05:02	04:43
16:38	16:03 (WEA 10 (GRS))   17:40	18:34	07:03 (WEA_G3)   20:33	14   06:38 (WEA 06 (GRN))   21:26	3   05:34 (WEA 03 (GRN))   21:55
24   08:19	15:56 (WEA 10 (GRS))   07:19	06:12	06:50 (WEA_G3)   06:00	06:22 (WEA 06 (GRN))   05:01	04:43
16:39	16:05 (WEA 10 (GRS))   17:42	18:36	07:04 (WEA_G3)   20:35	16   06:38 (WEA 06 (GRN))   21:27	5   05:35 (WEA 03 (GRN))   21:55
25   08:17	15:57 (WEA 10 (GRS))   07:17	06:09	06:50 (WEA_G3)   06:00	06:20 (WEA 06 (GRN))   05:00	04:44
16:41	16:08 (WEA 10 (GRS))   17:44	18:38	07:05 (WEA_G3)   20:36	19   06:39 (WEA 06 (GRN))   21:29	6   05:35 (WEA 03 (GRN))   21:55
26   08:16	15:57 (WEA 10 (GRS))   07:15	06:07	06:52 (WEA_G3)   06:00	06:18 (WEA 06 (GRN))   04:58	05:28 (WEA 03 (GRN))   21:56
16:43	16:10 (WEA 10 (GRS))   17:46	5   07:40 (WEA_G1)   06:07	07:06 (WEA_G3)   20:38	21   06:39 (WEA 06 (GRN))   21:30	8   05:36 (WEA 03 (GRN))   21:55
27   08:14	15:50 (WEA 10 (GRS))   07:12	06:04	06:50 (WEA_G3)   06:00	06:16 (WEA 06 (GRN))   04:57	05:27 (WEA 03 (GRN))   21:56
16:45	16:11 (WEA 10 (GRS))   17:48	10   07:47 (WEA_G1)   06:02	07:07 (WEA_G3)   20:40	22   06:39 (WEA 06 (GRN))   21:32	9   05:36 (WEA 03 (GRN))   21:55
28   08:13	16:00 (WEA 10 (GRS))   07:10	06:02	06:50 (WEA_G3)   06:00	06:14 (WEA 06 (GRN))   04:55	05:26 (WEA 03 (GRN))   21:56
16:47	16:12 (WEA 10 (GRS))   17:50	13   07:48 (WEA_G1)   06:04	07:08 (WEA_G3)   20:42	24   06:39 (WEA 06 (GRN))   21:33	10   05:36 (WEA 03 (GRN))   21:54
29   08:11	16:01 (WEA 10 (GRS))   07:09	06:01	06:50 (WEA_G3)   06:00	06:12 (WEA 06 (GRN))   04:54	05:25 (WEA 03 (GRN))   21:56
16:49	16:11 (WEA 10 (GRS))   17:46	19:46	07:09 (WEA_G3)   20:44	25   06:38 (WEA 06 (GRN))   21:35	12   05:37 (WEA 03 (GRN))   21:54
30   08:10	16:03 (WEA 10 (GRS))   07:08	06:00	06:50 (WEA_G3)   06:00	06:10 (WEA 06 (GRN))   04:53	05:24 (WEA 03 (GRN))   21:54
16:51	16:08 (WEA 10 (GRS))   17:49	19:47	07:20 (WEA 06 (GRN))   05:44	26   06:38 (WEA 06 (GRN))   21:36	13   05:37 (WEA 03 (GRN))   21:54
31   08:08	16:53	19:49	07:18 (WEA 06 (GRN))   05:42	27   06:38 (WEA 06 (GRN))   21:36	05:23 (WEA 03 (GRN))   21:54
16:53	272	367	421	496	513
Sonnenscheinstunden   248	272	367	421	496	513
astr. max. mögl. Beschattung   172	28	382	283	179	237

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

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großholz (3 x V150-6.0) **Schattenrezeptor:** IO 39 - IO 39 Rütiger Kornenhof 1 (Rütig)

### 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

Jul	August	September	Oktober	November	Dezember
1   04:47	05:31 (WEA 03 (GRN))   05:27	06:23	07:17	07:44 (WEA_G3)   07:16	08:12
2   04:54	05:39 (WEA 03 (GRN))   05:34	06:30	07:24	07:51 (WEA_G2)   07:24	08:18
3   04:58	05:40 (WEA 03 (GRN))   05:36	06:36	07:31	07:58 (WEA_G1)   07:31	08:24
4   04:49	05:41 (WEA 03 (GRN))   05:33	06:28	07:23	07:49 (WEA_G2)   07:22	08:17
5   04:50	05:42 (WEA 03 (GRN))   05:34	06:30	07:25	07:51 (WEA_G2)   07:24	08:18
6   04:51	05:43 (WEA 03 (GRN))   05:36	06:32	07:26	07:53 (WEA_G2)   07:26	08:19
7   04:52	05:44 (WEA 03 (GRN))   05:38	06:34	07:28	07:55 (WEA_G1)   07:28	08:21
8   04:53	05:45 (WEA 03 (GRN))   05:40	06:36	07:30	07:57 (WEA_G1)   07:30	08:22
9   04:54	05:46 (WEA 03 (GRN))   05:41	06:38	07:32	07:59 (WEA_G1)   07:32	08:23
10   04:55	05:47 (WEA 03 (GRN))   05:42	06:40	07:34	08:01 (WEA_G1)   07:34	08:25
11   04:56	05:48 (WEA 03 (GRN))   05:43	06:42	07:36	08:03 (WEA_G1)   07:36	08:26
12   04:58	05:49 (WEA 03 (GRN))   05:44	06:44	07:38	08:05 (WEA_G1)   07:38	08:27
13   04:59	05:50 (WEA 03 (GRN))   05:45	06:46	07:40	08:07 (WEA_G1)   07:40	08:28
14   05:00	05:51 (WEA 03 (GRN))   05:46	06:48	07:42	08:09 (WEA_G1)   07:42	08:29
15   05:01	05:52 (WEA 03 (GRN))   05:47	06:50	07:44	08:11 (WEA_G1)   07:44	08:30
16   05:03	05:53 (WEA 03 (GRN))   05:48	06:52	07:46	08:13 (WEA_G1)   07:46	08:31
17   05:04	05:54 (WEA 03 (GRN))   05:49	06:54	07:48	08:15 (WEA_G1)   07:48	08:32
18   05:05	05:55 (WEA 03 (GRN))   05:50	06:56	07:50	08:17 (WEA_G1)   07:50	08:33
19   05:07	05:56 (WEA 03 (GRN))   05:51	06:58	07:52	08:19 (WEA_G1)   07:52	08:34
20   05:08	05:57 (WEA 03 (GRN))   05:52	07:00	07:54	08:21 (WEA_G1)   07:54	08:35
21   05:10	05:58 (WEA 03 (GRN))   05:53	07:02	07:56	08:23 (WEA_G1)   07:56	08:36
22   05:11	05:59 (WEA 03 (GRN))   05:54	07:04	07:58	08:25 (WEA_G1)   07:58	08:37
23   05:13	06:00 (WEA 03 (GRN))   05:55	07:06	08:00	08:27 (WEA_G1)   07:60	08:38
24   05:14	06:01 (WEA 03 (GRN))   05:56	07:08	08:02	08:29 (WEA_G1)   07:62	08:39
25   05:16	06:02 (WEA 03 (GRN))   05:57	07:10	08:04	08:31 (WEA_G1)   07:64	08:40
26   05:18	06:03 (WEA 03 (GRN))   05:58	07:12	08:06	08:33 (WEA_G1)   07:66	08:41
27   05:19	06:04 (WEA 03 (GRN))   05:59	07:14	08:08	08:35 (WEA_G1)   07:68	08:42
28   05:21	06:05 (WEA 03 (GRN))   06:00	07:16	08:10	08:37 (WEA_G1)   07:70	08:43
29   05:22	06:06 (WEA 03 (GRN))   06:01	07:18	08:12	08:39 (WEA_G1)   07:72	08:44
30   05:24	06:07 (WEA 03 (GRN))   06:02	07:20	08:14	08:41 (WEA_G1)   07:74	08:45
31   05:26	06:08 (WEA 03 (GRN))   06:03	07:22	08:16	08:43 (WEA_G1)   07:76	08:46
1   05:27	06:09 (WEA 03 (GRN))   06:04	07:24	08:18	08:45 (WEA_G1)   07:78	08:47
2   05:28	06:10 (WEA 03 (GRN))   06:05	07:26	08:20	08:47 (WEA_G1)   07:80	08:48
3   05:29	06:11 (WEA 03 (GRN))   06:06	07:28	08:22	08:49 (WEA_G1)   07:82	08:49
4   05:30	06:12 (WEA 03 (GRN))   06:07	07:30	08:24	08:51 (WEA_G1)   07:84	08:50
5   05:31	06:13 (WEA 03 (GRN))   06:08	07:32	08:26	08:53 (WEA_G1)   07:86	08:51
6   05:32	06:14 (WEA 03 (GRN))   06:09	07:34	08:28	08:55 (WEA_G1)   07:88	08:52
7   05:33	06:15 (WEA 03 (GRN))   06:10	07:36	08:30	08:57 (WEA_G1)   07:90	08:53
8   05:34	06:16 (WEA 03 (GRN))   06:11	07:38	08:32	08:59 (WEA_G1)   07:92	08:54
9   05:35	06:17 (WEA 03 (GRN))   06:12	07:40	08:34	09:01 (WEA_G1)   07:94	08:55
10   05:36	06:18 (WEA 03 (GRN))   06:13	07:42	08:36	09:03 (WEA_G1)   07:96	08:56
11   05:37	06:19 (WEA 03 (GRN))   06:14	07:44	08:38	09:05 (WEA_G1)   07:98	08:57
12   05:38	06:20 (WEA 03 (GRN))   06:15	07:46	08:40	09:07 (WEA_G1)   08:00	08:58
13   05:39	06:21 (WEA 03 (GRN))   06:16	07:48	08:42	09:09 (WEA_G1)   08:02	08:59
14   05:40	06:22 (WEA 03 (GRN))   06:17	07:50	08:44	09:11 (WEA_G1)   08:04	09:00
15   05:41	06:23 (WEA 03 (GRN))   06:18	07:52	08:46	09:13 (WEA_G1)   08:06	09:01
16   05:42	06:24 (WEA 03 (GRN))   06:19	07:54	08:48	09:15 (WEA_G1)   08:08	09:02
17   05:43	06:25 (WEA 03 (GRN))   06:20	07:56	08:50	09:17 (WEA_G1)   08:10	09:03
18   05:44	06:26 (WEA 03 (GRN))   06:21	07:58	08:52	09:19 (WEA_G1)   08:12	09:04
19   05:45	06:27 (WEA 03 (GRN))   06:22	08:00	08:54	09:21 (WEA_G1)   08:14	09:05
20   05:46	06:28 (WEA 03 (GRN))   06:23	08:02	08:56	09:23 (WEA_G1)   08:16	09:06
21   05:47	06:29 (WEA 03 (GRN))   06:24	08:04	08:58	09:25 (WEA_G1)   08:18	09:07
22   05:48	06:30 (WEA 03 (GRN))   06:25	08:06	09:00	09:27 (WEA_G1)   08:20	09:08
23   05:49	06:31 (WEA 03 (GRN))   06:26	08:08	09:02	09:29 (WEA_G1)   08:22	09:09
24   05:50	06:32 (WEA 03 (GRN))   06:27	08:10	09:04	09:31 (WEA_G1)   08:24	09:10
25   05:51	06:33 (WEA 03 (GRN))   06:28	08:12	09:06	09:33 (WEA_G1)   08:26	09:11
26   05:52	06:34 (WEA 03 (GRN))   06:29	08:14	09:08	09:35 (WEA_G1)   08:28	09:12
27   05:53	06:35 (WEA 03 (GRN))   06:30	08:16	09:10	09:37 (WEA_G1)   08:30	09:13
28   05:54	06:36 (WEA 03 (GRN))   06:31	08:18	09:12	09:39 (WEA_G1)   08:32	09:14
29   05:55	06:37 (WEA 03 (GRN))   06:32	08:20	09:14	09:41 (WEA_G1)   08:34	09:15
30   05:56	06:38 (WEA 03 (GRN))   06:33	08:22	09:16	09:43 (WEA_G1)   08:36	09:16
31   05:57	06:39 (WEA 03 (GRN))   06:34	08:24	09:18	09:45 (WEA_G1)   08:38	09:17
1   05:58	06:40 (WEA 03 (GRN))   06:35	08:26	09:20	09:47 (WEA_G1)   08:40	09:18
2   05:59	06:41 (WEA 03 (GRN))   06:36	08:28	09:22	09:49 (WEA_G1)   08:42	09:19
3   06:00	06:42 (WEA 03 (GRN))   06:37	08:30	09:24	09:51 (WEA_G1)   08:44	09:20
4   06:01	06:43 (WEA 03 (GRN))   06:38	08:32	09:26	09:53 (WEA_G1)   08:46	09:21
5   06:02	06:44 (WEA 03 (GRN))   06:39	08:34	09:28	09:55 (WEA_G1)   08:48	09:22
6   06:03	06:45 (WEA 03 (GRN))   06:40	08:36	09:30	09:57 (WEA_G1)   08:50	09:23
7   06:04	06:46 (WEA 03 (GRN))   06:41	08:38	09:32	09:59 (WEA_G1)   08:52	09:24
8   06:05	06:47 (WEA 03 (GRN))   06:42	08:40	09:34	10:01 (WEA_G1)   08:54	09:25
9   06:06	06:48 (WEA 03 (GRN))   06:43	08:42	09:36	10:03 (WEA_G1)   08:56	09:26
10   06:07	06:49 (WEA 03 (GRN))   06:44	08:44	09:38	10:05 (WEA_G1)   08:58	09:27
11   06:08	06:50 (WEA 03 (GRN))   06:45	08:46	09:40	10:07 (WEA_G1)   09:00	09:28
12   06:09	06:51 (WEA 03 (GRN))   06:46	08:48	09:42	10:09 (WEA_G1)   09:02	09:29
13   06:10	06:52 (WEA 03 (GRN))   06:47	08:50	09:44	10:11 (WEA_G1)   09:04	09:30
14   06:11	06:53 (WEA 03 (GRN))   06:48	08:52	09:46	10:13 (WEA_G1)   09:06	09:31
15   06:12	06:54 (WEA 03 (GRN))   06:49	08:54	09:48	10:15 (WEA_G1)   09:08	09:32
16   06:13	06:55 (WEA 03 (GRN))   06:50	08:56	09:50	10:17 (WEA_G1)   09:10	09:33
17   06:14	06:56 (WEA 03 (GRN))   06:51	08:58	09:52	10:19 (WEA_G1)   09:12	09:34
18   06:15	06:57 (WEA 03 (GRN))   06:52	09:00	09:54	10:21 (WEA_G1)   09:14	09:35
19   06:16	06:58 (WEA 03 (GRN))   06:53	09:02	09:56	10:23 (WEA_G1)   09:16	09:36
20   06:17	06:59 (WEA 03 (GRN))   06:54	09:04	09:58	10:25 (WEA_G1)   09:18	09:37
21   06:18	07:00 (WEA 03 (GRN))   06:55	09:06	10:00	10:27 (WEA_G1)   09:20	09:38
22   06:19	07:01 (WEA 03 (GRN))   06:56	09:08	10:02	10:29 (WEA_G1)   09:22	09:39
23   06:20	07:02 (WEA 03 (GRN))   06:57	09:10	10:04	10:31 (WEA_G1)   09:24	09:40
24   06:21	07:03 (WEA 03 (GRN))   06:58	09:12	10:06	10:33 (WEA_G1)   09:26	09:41
25   06:22	07:04 (WEA 03 (GRN))   06:59	09:14	10:08	10:35 (WEA_G1)   09:28	09:42
26   06:23	07:05 (WEA 03 (GRN))   07:00	09:16	10:10	10:37 (WEA_G1)   09:30	09:43
27   06:24	07:06 (WEA 03 (GRN))   07:01	09:18	10:12	10:39 (WEA_G1)   09:32	09:44
28   06:25	07:07 (WEA 03 (GRN))   07:02	09:20	10:14	10:41 (WEA_G1)   09:34	09:45
29   06:26	07:08 (WEA 03 (GRN))   07:03	09:22	10:16	10:43 (WEA_G1)   09:36	09:46
30   06:27	07:09 (WEA 03 (GRN))   07:04	09:24	10:18	10:45 (WEA_G1)   09:38	09:47
31   06:28	07:10 (WEA 03 (GRN))   07:05	09:26	10:20	10:47 (WEA_G1)   09:40	09:48
1   06:29	07:11 (WEA 03 (GRN))   07:06	09:28	10:22	10:49 (WEA_G1)   09:42	09:49
2   06:30	07:12 (WEA 03 (GRN))   07:07	09:30	10:24	10:51 (WEA_G1)   09:44	09:50
3   06:31	07:13 (WEA 03 (GRN))   07:08	09:32	10:26	10:53 (WEA_G1)   09:46	09:51
4   06:32	07:14 (WEA 03 (GRN))   07:09	09:34	10:28	10:55 (WEA_G1)   09:48	09:52
5   06:33	07:15 (WEA 03 (GRN))   07:10	09:36	10:30	10:57 (WEA_G1)   09:50	09:53
6   06:34	07:16 (WEA 03 (GRN))   07:11	09:38	10:32	10:59 (WEA_G1)   09:52	09:54
7   06:35	07:17 (WEA 03 (GRN))   07:12	09:40	10:34	11:01 (WEA_G1)   09:54	09:55
8   06:36	07:18 (WEA 03 (GRN))   07:13	09:42	10:36	11:03 (WEA_G1)   09:56	09:56
9   06:37	07:19 (WEA 03 (GRN))   07:14	09:44	10:38	11:05 (WEA_G1)   09:58	09:57
10   06:38	07:20 (WEA 03 (GRN))   07:15	09:46	10:40	11:07 (WEA_G1)   10:00	09:58
11   06:39	07:21 (WEA 03 (GRN))   07:16	09:48	10:42	11:09 (WEA_G1)   10:02	09:59
12   06:40	07:22 (WEA 03 (GRN))   07:17	09:50	10:44	11:11 (WEA_G1)   10:04	10:00
13   06:41	07:23 (WEA 03 (GRN))   07:18	09:52	10:46	11:13 (WEA_G1)   10:06	10:01
14   06:42	07:24 (WEA 03 (GRN))   07:19	09:54	10:48	11:15 (WEA_G1)   10:08	10:02
15   06:43	07:25 (WEA 03 (GRN))   07:20	09:56	10:50	11:17 (WEA_G1)   10:10	10:03
16   06:44	07:26 (WEA 03 (GRN))   07:21	09:58	10:52	11:19 (WEA_G1)   10:12	10:04
17   06:45	07:27 (WEA 03 (GRN))   07:22	10:00	10:54	11:21 (WEA_G1)   10:14	10:05
18   06:46	07:28 (WEA 03 (GRN))   07:23	10:02	10:56	11:23 (WEA_G1)   10:16	10:06
19   06:47	07:29 (WEA 03 (GRN))   07:24	10:04	10:58	11:25 (WEA_G1)   10:18	10:07
20   06:48	07:30 (WEA 03 (GRN))   07:25	10:06	11:00	11:27 (WEA_G1)   10:20	10:08
21   06:49	07:31 (WEA 03 (GRN))   07:26	10:08	11:02	11:29 (WEA_G1)   10:22	10:09
22   06:50	07:32 (WEA 03 (GRN))   07:27	10:10	11:04	11:31 (WEA_G1)   10:24	10:10
23   06:51	07:33 (WEA 03 (GRN))   07:28	10:12	11:06	11:33 (WEA_G1)   10:26	10:11
24   06:52	07:34 (WEA 03 (GRN))   07:29	10:14	11:08	11:35 (WEA_G1)   10:28	10:12
25   06:53	07:35 (WEA 03 (GRN))   07:30	10:16	11:10	11:37 (WEA_G1)   10:30	10:13

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 40 - IO 40 Rütiger Kornenhof 10 (Rütig)

### 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	08:37 16:03	08:06 16:55	07:08 17:52	07:33 (WEA_G1) 06:52 07:45 (WEA_G1) 19:51	07:16 (WEA_08 (GRN)) 05:42 07:27 (WEA_08 (GRN)) 20:46	04:51 21:39	
2	08:37 16:04	08:04 16:57	07:05 17:54	07:30 (WEA_G1) 06:49 07:46 (WEA_G1) 19:53	07:13 (WEA_08 (GRN)) 05:39 07:26 (WEA_08 (GRN)) 20:49	04:50 21:40	
3	08:37 16:05	08:03 16:59	07:03 17:56	07:28 (WEA_G1) 06:47 07:47 (WEA_G1) 19:55	07:12 (WEA_08 (GRN)) 05:37 07:25 (WEA_08 (GRN)) 20:51	04:49 21:41	
4	08:37 16:07	08:01 17:01	07:01 17:58	07:25 (WEA_G1) 06:44 07:47 (WEA_G1) 19:57	07:12 (WEA_08 (GRN)) 05:35 07:23 (WEA_08 (GRN)) 20:53	04:48 21:42	
5	08:36 16:08	07:59 17:03	06:58 18:00	07:23 (WEA_G1) 06:42 07:47 (WEA_G1) 19:59	07:14 (WEA_08 (GRN)) 05:33 07:21 (WEA_08 (GRN)) 20:55	04:46 21:43	
6	08:36 16:09	07:57 17:05	06:56 18:02	07:20 (WEA_G1) 06:39 07:47 (WEA_G1) 20:01	07:11 (WEA_08 (GRN)) 05:31 07:20 (WEA_08 (GRN)) 20:57	04:47 21:44	
7	08:35 16:11	07:55 17:07	06:53 18:04	07:18 (WEA_G1) 06:37 07:47 (WEA_G1) 20:03	07:10 (WEA_08 (GRN)) 05:29 07:19 (WEA_08 (GRN)) 20:59	04:46 21:45	
8	08:35 16:12	07:53 17:09	06:51 18:06	07:15 (WEA_G2) 06:35 07:46 (WEA_G1) 20:04	07:09 (WEA_08 (GRN)) 05:27 07:18 (WEA_08 (GRN)) 21:00	04:46 21:46	
9	08:34 16:14	07:51 17:11	06:49 18:08	07:13 (WEA_G2) 06:32 07:46 (WEA_G1) 20:06	07:08 (WEA_08 (GRN)) 05:25 07:17 (WEA_08 (GRN)) 21:02	04:45 21:47	
10	08:33 16:15	15:37 (WEA_10 (GRS)) 07:49 15:38 (WEA_10 (GRS)) 17:13	06:46 18:09	07:10 (WEA_G2) 06:30 07:45 (WEA_G1) 20:08	07:07 (WEA_08 (GRN)) 05:24 07:16 (WEA_08 (GRN)) 21:04	04:44 21:48	
11	08:33 16:17	15:37 (WEA_10 (GRS)) 07:47 15:39 (WEA_10 (GRS)) 17:16	06:44 18:11	07:10 (WEA_G2) 06:27 07:45 (WEA_G1) 20:10	07:06 (WEA_08 (GRN)) 05:22 07:15 (WEA_08 (GRN)) 21:06	04:44 21:49	
12	08:32 16:18	15:37 (WEA_10 (GRS)) 07:45 15:41 (WEA_10 (GRS)) 17:18	06:41 18:13	07:10 (WEA_G2) 06:25 07:43 (WEA_G1) 20:12	07:05 (WEA_08 (GRN)) 05:20 07:14 (WEA_08 (GRN)) 21:08	04:44 21:50	
13	08:31 16:20	15:37 (WEA_10 (GRS)) 07:43 15:43 (WEA_10 (GRS)) 17:20	06:39 18:15	07:12 (WEA_G2) 06:22 07:42 (WEA_G1) 20:14	07:04 (WEA_08 (GRN)) 05:18 07:13 (WEA_08 (GRN)) 21:09	04:43 21:50	
14	08:30 16:21	15:37 (WEA_10 (GRS)) 07:41 15:45 (WEA_10 (GRS)) 17:22	06:36 18:17	07:13 (WEA_G2) 06:20 07:40 (WEA_G1) 20:16	07:03 (WEA_08 (GRN)) 05:16 07:21 (WEA_G1) 20:18	04:43 21:51	
15	08:29 16:23	15:38 (WEA_10 (GRS)) 07:39 15:47 (WEA_10 (GRS)) 17:24	06:34 18:19	07:23 (WEA_G1) 06:18 07:38 (WEA_G1) 20:18	07:02 (WEA_08 (GRN)) 05:15 07:11 (WEA_08 (GRN)) 21:13	04:43 21:52	
16	08:28 16:25	15:38 (WEA_10 (GRS)) 07:37 15:49 (WEA_10 (GRS)) 17:26	06:31 18:21	07:23 (WEA_G1) 06:15 07:34 (WEA_G1) 20:20	06:40 (WEA_06 (GRN)) 05:13 06:49 (WEA_06 (GRN)) 21:15	04:42 21:52	
17	08:27 16:27	15:39 (WEA_10 (GRS)) 07:35 15:51 (WEA_10 (GRS)) 17:28	06:29 18:23	07:23 (WEA_G1) 06:13 07:34 (WEA_G1) 20:21	06:37 (WEA_06 (GRN)) 05:11 06:45 (WEA_06 (GRN)) 21:16	04:42 21:53	
18	08:26 16:28	15:39 (WEA_10 (GRS)) 07:33 15:53 (WEA_10 (GRS)) 17:30	06:27 18:25	07:23 (WEA_G1) 06:11 07:34 (WEA_G1) 20:22	06:35 (WEA_06 (GRN)) 05:10 06:46 (WEA_06 (GRN)) 21:18	04:42 21:53	
19	08:25 16:30	15:40 (WEA_10 (GRS)) 07:31 15:55 (WEA_10 (GRS)) 17:32	06:24 18:27	07:23 (WEA_G1) 06:08 07:34 (WEA_G1) 20:23	06:33 (WEA_06 (GRN)) 05:08 06:47 (WEA_06 (GRN)) 21:20	04:42 21:54	
20	08:24 16:32	15:41 (WEA_10 (GRS)) 07:28 15:56 (WEA_10 (GRS)) 17:34	06:22 18:29	07:23 (WEA_G1) 06:06 07:34 (WEA_G1) 20:24	06:31 (WEA_06 (GRN)) 05:06 06:47 (WEA_06 (GRN)) 21:21	04:42 21:54	
21	08:23 16:34	15:41 (WEA_10 (GRS)) 07:26 15:55 (WEA_10 (GRS)) 17:36	06:19 18:31	07:23 (WEA_G1) 06:04 07:34 (WEA_G1) 20:25	06:28 (WEA_06 (GRN)) 05:05 06:46 (WEA_06 (GRN)) 21:23	04:43 21:54	
22	08:21 16:36	15:43 (WEA_10 (GRS)) 07:24 15:56 (WEA_10 (GRS)) 17:38	06:17 18:32	07:23 (WEA_G1) 06:01 07:34 (WEA_G1) 20:26	06:27 (WEA_06 (GRN)) 05:03 06:46 (WEA_06 (GRN)) 21:24	04:43 21:54	
23	08:20 16:38	15:44 (WEA_10 (GRS)) 07:22 15:54 (WEA_10 (GRS)) 17:40	06:14 18:34	07:23 (WEA_G1) 05:59 07:34 (WEA_G1) 20:27	06:27 (WEA_06 (GRN)) 05:02 06:46 (WEA_06 (GRN)) 21:26	04:43 21:55	
24	08:19 16:39	15:45 (WEA_10 (GRS)) 07:19 15:53 (WEA_10 (GRS)) 17:42	06:12 18:36	07:23 (WEA_G1) 05:57 07:34 (WEA_G1) 20:28	06:22 (WEA_07 (GRN)) 05:01 06:45 (WEA_06 (GRN)) 21:27	04:43 21:55	
25	08:17 16:41	07:17 17:44	06:09 18:38	07:23 (WEA_G1) 05:55 07:34 (WEA_G1) 20:29	06:20 (WEA_07 (GRN)) 04:59 06:45 (WEA_06 (GRN)) 21:29	04:44 21:55	
26	08:16 16:43	07:15 17:46	06:07 18:40	07:23 (WEA_G1) 05:52 07:34 (WEA_G1) 20:30	06:19 (WEA_07 (GRN)) 04:58 06:44 (WEA_06 (GRN)) 21:30	04:44 21:55	
27	08:14 16:45	07:12 17:48	06:04 18:42	07:23 (WEA_G1) 05:50 07:34 (WEA_G1) 20:31	06:16 (WEA_07 (GRN)) 04:57 06:42 (WEA_06 (GRN)) 21:32	04:44 21:55	
28	08:13 16:47	07:10 17:50	06:02 18:44	07:23 (WEA_G1) 05:48 07:34 (WEA_G1) 20:32	06:14 (WEA_07 (GRN)) 04:55 06:40 (WEA_06 (GRN)) 21:33	04:45 21:54	
29	08:11 16:49	07:08 17:52	05:59 18:46	07:23 (WEA_G1) 05:46 07:34 (WEA_G1) 20:33	06:13 (WEA_07 (GRN)) 04:54 06:21 (WEA_07 (GRN)) 21:35	04:46 21:54	
30	08:10 16:51	07:07 17:53	05:57 18:47	07:23 (WEA_G1) 05:44 07:34 (WEA_G1) 20:34	06:16 (WEA_07 (GRN)) 04:53 06:17 (WEA_07 (GRN)) 21:36	04:46 21:54	
31	08:08 16:53	07:06 17:54	05:55 18:49	07:23 (WEA_G1) 05:42 07:34 (WEA_G1) 20:35	06:15 (WEA_07 (GRN)) 04:52 06:16 (WEA_07 (GRN)) 21:37	04:46 21:54	
	Sonnenscheinstunden astr. max. mögl. Beschattung	246 142	272 13	367 420	421 265	496 125	513

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

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 40 - IO 40 Rütiger Kornhof 10 (Rütig)

### 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

Jul	August	September	Oktober	November	Dezember
1   04:47	05:27	06:23	07:17	07:51 (WEA_G2)   07:16	08:12
2   04:48	05:29	06:25	07:19	08:23 (WEA_G1)   16:44	2   15:59 (WEA 10 (GRS))
3   04:48	05:31	06:26	07:21	07:49 (WEA_G2)   07:18	08:14
4   04:49	05:33	06:28	07:23	08:23 (WEA_G1)   16:42	1   15:58 (WEA 10 (GRS))
5   04:50	05:34	06:30	07:24	07:51 (WEA_G2)   07:20	08:15
6   04:51	05:36	06:32	07:26	08:23 (WEA_G1)   16:40	15:57
7   04:52	05:38	06:34	07:28	07:49 (WEA_G2)   07:22	08:17
8   04:53	05:40	06:35	07:30	08:23 (WEA_G1)   16:38	15:56
9   04:54	05:41	06:37	07:32	07:51 (WEA_G2)   07:24	08:18
10   04:55	05:43	06:39	07:34	08:23 (WEA_G1)   16:36	15:56
11   04:56	05:45	06:41	07:36	07:53 (WEA_G1)   07:26	08:20
12   04:58	05:47	06:43	07:37	08:23 (WEA_G1)   16:34	15:55
13   04:59	05:49	06:44	07:39	07:55 (WEA_G1)   07:28	08:21
14   05:00	05:50	06:46	07:41	08:23 (WEA_G1)   16:32	15:55
15   05:01	05:45 (WEA 03 (GRN))   05:52	06:21 (WEA 07 (GRN))   06:48	07:10 (WEA 06 (GRN))   07:30	07:57 (WEA_G1)   07:30	08:22
16   05:03	05:44 (WEA 03 (GRN))   05:54	06:20 (WEA 07 (GRN))   06:46	07:07 (WEA 06 (GRN))   07:30	08:23 (WEA_G1)   16:30	15:54
17   05:04	05:44 (WEA 03 (GRN))   05:56	06:25 (WEA 07 (GRN))   06:52	07:18 (WEA 06 (GRN))   07:32	08:01 (WEA_G1)   07:34	15:54
18   05:05	05:43 (WEA 03 (GRN))   05:58	06:27 (WEA 07 (GRN))   06:53	07:19 (WEA 06 (GRN))   07:34	08:23 (WEA_G1)   16:28	15:54
19   05:07	05:42 (WEA 03 (GRN))   05:59	06:28 (WEA 07 (GRN))   06:55	07:20 (WEA 06 (GRN))   07:36	08:01 (WEA_G1)   07:34	15:54
20   05:08	05:42 (WEA 03 (GRN))   06:01	06:33 (WEA 06 (GRN))   06:57	07:21 (WEA 06 (GRN))   07:38	08:23 (WEA_G1)   16:27	15:54
21   05:10	05:42 (WEA 03 (GRN))   06:03	06:35 (WEA 06 (GRN))   06:59	07:22 (WEA 06 (GRN))   07:40	08:03 (WEA_G1)   07:36	15:54
22   05:11	05:43 (WEA 03 (GRN))   06:05	06:33 (WEA 06 (GRN))   07:01	07:23 (WEA 06 (GRN))   07:41	08:09 (WEA_G1)   07:42	15:53
23   05:13	05:45 (WEA 03 (GRN))   06:07	06:35 (WEA 06 (GRN))   07:02	07:24 (WEA 06 (GRN))   07:43	08:11 (WEA_G1)   07:44	15:53
24   05:14	05:46 (WEA 03 (GRN))   06:08	06:37 (WEA 06 (GRN))   07:04	07:25 (WEA 06 (GRN))   07:44	08:14 (WEA_G1)   07:46	15:53
25   05:16	05:48 (WEA 03 (GRN))   06:10	06:38 (WEA 06 (GRN))   07:06	07:26 (WEA 06 (GRN))   07:45	08:16 (WEA_G1)   07:48	15:53
26   05:18	05:49 (WEA 03 (GRN))   06:12	06:40 (WEA 06 (GRN))   07:08	07:27 (WEA 06 (GRN))   07:46	08:18 (WEA_G1)   07:50	15:53
27   05:19	05:51 (WEA 03 (GRN))   06:14	06:42 (WEA 06 (GRN))   07:10	07:28 (WEA 06 (GRN))   07:47	08:20 (WEA_G1)   07:52	15:53
28   05:21	05:52 (WEA 03 (GRN))   06:16	06:44 (WEA 06 (GRN))   07:11	07:29 (WEA 06 (GRN))   07:48	08:22 (WEA_G1)   07:54	15:53
29   05:22	05:54 (WEA 03 (GRN))   06:17	06:46 (WEA 06 (GRN))   07:13	07:30 (WEA 06 (GRN))   07:49	08:24 (WEA_G1)   07:56	15:53
30   05:24	05:55 (WEA 03 (GRN))   06:19	06:48 (WEA 06 (GRN))   07:14	07:31 (WEA 06 (GRN))   07:50	08:26 (WEA_G1)   07:58	15:53
31   05:26	05:56 (WEA 03 (GRN))   06:21	06:50 (WEA 06 (GRN))   07:15	07:32 (WEA 06 (GRN))   07:51	08:28 (WEA_G1)   07:59	15:53
Sommereinheiten   515	461	383	328	257	231
astr. max mögl. Beschattung   127	213	152	347	140	3

**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:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 41 - IO 41 Kathenkamp 11 (Rüting)  
**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   08:37	06:06	07:08	07:33 (WEA_G1)   06:52	07:23 (WEA_06 (GRN))   05:42	04:51
1   16:03	16:55	17:52 30	08:03 (WEA_G1)   17:51	11   07:34 (WEA_06 (GRN))   20:40	3   05:30 (WEA_03 (GRN))   21:39
2   08:37	06:04	07:05	07:30 (WEA_G1)   06:49	07:24 (WEA_06 (GRN))   05:39	04:50
1   16:04	16:57	17:54 32	08:02 (WEA_G1)   17:53	7   07:31 (WEA_06 (GRN))   20:49	2   04:50
3   08:37	06:03	07:03	07:28 (WEA_G2)   06:47	07:23 (WEA_06 (GRN))   05:37	04:49
1   16:05	16:59	17:56 34	08:02 (WEA_G1)   17:55	07:24 (WEA_06 (GRN))   05:39	04:50
4   08:37	06:01	07:01	07:25 (WEA_G2)   06:44	07:23 (WEA_06 (GRN))   05:37	04:48
1   16:07	17:01	17:58 36	08:01 (WEA_G1)   17:57	07:23 (WEA_06 (GRN))   05:37	04:48
5   08:36	07:59	06:58	07:23 (WEA_G2)   06:42	07:23 (WEA_06 (GRN))   05:37	04:48
1   16:08	17:03	18:00 38	08:01 (WEA_G1)   17:59	07:23 (WEA_06 (GRN))   05:37	04:48
6   08:36	07:57	06:56	07:20 (WEA_G2)   06:39	07:23 (WEA_06 (GRN))   05:37	04:47
1   16:09	17:05	18:02 40	08:00 (WEA_G1)   20:01	07:23 (WEA_06 (GRN))   05:37	04:46
7   08:35	07:55	06:53	07:19 (WEA_G2)   06:37	07:23 (WEA_06 (GRN))   05:37	04:46
1   16:11	17:07	18:04 40	07:59 (WEA_G1)   20:03	07:23 (WEA_06 (GRN))   05:37	04:45
8   08:35	07:53	06:51	07:19 (WEA_G2)   06:35	07:23 (WEA_06 (GRN))   05:37	04:45
1   16:12	17:09	18:06 39	07:58 (WEA_G1)   20:04	07:23 (WEA_06 (GRN))   05:37	04:46
9   08:34	07:51	06:49	07:13 (WEA_G2)   06:32	07:23 (WEA_06 (GRN))   05:37	04:45
1   16:14	17:11	18:08 40	07:57 (WEA_G1)   20:06	07:23 (WEA_06 (GRN))   05:37	04:47
10   08:33	07:49	06:46	07:10 (WEA_G3)   06:30	07:23 (WEA_06 (GRN))   05:37	04:44
1   16:15	17:13	18:09 39	07:54 (WEA_G1)   20:08	07:23 (WEA_06 (GRN))   05:37	04:48
11   08:33	07:47	06:44	07:08 (WEA_G2)   06:27	07:23 (WEA_06 (GRN))   05:37	04:44
1   16:17	17:16	18:11 34	07:52 (WEA_G1)   20:10	07:23 (WEA_06 (GRN))   05:37	04:49
12   08:32	07:45	06:41	07:05 (WEA_G3)   06:25	07:23 (WEA_06 (GRN))   05:37	04:44
1   16:18	17:18	18:13 21	07:48 (WEA_G1)   20:12	07:23 (WEA_06 (GRN))   05:37	04:50
13   08:31	07:43	06:39	07:03 (WEA_G3)   06:22	06:47 (WEA_06 (GRN))   05:18	04:43
1   16:20	17:20	18:15 13	07:16 (WEA_G3)   20:14	5   06:52 (WEA_06 (GRN))   21:09	2   04:50
14   08:30	15:44 (WEA_10 (GRS))   07:41	06:36	07:00 (WEA_G3)   06:20	06:44 (WEA_06 (GRN))   05:16	04:43
1   16:21	1   15:45 (WEA_10 (GRS))   07:22	18:17 14	07:14 (WEA_G3)   20:16	9   06:53 (WEA_06 (GRN))   21:11	1   04:51
15   08:29	15:45 (WEA_10 (GRS))   07:39	06:34	06:58 (WEA_G3)   06:18	06:42 (WEA_06 (GRN))   05:15	05:43 (WEA_03 (GRN))   04:43
1   16:23	2   15:47 (WEA_10 (GRS))   07:24	18:19 16	07:14 (WEA_G3)   20:18	12   06:54 (WEA_06 (GRN))   21:13	2   05:45 (WEA_03 (GRN))   21:52
16   08:28	15:45 (WEA_10 (GRS))   07:37	06:31	06:58 (WEA_G3)   06:15	06:40 (WEA_06 (GRN))   05:13	05:41 (WEA_03 (GRN))   04:42
1   16:25	4   15:49 (WEA_10 (GRS))   07:26	18:21 14	07:12 (WEA_G3)   20:20	15   06:55 (WEA_06 (GRN))   21:14	4   05:45 (WEA_03 (GRN))   21:52
17   08:27	15:46 (WEA_10 (GRS))   07:35	06:29	07:01 (WEA_G3)   06:13	06:37 (WEA_06 (GRN))   05:11	05:40 (WEA_03 (GRN))   04:42
1   16:27	5   15:51 (WEA_10 (GRS))   07:28	18:23 9	07:10 (WEA_G3)   20:21	18   06:55 (WEA_06 (GRN))   21:16	6   05:46 (WEA_03 (GRN))   21:53
18   08:26	15:45 (WEA_10 (GRS))   07:33	06:27	06:11	06:35 (WEA_06 (GRN))   05:10	05:38 (WEA_03 (GRN))   04:42
1   16:28	8   15:53 (WEA_10 (GRS))   07:30	18:25	20:23	21   06:56 (WEA_06 (GRN))   21:18	8   05:46 (WEA_03 (GRN))   21:53
19   08:25	15:46 (WEA_10 (GRS))   07:31	06:24	06:08	06:34 (WEA_06 (GRN))   05:08	05:37 (WEA_03 (GRN))   04:42
1   16:30	9   15:55 (WEA_10 (GRS))   07:32	18:27	20:25	22   06:56 (WEA_06 (GRN))   21:20	10   05:47 (WEA_03 (GRN))   21:54
20   08:24	15:47 (WEA_10 (GRS))   07:28	06:22	06:06	06:34 (WEA_06 (GRN))   05:06	05:35 (WEA_03 (GRN))   04:42
1   16:32	10   15:57 (WEA_10 (GRS))   07:34	18:29	20:27	22   06:56 (WEA_06 (GRN))   21:21	11   05:46 (WEA_03 (GRN))   21:54
21   08:23	15:47 (WEA_10 (GRS))   07:26	07:52 (WEA_G1)   06:19	06:04	06:33 (WEA_06 (GRN))   05:05	05:34 (WEA_03 (GRN))   04:42
1   16:34	12   15:59 (WEA_10 (GRS))   07:36	4   07:56 (WEA_G1)   18:31	20:29	21   06:54 (WEA_06 (GRN))   21:23	13   05:47 (WEA_03 (GRN))   21:54
22   08:21	15:49 (WEA_10 (GRS))   07:24	07:49 (WEA_G1)   06:17	06:01	06:34 (WEA_06 (GRN))   05:03	05:33 (WEA_03 (GRN))   04:43
1   16:36	12   16:01 (WEA_10 (GRS))   07:38	8   07:57 (WEA_G1)   18:32	20:31	20   06:54 (WEA_06 (GRN))   21:24	14   05:47 (WEA_03 (GRN))   21:54
23   08:20	15:49 (WEA_10 (GRS))   07:22	07:47 (WEA_G1)   06:14	05:59	06:24 (WEA_07 (GRN))   05:02	05:31 (WEA_03 (GRN))   04:43
1   16:38	12   16:01 (WEA_10 (GRS))   07:40	12   07:59 (WEA_G1)   18:34	20:33	21   06:53 (WEA_06 (GRN))   21:26	15   05:46 (WEA_03 (GRN))   21:55
24   08:19	15:50 (WEA_10 (GRS))   07:19	07:45 (WEA_G1)   06:12	06:35 (WEA_06 (GRN))   05:57	06:22 (WEA_07 (GRN))   05:01	05:31 (WEA_03 (GRN))   04:43
1   16:39	9   15:59 (WEA_10 (GRS))   07:42	16   08:01 (WEA_G1)   18:36	1   06:36 (WEA_06 (GRN))   20:55	22   06:52 (WEA_06 (GRN))   21:27	15   05:46 (WEA_03 (GRN))   21:55
25   08:17	15:53 (WEA_10 (GRS))   07:17	07:42 (WEA_G1)   06:09	06:33 (WEA_06 (GRN))   05:55	06:20 (WEA_07 (GRN))   04:59	05:31 (WEA_03 (GRN))   04:44
1   16:41	5   15:58 (WEA_10 (GRS))   07:44	19   08:01 (WEA_G1)   18:38	4   06:37 (WEA_06 (GRN))   20:56	22   06:51 (WEA_06 (GRN))   21:29	15   05:46 (WEA_03 (GRN))   21:55
26   08:16	07:15	07:40 (WEA_G1)   06:07	06:30 (WEA_06 (GRN))   05:52	06:18 (WEA_07 (GRN))   04:58	05:32 (WEA_03 (GRN))   04:44
1   16:43	17:46	22   08:02 (WEA_G1)   18:40	7   06:37 (WEA_06 (GRN))   20:58	19   06:49 (WEA_06 (GRN))   21:30	14   05:46 (WEA_03 (GRN))   21:55
27   08:14	07:12	07:37 (WEA_G1)   06:04	06:28 (WEA_06 (GRN))   05:50	06:16 (WEA_07 (GRN))   04:57	05:32 (WEA_03 (GRN))   04:44
1   16:45	17:48	25   08:02 (WEA_G1)   18:42	10   06:38 (WEA_06 (GRN))   20:40	17   06:47 (WEA_06 (GRN))   21:32	14   05:46 (WEA_03 (GRN))   21:55
28   08:13	07:10	07:35 (WEA_G1)   06:02	06:25 (WEA_06 (GRN))   05:48	06:15 (WEA_07 (GRN))   04:55	05:31 (WEA_03 (GRN))   04:45
1   16:47	17:50	27   08:02 (WEA_G1)   18:44	12   06:37 (WEA_06 (GRN))   20:42	10   06:25 (WEA_07 (GRN))   21:33	12   05:45 (WEA_03 (GRN))   21:54
29   08:11		06:59	07:23 (WEA_06 (GRN))   20:46	06:17 (WEA_07 (GRN))   04:54	05:34 (WEA_03 (GRN))   04:46
1   16:49		19:46	14   07:37 (WEA_06 (GRN))   20:44	6   06:23 (WEA_07 (GRN))   21:35	11   05:45 (WEA_03 (GRN))   21:54
30   08:10		06:57	16   07:36 (WEA_06 (GRN))   20:46		05:35 (WEA_03 (GRN))   04:46
1   16:51		19:47	16   07:36 (WEA_06 (GRN))   20:46		9   05:44 (WEA_03 (GRN))   21:54
31   08:08		06:54	07:21 (WEA_06 (GRN))   20:44		05:36 (WEA_03 (GRN))   04:46
1   16:53		19:49 14	07:35 (WEA_06 (GRN))   20:46		7   05:43 (WEA_03 (GRN))   21:53
Sommerscheinstunden   248	272	367	421	496	513
astr. max. mögl. Beschattung   89	133	367	567	300	3

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	Schattenanfang (WEA mit erstem Schatten)	Schattenende (WEA mit letztem Schatten)
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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 41 - IO 41 Kathenkamp 11 (Rüting)

### 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

Jul	August	September	Oktober	November	Dezember	
1   04:47	05:27	06:23	07:17	07:44 (WEA_G3)   07:16	08:12	
2   04:48	05:29	06:25	07:19	08:25 (WEA_G1)   07:18	08:14	
3   04:48	05:31	06:26	07:21	08:30 (WEA_G1)   07:20	08:15	
4   04:49	05:33	06:28	07:23	08:31 (WEA_G1)   07:22	08:17	
5   04:50	05:34	06:29	07:24	08:33 (WEA_G1)   07:24	08:18	
6   04:51	05:36	06:32	07:26	08:34 (WEA_G1)   07:26	08:19	
7   04:52	05:38	06:34	07:28	08:35 (WEA_G1)   07:28	08:21	
8   04:53	05:40	06:35	07:30	08:36 (WEA_G1)   07:30	08:22	
9   04:54	05:41	06:36	07:31	08:36 (WEA_G1)   07:31	08:23	
10   04:55	05:43	06:39	07:34	08:37 (WEA_G1)   07:34	08:25	
11   04:56	05:45	06:41	07:36	08:38 (WEA_G1)   07:36	08:26	
12   04:58	05:45 (WEA_03 (GRN))   05:47	06:43	07:37	08:39 (WEA_G1)   07:37	08:27	
13   04:59	05:44 (WEA_03 (GRN))   05:49	06:44	07:38	08:40 (WEA_G1)   07:40	08:28	
14   05:00	05:43 (WEA_03 (GRN))   05:50	06:46	07:40	08:41 (WEA_G1)   07:42	08:29	
15   05:01	05:42 (WEA_03 (GRN))   05:52	06:24 (WEA_07 (GRN))   06:46	07:41	08:42 (WEA_G1)   07:44	08:30	
16   05:03	05:41 (WEA_03 (GRN))   05:54	06:31 (WEA_07 (GRN))   06:48	07:43	08:43 (WEA_G1)   07:46	08:31	
17   05:04	05:40 (WEA_03 (GRN))   05:56	06:22 (WEA_07 (GRN))   06:50	07:45	08:44 (WEA_G1)   07:48	08:32	
18   05:05	05:39 (WEA_03 (GRN))   05:58	06:23 (WEA_07 (GRN))   06:52	07:47	08:45 (WEA_G1)   07:50	08:33	
19   05:07	05:38 (WEA_03 (GRN))   06:00	06:24 (WEA_07 (GRN))   06:54	07:49	08:46 (WEA_G1)   07:52	08:34	
20   05:08	05:37 (WEA_03 (GRN))   06:01	06:25 (WEA_07 (GRN))   06:56	07:51	08:47 (WEA_G1)   07:54	08:35	
21   05:10	05:36 (WEA_03 (GRN))   06:03	06:26 (WEA_07 (GRN))   06:58	07:53	08:48 (WEA_G1)   07:56	08:36	
22   05:11	05:35 (WEA_03 (GRN))   06:05	06:27 (WEA_07 (GRN))   07:01	07:55	08:49 (WEA_G1)   07:58	08:37	
23   05:13	05:34 (WEA_03 (GRN))   06:07	06:28 (WEA_07 (GRN))   07:02	07:57	08:50 (WEA_G1)   08:00	08:38	
24   05:14	05:33 (WEA_03 (GRN))   06:09	06:29 (WEA_07 (GRN))   07:04	07:59	08:51 (WEA_G1)   08:02	08:39	
25   05:16	05:32 (WEA_03 (GRN))   06:10	06:30 (WEA_07 (GRN))   07:06	08:01	08:52 (WEA_G1)   08:04	08:40	
26   05:18	05:31 (WEA_03 (GRN))   06:12	06:31 (WEA_07 (GRN))   07:08	07:44 (WEA_G3)   07:04	08:53 (WEA_G1)   08:06	08:41	
27   05:19	05:30 (WEA_03 (GRN))   06:14	06:32 (WEA_07 (GRN))   07:10	07:50 (WEA_G3)   07:06	08:54 (WEA_G1)   08:08	08:42	
28   05:21	05:29 (WEA_03 (GRN))   06:16	06:33 (WEA_07 (GRN))   07:11	07:53 (WEA_G3)   07:08	08:55 (WEA_G1)   08:10	08:43	
29   05:22	05:28 (WEA_03 (GRN))   06:17	06:34 (WEA_07 (GRN))   07:13	07:56 (WEA_G3)   07:10	08:56 (WEA_G1)   08:12	08:44	
30   05:24	05:27 (WEA_03 (GRN))   06:19	06:35 (WEA_07 (GRN))   07:15	07:59 (WEA_G3)   07:12	08:57 (WEA_G1)   08:14	08:45	
31   05:26	05:26 (WEA_03 (GRN))   06:21	06:36 (WEA_07 (GRN))   07:17	08:02 (WEA_G3)   07:14	08:58 (WEA_G1)   08:16	08:46	
Sommereinheiten	515	461	383	328	257	231
astr. max. mögl. Beschattung	183	279	161	569	89	8

**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: Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) Schattenrezeptor: IO 42 - IO 42 Kathenkamp 19 (Rüting) 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

Table with columns for months (Januar to Juni) and rows for days, showing sunrise/sunset times and shadowing events (e.g., 07:33 (WEA\_G2) 06:52, 07:16 (WEA\_06 (GRN)) 05:42).

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

Summary table with columns: 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)

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 42 - IO 42 Kathenkamp 19 (Rüting)

### 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

Juli		August		September		Oktober		November/Dezember			
1	04:47	05:21 (WEA 02 (GRN))	05:27	05:58 (WEA 05 (GRN))	06:23	07:08 (WEA 06 (GRN))	07:17	07:16	08:12		
	21:54	06:11 (WEA 05 (GRN))	21:18	06:17 (WEA 05 (GRN))	20:10	07:14 (WEA 06 (GRN))	18:55	18:44	15:59		
2	04:48	05:21 (WEA 02 (GRN))	05:29	06:00 (WEA 05 (GRN))	06:25	07:05 (WEA 06 (GRN))	07:19	07:18	08:14		
	21:53	06:11 (WEA 05 (GRN))	21:16	06:16 (WEA 05 (GRN))	20:08	07:16 (WEA 06 (GRN))	18:53	18:42	15:58		
3	04:48	05:22 (WEA 02 (GRN))	05:31	06:02 (WEA 05 (GRN))	06:26	07:04 (WEA 06 (GRN))	07:21	07:20	08:15		
	21:53	06:12 (WEA 05 (GRN))	21:14	06:15 (WEA 05 (GRN))	20:05	07:18 (WEA 06 (GRN))	18:50	18:40	15:57		
4	04:49	05:23 (WEA 02 (GRN))	05:33	06:03 (WEA 05 (GRN))	06:28	07:03 (WEA 06 (GRN))	07:23	07:22	08:17		
	21:52	06:13 (WEA 05 (GRN))	21:12	06:19 (WEA 03 (GRN))	20:03	07:19 (WEA 06 (GRN))	18:48	18:38	15:56		
5	04:50	05:24 (WEA 02 (GRN))	05:34	06:11 (WEA 03 (GRN))	06:30	07:01 (WEA 06 (GRN))	07:24	07:24	08:18		
	21:52	06:14 (WEA 05 (GRN))	21:10	06:21 (WEA 03 (GRN))	20:00	07:18 (WEA 06 (GRN))	18:45	18:36	15:56		
6	04:51	05:25 (WEA 02 (GRN))	05:36	06:10 (WEA 03 (GRN))	06:32	07:01 (WEA 06 (GRN))	07:26	08:09 (WEA_G2)	08:20		
	21:51	06:14 (WEA 05 (GRN))	21:08	06:22 (WEA 03 (GRN))	19:58	07:19 (WEA 06 (GRN))	18:43	06:15 (WEA_G2)	16:34		
7	04:52	05:26 (WEA 02 (GRN))	05:38	06:09 (WEA 03 (GRN))	06:34	07:01 (WEA 06 (GRN))	07:28	08:05 (WEA_G2)	08:28		
	21:50	06:15 (WEA 05 (GRN))	21:06	06:22 (WEA 03 (GRN))	19:55	07:19 (WEA 06 (GRN))	18:41	06:31 (WEA_G1)	16:32		
8	04:53	05:26 (WEA 02 (GRN))	05:40	06:10 (WEA 03 (GRN))	06:35	07:06 (WEA 06 (GRN))	07:30	08:03 (WEA_G2)	08:22		
	21:50	06:15 (WEA 05 (GRN))	21:04	06:23 (WEA 03 (GRN))	19:53	07:18 (WEA 06 (GRN))	18:38	06:34 (WEA_G1)	16:30		
9	04:54	05:27 (WEA 02 (GRN))	05:41	06:11 (WEA 03 (GRN))	06:37	07:04 (WEA 06 (GRN))	07:32	08:02 (WEA_G2)	08:23		
	21:49	06:16 (WEA 05 (GRN))	21:02	06:22 (WEA 03 (GRN))	19:50	07:17 (WEA 06 (GRN))	18:36	06:36 (WEA_G1)	16:28		
10	04:55	05:29 (WEA 02 (GRN))	05:43	06:13 (WEA 03 (GRN))	06:39	07:06 (WEA 06 (GRN))	07:34	08:01 (WEA_G2)	08:25		
	21:48	06:17 (WEA 05 (GRN))	21:00	06:23 (WEA 03 (GRN))	19:48	07:16 (WEA 06 (GRN))	18:33	06:37 (WEA_G1)	16:27		
11	04:56	05:30 (WEA 02 (GRN))	05:45	06:15 (WEA 03 (GRN))	06:41	07:08 (WEA 06 (GRN))	07:36	08:03 (WEA_G2)	08:26		
	21:47	06:18 (WEA 05 (GRN))	20:58	06:23 (WEA 03 (GRN))	19:45	07:15 (WEA 06 (GRN))	18:31	06:38 (WEA_G1)	16:25		
12	04:58	05:31 (WEA 02 (GRN))	05:47	06:16 (WEA 03 (GRN))	06:43	07:10 (WEA 06 (GRN))	07:37	08:05 (WEA_G2)	08:27		
	21:46	06:18 (WEA 05 (GRN))	20:56	06:21 (WEA 03 (GRN))	19:43	07:12 (WEA 06 (GRN))	18:29	06:38 (WEA_G1)	16:23		
13	04:59	05:32 (WEA 02 (GRN))	05:49	06:18 (WEA 03 (GRN))	06:44	07:39	07:39	08:07 (WEA_G2)	08:28		
	21:45	06:19 (WEA 05 (GRN))	20:54	06:21 (WEA 03 (GRN))	19:40	18:26	32	08:39 (WEA_G1)	16:21		
14	05:00	05:33 (WEA 02 (GRN))	05:50	06:21 (WEA 03 (GRN))	06:46	07:41	08:09 (WEA_G2)	07:42	08:29		
	21:44	06:19 (WEA 05 (GRN))	20:52	19:38	18:24	30	08:39 (WEA_G1)	16:20	15:53		
15	05:01	05:34 (WEA 02 (GRN))	05:52	06:46	07:43	08:11 (WEA_G1)	07:44	08:30	14:57 (WEA 10 (GRS))		
	21:43	06:19 (WEA 05 (GRN))	20:49	19:35	18:21	28	08:39 (WEA_G1)	16:18	15:53		
16	05:03	05:35 (WEA 02 (GRN))	05:54	06:50	07:45	08:13 (WEA_G1)	07:46	08:31	14:57 (WEA 10 (GRS))		
	21:42	06:19 (WEA 05 (GRN))	20:47	19:33	18:19	25	08:38 (WEA_G1)	16:17	15:53		
17	05:04	05:34 (WEA 02 (GRN))	05:56	06:52	07:47	08:15 (WEA_G1)	07:47	08:32	14:57 (WEA 10 (GRS))		
	21:41	06:20 (WEA 05 (GRN))	20:45	19:30	18:17	23	08:38 (WEA_G1)	16:15	15:53		
18	05:05	05:34 (WEA 02 (GRN))	05:58	06:53	07:49	08:17 (WEA_G1)	07:49	08:33	14:58 (WEA 10 (GRS))		
	21:39	06:20 (WEA 05 (GRN))	20:43	19:28	18:14	21	08:38 (WEA_G1)	16:14	15:53		
19	05:07	05:35 (WEA 02 (GRN))	05:59	06:55	07:51	08:19 (WEA_G1)	07:51	08:33	14:59 (WEA 10 (GRS))		
	21:38	06:20 (WEA 05 (GRN))	20:41	19:25	5	07:36 (WEA 08 (GRN))	18:12	18	08:37 (WEA_G1)	16:12	
20	05:08	05:34 (WEA 02 (GRN))	06:01	06:57	07:53	08:21 (WEA_G1)	07:53	08:34	14:59 (WEA 10 (GRS))		
	21:37	06:21 (WEA 05 (GRN))	20:38	19:23	10	07:38 (WEA 08 (GRN))	18:10	15	08:36 (WEA_G1)	16:11	
21	05:10	05:34 (WEA 02 (GRN))	06:03	06:59	07:55	08:26 (WEA 08 (GRN))	07:55	08:35	14:59 (WEA 10 (GRS))		
	21:35	06:21 (WEA 05 (GRN))	20:36	19:20	12	07:38 (WEA 08 (GRN))	18:08	12	08:35 (WEA_G1)	16:09	
22	05:11	05:35 (WEA 02 (GRN))	06:05	07:01	07:57	08:27 (WEA 08 (GRN))	07:57	08:35	14:59 (WEA 10 (GRS))		
	21:34	06:21 (WEA 05 (GRN))	20:34	19:18	12	07:39 (WEA 08 (GRN))	18:05	9	08:34 (WEA_G1)	16:08	
23	05:13	05:34 (WEA 02 (GRN))	06:07	07:02	07:59	08:29 (WEA 08 (GRN))	07:59	08:36	15:01 (WEA 10 (GRS))		
	21:33	06:21 (WEA 05 (GRN))	20:31	19:15	10	07:39 (WEA 08 (GRN))	18:03	5	08:32 (WEA_G1)	16:07	
24	05:14	05:34 (WEA 02 (GRN))	06:08	07:04	08:01	08:31 (WEA 08 (GRN))	08:01	08:36	15:01 (WEA 10 (GRS))		
	21:31	06:21 (WEA 05 (GRN))	20:29	19:13	8	07:39 (WEA 08 (GRN))	18:01	1	08:30 (WEA_G1)	16:06	
25	05:16	05:34 (WEA 02 (GRN))	06:10	07:06	08:02	08:33 (WEA 08 (GRN))	07:02	08:02	08:36	15:01 (WEA 10 (GRS))	
	21:29	06:21 (WEA 05 (GRN))	20:27	8	06:47 (WEA 07 (GRN))	19:10	5	07:38 (WEA 08 (GRN))	18:59	14:57 (WEA 10 (GRS))	
26	05:18	05:34 (WEA 02 (GRN))	06:12	07:08	08:04	08:34 (WEA 08 (GRN))	07:04	08:04	08:37	15:02 (WEA 10 (GRS))	
	21:28	06:21 (WEA 05 (GRN))	20:24	8	06:48 (WEA 07 (GRN))	19:08	2	07:36 (WEA 08 (GRN))	18:56	14:57 (WEA 10 (GRS))	
27	05:19	05:35 (WEA 02 (GRN))	06:14	07:10	08:06	08:35 (WEA 08 (GRN))	07:06	08:06	08:37	15:03 (WEA 10 (GRS))	
	21:26	06:21 (WEA 05 (GRN))	20:22	6	06:48 (WEA 07 (GRN))	19:05	16:54	16:02	15:58	13	15:16 (WEA 10 (GRS))
28	05:21	05:35 (WEA 02 (GRN))	06:16	07:11	08:08	08:36 (WEA 08 (GRN))	07:08	08:07	08:37	14:57 (WEA 10 (GRS))	
	21:25	06:20 (WEA 05 (GRN))	20:20	5	06:49 (WEA 07 (GRN))	19:03	16:52	16:01	15:57	14	15:17 (WEA 10 (GRS))
29	05:22	05:36 (WEA 02 (GRN))	06:17	07:13	08:10	08:37 (WEA 08 (GRN))	07:10	08:09	08:37	15:04 (WEA 10 (GRS))	
	21:23	06:20 (WEA 05 (GRN))	20:17	3	06:48 (WEA 07 (GRN))	19:00	16:50	16:00	16:00	13	15:17 (WEA 10 (GRS))
30	05:24	05:36 (WEA 02 (GRN))	06:19	07:15	08:12	08:38 (WEA 08 (GRN))	07:12	08:11	08:37	15:05 (WEA 10 (GRS))	
	21:21	06:19 (WEA 05 (GRN))	20:15	18:58	16:48	15:59	16:01	16:01	16:01	12	15:17 (WEA 10 (GRS))
31	05:26	05:37 (WEA 02 (GRN))	06:21	07:14	08:14	08:37 (WEA 08 (GRN))	07:14	08:14	08:37	15:05 (WEA 10 (GRS))	
	21:19	06:18 (WEA 05 (GRN))	20:12	18:56	16:46	16:02	16:02	16:02	16:02	12	15:17 (WEA 10 (GRS))
Sonnenscheinstunden		515	461	383	211	417	257	231	314		
astr.max.mögl.Beschattung		856	179	211	417	257	231	314			

**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:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 43 - IO 43 Kathenkamp 2 (Rüting)

### 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	08:37	08:06			07:08	07:33 (WEA_G1)	06:52			06:08 (WEA_05 (GRN))	04:51
	16:03	16:55			17:52	07:52 (WEA_G1)	19:51			06:18 (WEA_05 (GRN))	21:39
2	08:37	08:04			07:05	07:30 (WEA_G1)	06:49			06:08 (WEA_05 (GRN))	04:50
	16:04	16:57			17:54	07:51 (WEA_G1)	19:53			06:19 (WEA_05 (GRN))	21:40
3	08:37	08:03			07:03	07:28 (WEA_G1)	06:47			06:04 (WEA_05 (GRN))	04:49
	16:05	16:59			17:56	07:51 (WEA_G1)	19:55			06:19 (WEA_05 (GRN))	21:41
4	08:37	08:01			07:01	07:25 (WEA_G2)	06:44			06:02 (WEA_05 (GRN))	04:48
	16:07	17:01			17:58	07:50 (WEA_G1)	19:57			06:20 (WEA_05 (GRN))	21:42
5	08:36	07:59			06:58	07:23 (WEA_G2)	06:42			06:00 (WEA_05 (GRN))	04:48
	16:08	17:03			18:00	07:50 (WEA_G1)	19:59			06:20 (WEA_05 (GRN))	21:43
6	08:36	07:57			06:56	07:20 (WEA_G2)	06:39			05:59 (WEA_05 (GRN))	04:47
	16:09	17:05			18:02	07:48 (WEA_G1)	20:01			06:20 (WEA_05 (GRN))	21:44
7	08:35	07:55			06:54	07:19 (WEA_G2)	06:37			05:59 (WEA_05 (GRN))	04:46
	16:11	17:07			18:04	07:47 (WEA_G1)	20:03			06:20 (WEA_05 (GRN))	21:45
8	08:35	07:53			06:51	07:18 (WEA_G2)	06:35			05:58 (WEA_05 (GRN))	04:46
	16:12	17:09			18:06	07:45 (WEA_G1)	20:04			06:19 (WEA_05 (GRN))	21:46
9	08:34	07:51			06:49	07:21 (WEA_G2)	06:32			05:59 (WEA_05 (GRN))	04:45
	16:14	17:11			18:08	07:43 (WEA_G1)	20:06			06:20 (WEA_05 (GRN))	21:47
10	08:34	07:49			06:46		06:30			05:59 (WEA_05 (GRN))	04:44
	16:15	17:13			18:09		20:08			06:19 (WEA_05 (GRN))	21:48
11	08:33	07:47			06:44		06:27			05:59 (WEA_05 (GRN))	04:44
	16:17	17:16			18:11		20:10			06:19 (WEA_05 (GRN))	21:49
12	08:32	07:45			06:41		06:25			05:59 (WEA_05 (GRN))	04:44
	16:18	17:18			18:13		20:12			06:18 (WEA_05 (GRN))	21:50
13	08:31	07:43			06:39		06:22			06:01 (WEA_05 (GRN))	04:43
	16:20	17:20			18:15		20:14			06:18 (WEA_05 (GRN))	21:50
14	08:30	07:41			06:36		06:20			06:01 (WEA_05 (GRN))	04:43
	16:21	17:22			18:17		20:16			06:16 (WEA_05 (GRN))	21:51
15	08:29	07:39			06:34		06:18			06:03 (WEA_05 (GRN))	04:43
	16:23	17:24			18:19		20:18			06:16 (WEA_05 (GRN))	21:52
16	08:28	07:37			06:31		06:15			06:04 (WEA_05 (GRN))	04:42
	16:25	17:26			18:21		20:20			06:14 (WEA_05 (GRN))	21:52
17	08:27	07:35			06:29		06:13			05:40 (WEA_02 (GRN))	04:42
	16:27	17:28			18:23		20:21			06:11 (WEA_05 (GRN))	21:53
18	08:26	07:33			06:27		06:11			05:38 (WEA_02 (GRN))	04:42
	16:28	17:30			18:25		20:23			06:11 (WEA_05 (GRN))	21:53
19	08:25	07:31			06:24		06:08			05:37 (WEA_02 (GRN))	04:42
	16:30	17:32			18:27		20:25			05:42 (WEA_02 (GRN))	21:54
20	08:24	07:28			06:22		06:06			05:35 (WEA_02 (GRN))	04:42
	16:32	17:34			18:29	06:45 (WEA_08 (GRN))	20:27			05:42 (WEA_02 (GRN))	21:54
21	08:23	07:26			06:19	06:43 (WEA_08 (GRN))	06:04			05:34 (WEA_02 (GRN))	04:43
	16:34	17:36			18:31	06:47 (WEA_08 (GRN))	20:29			05:43 (WEA_02 (GRN))	21:54
22	08:21	07:24			06:17	06:40 (WEA_08 (GRN))	06:01			05:33 (WEA_02 (GRN))	04:43
	16:36	17:38			18:32	06:46 (WEA_08 (GRN))	20:31			05:43 (WEA_02 (GRN))	21:54
23	08:20	07:22			06:14	06:38 (WEA_08 (GRN))	05:59			05:32 (WEA_02 (GRN))	04:43
	16:38	17:40			18:34	06:46 (WEA_08 (GRN))	20:33			05:44 (WEA_02 (GRN))	21:55
24	08:19	07:19			06:12	06:35 (WEA_08 (GRN))	05:57			05:30 (WEA_02 (GRN))	04:43
	16:39	17:42			18:36	06:44 (WEA_08 (GRN))	20:35			05:43 (WEA_02 (GRN))	21:55
25	08:17	07:17			06:09	06:37 (WEA_08 (GRN))	05:55			05:29 (WEA_02 (GRN))	04:44
	16:41	17:44			18:38	06:42 (WEA_08 (GRN))	20:36			20:55 (WEA_33 (LR))	21:55
26	08:16	07:15			06:07		05:52			05:29 (WEA_02 (GRN))	04:44
	16:43	17:46			18:40		20:38			20:56 (WEA_33 (LR))	21:55
27	08:14	07:12			06:04		05:50			05:28 (WEA_02 (GRN))	04:44
	16:45	17:48			18:42		20:40			20:58 (WEA_33 (LR))	21:55
28	08:13	07:10			06:02		05:48			05:29 (WEA_02 (GRN))	04:45
	16:47	17:50			18:44		20:42			20:59 (WEA_33 (LR))	21:54
29	08:11				06:59		05:46			05:29 (WEA_02 (GRN))	04:46
	16:49				19:46		20:44			05:43 (WEA_02 (GRN))	21:54
30	08:10				06:57		05:44			05:30 (WEA_02 (GRN))	04:46
	16:51				19:48		20:46			05:42 (WEA_02 (GRN))	21:54
31	08:08				06:54		05:42			05:30 (WEA_02 (GRN))	21:54
	16:53				19:49		21:37			05:42 (WEA_02 (GRN))	21:54
Sonnenscheinstunden		246	272		367		421		496		513
astr.max.mögl.Beschattung			49		253		113		439		26

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:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 43 - IO 43 Kathenkamp 2 (Rüting)

### 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

Juli		August		September		Oktober		November		Dezember	
1	04:47										
	21:54										
2	04:48										
	21:53										
3	04:48										
	21:53										
4	04:49										
	21:52										
5	04:50										
	21:52										
6	04:51										
	21:51										
7	04:52										
	21:50										
8	04:53										
	21:50										
9	04:54										
	21:49										
10	04:55										
	21:48										
11	04:56										
	21:47										
12	04:58										
	21:46										
13	04:59										
	21:45										
14	05:00										
	21:44										
15	05:01										
	21:43										
16	05:03										
	21:42										
17	05:04										
	21:41										
18	05:05										
	21:39										
19	05:07										
	21:38										
20	05:08										
	21:37										
21	05:10										
	21:35										
22	05:11										
	21:34										
23	05:13										
	21:33										
24	05:14										
	21:31										
25	05:16										
	21:29										
26	05:18										
	21:28										
27	05:19										
	21:26										
28	05:21										
	21:25										
29	05:22										
	21:23										
30	05:24										
	21:21										
31	05:26										
	21:19										
Sonnenscheinstunden		515									
astr.max.mögl.Beschattung		248									
			461			383		123		328	276
			242							257	231

**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:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 44 - IO 44 Kälberhof 5 (Rüting)

### 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   08:37   15:06 (WEA 10 (GRS))   08:06		07:08	07:33 (WEA_G1)   06:52	05:42	04:51
16:03   17   15:25 (WEA 10 (GRS))   16:55		17:52   18	07:51 (WEA_G1)   19:51	20:40	21:39
2   08:37   15:09 (WEA 10 (GRS))   08:04		07:05	07:30 (WEA_G1)   06:49	05:39	04:50
16:04   17   15:26 (WEA 10 (GRS))   16:57		17:54   21	07:51 (WEA_G1)   19:53	20:49	21:40
3   08:37   15:09 (WEA 10 (GRS))   08:03		07:03	07:28 (WEA_G1)   06:47	05:37	04:49
16:05   17   15:26 (WEA 10 (GRS))   16:59		17:56   23	07:51 (WEA_G1)   19:55	20:51	21:41
4   08:37   15:10 (WEA 10 (GRS))   08:01		07:01	07:25 (WEA_G1)   06:44	05:35	04:48
16:07   17   15:27 (WEA 10 (GRS))   17:01		17:58   25	07:50 (WEA_G1)   19:57	20:53	21:42
5   08:36   15:11 (WEA 10 (GRS))   07:59		06:56	07:23 (WEA_G1)   06:42	05:33	04:48
16:08   15   15:26 (WEA 10 (GRS))   17:03		18:00   28	07:51 (WEA_G1)   19:59	20:55	21:43
6   08:36   15:12 (WEA 10 (GRS))   07:57		06:56	07:20 (WEA_G2)   06:39	05:31	04:47
16:09   15   15:27 (WEA 10 (GRS))   17:05		18:02   30	07:50 (WEA_G1)   20:01	20:57	21:44
7   08:35   15:12 (WEA 10 (GRS))   07:53		06:53	07:18 (WEA_G2)   06:37	05:29	04:46
16:11   15   15:27 (WEA 10 (GRS))   17:07		18:04   31	07:49 (WEA_G1)   20:03	20:59	21:45
8   08:35   15:13 (WEA 10 (GRS))   07:53		06:51	07:15 (WEA_G2)   06:35	05:27	04:46
16:12   14   15:27 (WEA 10 (GRS))   17:09		18:06   33	07:48 (WEA_G1)   20:04	21:00	21:46
9   08:34   15:14 (WEA 10 (GRS))   07:51		06:49	07:12 (WEA_G2)   06:32	05:25	04:45
16:14   12   15:26 (WEA 10 (GRS))   17:11		18:08   32	07:47 (WEA_G1)   20:06	21:02	21:47
10   08:33   15:15 (WEA 10 (GRS))   07:49		06:46	07:16 (WEA_G2)   06:30	05:24	04:44
16:15   11   15:26 (WEA 10 (GRS))   17:13		18:09   29	07:45 (WEA_G1)   20:08	21:04	21:48
11   08:33   15:16 (WEA 10 (GRS))   07:47		06:44	07:18 (WEA_G2)   06:27	05:22	04:44
16:17   9   15:25 (WEA 10 (GRS))   17:16		18:11   26	07:44 (WEA_G1)   20:10	21:06	21:49
12   08:32   15:18 (WEA 10 (GRS))   07:45		06:41	07:20 (WEA_G2)   06:25	05:20	04:44
16:18   6   15:24 (WEA 10 (GRS))   17:18		18:13   19	07:41 (WEA_G1)   20:12	21:08	21:50
13   08:31   15:20	07:43	18:15	07:14 (WEA_G2)   06:22	05:18	04:43
14   08:30   15:21	07:41	18:17	06:46 (WEA_G2)   06:23	05:16	04:43
15   08:29   15:22	07:39	18:19	06:47 (WEA_G2)   06:24	05:15	04:43
16   08:28   15:23	07:37	18:21	06:48 (WEA_G2)   06:25	05:14	04:42
17   08:27   15:24	07:35	18:23	06:49 (WEA_G2)   06:26	05:13	04:42
18   08:26   15:25	07:33	18:25	06:50 (WEA_G2)   06:27	05:12	04:42
19   08:25   15:26	07:31	18:27	06:51 (WEA_G2)   06:28	05:11	04:42
20   08:24   15:27	07:29	18:29	06:52 (WEA_G2)   06:29	05:10	04:42
21   08:23   15:28	07:27	18:31	06:53 (WEA_G2)   06:30	05:09	04:42
22   08:22   15:29	07:25	18:33	06:54 (WEA_G2)   06:31	05:08	04:42
23   08:21   15:30	07:23	18:35	06:55 (WEA_G2)   06:32	05:07	04:42
24   08:20   15:31	07:21	18:37	06:56 (WEA_G2)   06:33	05:06	04:42
25   08:19   15:32	07:19	18:39	06:57 (WEA_G2)   06:34	05:05	04:42
26   08:18   15:33	07:17	18:41	06:58 (WEA_G2)   06:35	05:04	04:42
27   08:17   15:34	07:15	18:43	06:59 (WEA_G2)   06:36	05:03	04:42
28   08:16   15:35	07:13	18:45	07:00 (WEA_G2)   06:37	05:02	04:42
29   08:15   15:36	07:11	18:47	07:01 (WEA_G2)   06:38	05:01	04:42
30   08:14   15:37	07:09	18:49	07:02 (WEA_G2)   06:39	05:00	04:42
31   08:13   15:38	07:07	18:51	07:03 (WEA_G2)   06:40	04:59	04:42
Sommereinheiten   248					
astr. max. mögl. Beschattung   165	272	367	421	496	513

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	Schattenanfang (WEA mit erstem Schatten)	Schattenende (WEA mit letztem Schatten)
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Projekt:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0

Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 44 - IO 44 Kälberhof 5 (Rüting)

### 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

Juli		August		September		Oktober		November		Dezember	
1	04:47	05:21 (WEA 02 (GRN))	05:28	05:59 (WEA 03 (GRN))	06:23	06:50 (WEA 05 (GRN))	07:17	08:09 (WEA_G1)	07:16	08:12	14:58 (WEA 10 (GR5))
2	04:48	05:21 (WEA 02 (GRN))	05:29	06:00 (WEA 03 (GRN))	06:25	06:52 (WEA 05 (GRN))	07:19	07:58 (WEA_G2)	07:18	08:14	14:58 (WEA 10 (GR5))
3	04:48	05:22 (WEA 02 (GRN))	05:31	06:02 (WEA 03 (GRN))	06:26	06:54 (WEA 05 (GRN))	07:21	07:54 (WEA_G2)	07:20	08:15	14:58 (WEA 10 (GR5))
4	04:49	05:24 (WEA 05 (GRN))	05:33	06:03 (WEA 03 (GRN))	06:28	06:56 (WEA 05 (GRN))	07:23	07:53 (WEA_G2)	07:22	08:17	14:57 (WEA 10 (GR5))
5	04:50	05:24 (WEA 05 (GRN))	05:34	06:05 (WEA 03 (GRN))	06:30	06:59 (WEA 05 (GRN))	07:24	07:52 (WEA_G1)	07:24	08:18	14:57 (WEA 10 (GR5))
6	04:51	05:24 (WEA 05 (GRN))	05:36	06:07 (WEA 03 (GRN))	06:32	07:02 (WEA 06 (GRN))	07:26	07:53 (WEA_G2)	07:26	08:20	14:57 (WEA 10 (GR5))
7	04:52	05:25 (WEA 05 (GRN))	05:38	06:08 (WEA 03 (GRN))	06:34	07:04 (WEA 06 (GRN))	07:28	07:55 (WEA_G2)	07:28	08:21	14:58 (WEA 10 (GR5))
8	04:53	05:25 (WEA 05 (GRN))	05:40	06:10 (WEA 03 (GRN))	06:35	07:06 (WEA 06 (GRN))	07:30	07:57 (WEA_G2)	07:30	08:22	14:57 (WEA 10 (GR5))
9	04:54	05:25 (WEA 05 (GRN))	05:41	06:11 (WEA 03 (GRN))	06:37	07:08 (WEA 06 (GRN))	07:32	07:59 (WEA_G1)	07:32	08:23	14:58 (WEA 10 (GR5))
10	04:55	05:25 (WEA 05 (GRN))	05:43	06:12 (WEA 03 (GRN))	06:39	07:10 (WEA 06 (GRN))	07:34	08:01 (WEA_G1)	07:34	08:25	14:58 (WEA 10 (GR5))
11	04:56	05:25 (WEA 05 (GRN))	05:45	06:13 (WEA 03 (GRN))	06:41	07:12 (WEA 06 (GRN))	07:36	08:03 (WEA_G1)	07:36	08:26	14:58 (WEA 10 (GR5))
12	04:58	05:25 (WEA 05 (GRN))	05:47	06:14 (WEA 03 (GRN))	06:43	07:14 (WEA 06 (GRN))	07:38	08:05 (WEA_G1)	07:38	08:27	14:59 (WEA 10 (GR5))
13	04:59	05:25 (WEA 05 (GRN))	05:49	06:15 (WEA 03 (GRN))	06:44	07:16 (WEA 06 (GRN))	07:40	08:07 (WEA_G1)	07:40	08:28	14:59 (WEA 10 (GR5))
14	05:00	05:26 (WEA 05 (GRN))	05:50	06:16 (WEA 03 (GRN))	06:46	07:18 (WEA 06 (GRN))	07:42	08:09 (WEA_G1)	07:42	08:29	14:59 (WEA 10 (GR5))
15	05:01	05:26 (WEA 05 (GRN))	05:52	06:17 (WEA 03 (GRN))	06:48	07:20 (WEA 06 (GRN))	07:44	08:11 (WEA_G1)	07:44	08:30	15:00 (WEA 10 (GR5))
16	05:03	05:26 (WEA 05 (GRN))	05:54	06:18 (WEA 03 (GRN))	06:50	07:22 (WEA 06 (GRN))	07:46	08:13 (WEA_G1)	07:46	08:31	15:00 (WEA 10 (GR5))
17	05:04	05:27 (WEA 05 (GRN))	05:56	06:19 (WEA 03 (GRN))	06:52	07:24 (WEA 06 (GRN))	07:48	08:15 (WEA_G1)	07:48	08:32	15:01 (WEA 10 (GR5))
18	05:05	05:28 (WEA 05 (GRN))	05:58	06:20 (WEA 03 (GRN))	06:53	07:26 (WEA 06 (GRN))	07:49	08:17 (WEA_G1)	07:49	08:33	15:01 (WEA 10 (GR5))
19	05:07	05:29 (WEA 05 (GRN))	05:59	06:21 (WEA 03 (GRN))	06:55	07:28 (WEA 06 (GRN))	07:51	08:19 (WEA_G1)	07:51	08:34	15:02 (WEA 10 (GR5))
20	05:08	05:31 (WEA 05 (GRN))	06:01	06:22 (WEA 03 (GRN))	06:57	07:30 (WEA 06 (GRN))	07:53	08:21 (WEA_G1)	07:53	08:35	15:03 (WEA 10 (GR5))
21	05:10	05:32 (WEA 05 (GRN))	06:03	06:23 (WEA 03 (GRN))	06:59	07:32 (WEA 06 (GRN))	07:55	08:23 (WEA_G1)	07:55	08:36	15:04 (WEA 10 (GR5))
22	05:11	05:33 (WEA 05 (GRN))	06:05	06:24 (WEA 03 (GRN))	07:01	07:34 (WEA 06 (GRN))	07:57	08:25 (WEA_G1)	07:57	08:37	15:04 (WEA 10 (GR5))
23	05:13	05:34 (WEA 05 (GRN))	06:07	06:25 (WEA 03 (GRN))	07:02	07:36 (WEA 06 (GRN))	07:59	08:27 (WEA_G1)	07:59	08:38	15:05 (WEA 10 (GR5))
24	05:14	05:35 (WEA 05 (GRN))	06:08	06:26 (WEA 03 (GRN))	07:04	07:38 (WEA 06 (GRN))	08:01	08:29 (WEA_G1)	08:01	08:39	15:05 (WEA 10 (GR5))
25	05:16	05:36 (WEA 05 (GRN))	06:10	06:27 (WEA 03 (GRN))	07:06	07:40 (WEA 06 (GRN))	08:03	08:31 (WEA_G1)	08:03	08:40	15:06 (WEA 10 (GR5))
26	05:18	05:37 (WEA 05 (GRN))	06:12	06:28 (WEA 03 (GRN))	07:08	07:42 (WEA 06 (GRN))	08:05	08:33 (WEA_G1)	08:05	08:41	15:06 (WEA 10 (GR5))
27	05:19	05:38 (WEA 05 (GRN))	06:14	06:29 (WEA 03 (GRN))	07:10	07:44 (WEA 06 (GRN))	08:07	08:35 (WEA_G1)	08:07	08:42	15:07 (WEA 10 (GR5))
28	05:21	05:39 (WEA 05 (GRN))	06:16	06:30 (WEA 03 (GRN))	07:12	07:46 (WEA 06 (GRN))	08:09	08:37 (WEA_G1)	08:09	08:43	15:07 (WEA 10 (GR5))
29	05:22	05:40 (WEA 05 (GRN))	06:17	06:31 (WEA 03 (GRN))	07:13	07:48 (WEA 06 (GRN))	08:11	08:39 (WEA_G1)	08:11	08:44	15:08 (WEA 10 (GR5))
30	05:24	05:41 (WEA 05 (GRN))	06:19	06:32 (WEA 03 (GRN))	07:15	07:50 (WEA 06 (GRN))	08:13	08:41 (WEA_G1)	08:13	08:45	15:08 (WEA 10 (GR5))
31	05:25	05:42 (WEA 05 (GRN))	06:21	06:33 (WEA 03 (GRN))	07:16	07:52 (WEA 06 (GRN))	08:15	08:43 (WEA_G1)	08:15	08:46	15:09 (WEA 10 (GR5))
	05:26	05:43 (WEA 05 (GRN))	06:22	06:34 (WEA 03 (GRN))	07:17	07:54 (WEA 06 (GRN))	08:17	08:45 (WEA_G1)	08:17	08:47	15:09 (WEA 10 (GR5))
	05:27	05:44 (WEA 05 (GRN))	06:23	06:35 (WEA 03 (GRN))	07:18	07:56 (WEA 06 (GRN))	08:19	08:47 (WEA_G1)	08:19	08:48	15:10 (WEA 10 (GR5))
	05:28	05:45 (WEA 05 (GRN))	06:24	06:36 (WEA 03 (GRN))	07:19	07:58 (WEA 06 (GRN))	08:21	08:49 (WEA_G1)	08:21	08:49	15:10 (WEA 10 (GR5))
	05:29	05:46 (WEA 05 (GRN))	06:25	06:37 (WEA 03 (GRN))	07:20	08:00 (WEA 06 (GRN))	08:23	08:51 (WEA_G1)	08:23	08:50	15:11 (WEA 10 (GR5))
	05:30	05:47 (WEA 05 (GRN))	06:26	06:38 (WEA 03 (GRN))	07:21	08:02 (WEA 06 (GRN))	08:25	08:53 (WEA_G1)	08:25	08:51	15:11 (WEA 10 (GR5))
	05:31	05:48 (WEA 05 (GRN))	06:27	06:39 (WEA 03 (GRN))	07:22	08:04 (WEA 06 (GRN))	08:27	08:55 (WEA_G1)	08:27	08:52	15:12 (WEA 10 (GR5))
	05:32	05:49 (WEA 05 (GRN))	06:28	06:40 (WEA 03 (GRN))	07:23	08:06 (WEA 06 (GRN))	08:29	08:57 (WEA_G1)	08:29	08:53	15:12 (WEA 10 (GR5))
	05:33	05:50 (WEA 05 (GRN))	06:29	06:41 (WEA 03 (GRN))	07:24	08:08 (WEA 06 (GRN))	08:31	08:59 (WEA_G1)	08:31	08:54	15:13 (WEA 10 (GR5))
	05:34	05:51 (WEA 05 (GRN))	06:30	06:42 (WEA 03 (GRN))	07:25	08:10 (WEA 06 (GRN))	08:33	09:01 (WEA_G1)	08:33	08:55	15:13 (WEA 10 (GR5))
	05:35	05:52 (WEA 05 (GRN))	06:31	06:43 (WEA 03 (GRN))	07:26	08:12 (WEA 06 (GRN))	08:35	09:03 (WEA_G1)	08:35	08:56	15:14 (WEA 10 (GR5))
	05:36	05:53 (WEA 05 (GRN))	06:32	06:44 (WEA 03 (GRN))	07:27	08:14 (WEA 06 (GRN))	08:37	09:05 (WEA_G1)	08:37	08:57	15:14 (WEA 10 (GR5))
	05:37	05:54 (WEA 05 (GRN))	06:33	06:45 (WEA 03 (GRN))	07:28	08:16 (WEA 06 (GRN))	08:39	09:07 (WEA_G1)	08:39	08:58	15:15 (WEA 10 (GR5))
	05:38	05:55 (WEA 05 (GRN))	06:34	06:46 (WEA 03 (GRN))	07:29	08:18 (WEA 06 (GRN))	08:41	09:09 (WEA_G1)	08:41	08:59	15:15 (WEA 10 (GR5))
	05:39	05:56 (WEA 05 (GRN))	06:35	06:47 (WEA 03 (GRN))	07:30	08:20 (WEA 06 (GRN))	08:43	09:11 (WEA_G1)	08:43	09:00	15:16 (WEA 10 (GR5))
	05:40	05:57 (WEA 05 (GRN))	06:36	06:48 (WEA 03 (GRN))	07:31	08:22 (WEA 06 (GRN))	08:45	09:13 (WEA_G1)	08:45	09:01	15:16 (WEA 10 (GR5))
	05:41	05:58 (WEA 05 (GRN))	06:37	06:49 (WEA 03 (GRN))	07:32	08:24 (WEA 06 (GRN))	08:47	09:15 (WEA_G1)	08:47	09:02	15:17 (WEA 10 (GR5))
	05:42	05:59 (WEA 05 (GRN))	06:38	06:50 (WEA 03 (GRN))	07:33	08:26 (WEA 06 (GRN))	08:49	09:17 (WEA_G1)	08:49	09:03	15:17 (WEA 10 (GR5))
	05:43	06:00 (WEA 05 (GRN))	06:39	06:51 (WEA 03 (GRN))	07:34	08:28 (WEA 06 (GRN))	08:51	09:19 (WEA_G1)	08:51	09:04	15:18 (WEA 10 (GR5))
	05:44	06:01 (WEA 05 (GRN))	06:40	06:52 (WEA 03 (GRN))	07:35	08:30 (WEA 06 (GRN))	08:53	09:21 (WEA_G1)	08:53	09:05	15:18 (WEA 10 (GR5))
	05:45	06:02 (WEA 05 (GRN))	06:41	06:53 (WEA 03 (GRN))	07:36	08:32 (WEA 06 (GRN))	08:55	09:23 (WEA_G1)	08:55	09:06	15:19 (WEA 10 (GR5))
	05:46	06:03 (WEA 05 (GRN))	06:42	06:54 (WEA 03 (GRN))	07:37	08:34 (WEA 06 (GRN))	08:57	09:25 (WEA_G1)	08:57	09:07	15:19 (WEA 10 (GR5))
	05:47	06:04 (WEA 05 (GRN))	06:43	06:55 (WEA 03 (GRN))	07:38	08:36 (WEA 06 (GRN))	08:59	09:27 (WEA_G1)	08:59	09:08	15:20 (WEA 10 (GR5))
	05:48	06:05 (WEA 05 (GRN))	06:44	06:56 (WEA 03 (GRN))	07:39	08:38 (WEA 06 (GRN))	09:01	09:29 (WEA_G1)	09:01	09:09	15:20 (WEA 10 (GR5))
	05:49	06:06 (WEA 05 (GRN))	06:45	06:57 (WEA 03 (GRN))	07:40	08:40 (WEA 06 (GRN))	09:03	09:31 (WEA_G1)	09:03	09:10	15:21 (WEA 10 (GR5))
	05:50	06:07 (WEA 05 (GRN))	06:46	06:58 (WEA 03 (GRN))	07:41	08:42 (WEA 06 (GRN))	09:05	09:33 (WEA_G1)	09:05	09:11	15:21 (WEA 10 (GR5))
	05:51	06:08 (WEA 05 (GRN))	06:47	06:59 (WEA 03 (GRN))	07:42	08:44 (WEA 06 (GRN))	09:07	09:35 (WEA_G1)	09:07	09:12	15:22 (WEA 10 (GR5))
	05:52	06:09 (WEA 05 (GRN))	06:48	07:00 (WEA 03 (GRN))	07:43	08:46 (WEA 06 (GRN))	09:09	09:37 (WEA_G1)	09:09	09:13	15:22 (WEA 10 (GR5))
	05:53	06:10 (WEA 05 (GRN))	06:49	07:01 (WEA 03 (GRN))	07:44	08:48 (WEA 06 (GRN))	09:11	09:39 (WEA_G1)	09:11	09:14	15:23 (WEA 10 (GR5))
	05:54	06:11 (WEA 05 (GRN))	06:50	07:02 (WEA 03 (GRN))	07:45	08:50 (WEA 06 (GRN))	09:13	09:41 (WEA_G1)	09:13	09:15	15:23 (WEA 10 (GR5))
	05:55	06:12 (WEA 05 (GRN))	06:51	07:03 (WEA 03 (GRN))	07:46	08:52 (WEA 06 (GRN))	09:15	09:43 (WEA_G1)	09:15	09:16	15:24 (WEA 10 (GR5))
	05:56	06:13 (WEA 05 (GRN))	06:52	07:04 (WEA 03 (GRN))	07:47	08:54 (WEA 06 (GRN))	09:17	09:45 (WEA_G1)	09:17	09:17	15:24 (WEA 10 (GR5))
	05:57	06:14 (WEA 05 (GRN))	06:53	07:05 (WEA 03 (GRN))	07:48	08:56 (WEA 06 (GRN))	09:19	09:47 (WEA_G1)	09:19	09:18	15:25 (WEA 10 (GR5))
	05:58	06:15 (WEA 05 (GRN))	06:54	07:06 (WEA 03 (GRN))	07:49	08:58 (WEA 06 (GRN))	09:21	09:49 (WEA_G1)	09:21	09:19	15:25 (WEA 10 (GR5))
	05:59	06:16 (WEA 05 (GRN))	06:55	07:07 (WEA 03 (GRN))	07:50	09:00 (WEA 06 (GRN))	09:23	09:51 (WEA_G1)	09:23	09:20	15:26 (WEA 10 (GR5))
	06:00	06:17 (WEA 05 (GRN))	06:56	07:08 (WEA 03 (GRN))	07:51	09:02 (WEA 06 (GRN))	09:25	09:53 (WEA_G1)	09:25	09:21	15:26 (WEA 10 (GR5))
	06:01	06:18 (WEA 05 (GRN))	06:57	07:09 (WEA 03 (GRN))	07:52	09:04 (WEA 06 (GRN))	09:27	09:55 (WEA_G1)	09:27	09:22	15:27 (WEA 10 (GR5))
	06:02	06:19 (WEA 05 (GRN))	06:58	07:10 (WEA 03 (GRN))	07:53	09:06 (WEA 06 (GRN))	09:29	09:57 (WEA_G1)	09:29	09:23	15:27 (WEA 10 (GR5))
	06:03	06:20 (WEA 05 (GRN))	06:59	07:11 (WEA 03 (GRN))	07:54	09:08 (WEA 06 (GRN))	09:31	09:59 (WEA_G1)	09:31	09:24	15:28 (WEA 10 (GR5))
	06:04	06:21 (WEA 05 (GRN))	07:00	07:12 (WEA 03 (GRN							

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 45 - IO 45 Bäderstraße 20-22 (Kabelhorst)  
**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	08:37	09:12 (WEA 12 (GRS))	08:06	07:08	06:52	05:42		04:51
	16:03	2 09:14 (WEA 12 (GRS))	16:55	17:52	19:51	20:48		21:39
2	08:37	09:12 (WEA 12 (GRS))	08:04	07:05	06:49	05:40		04:50
	16:04	3 09:15 (WEA 12 (GRS))	16:57	17:54	19:53	20:49		21:40
3	08:37	09:11 (WEA 12 (GRS))	08:03	07:03	06:47	05:37		04:49
	16:05	5 09:16 (WEA 12 (GRS))	16:59	17:56	19:55	20:51		21:41
4	08:37	09:11 (WEA 12 (GRS))	08:01	07:01	06:44	05:35	06:02 (WEA 03 (GRN))	04:48
	16:07	6 09:17 (WEA 12 (GRS))	17:01	17:58	19:57	20:53	1 06:03 (WEA 03 (GRN))	21:42
5	08:36	09:10 (WEA 12 (GRS))	07:59	06:58	06:42	05:33	06:00 (WEA 03 (GRN))	04:48
	16:08	8 09:18 (WEA 12 (GRS))	17:03	18:00	19:59	20:55	2 06:02 (WEA 03 (GRN))	21:43
6	08:36	09:10 (WEA 12 (GRS))	07:57	06:56	06:39	05:31		04:47
	16:09	9 09:19 (WEA 12 (GRS))	17:05	18:02	20:01	20:57		21:44
7	08:35	09:09 (WEA 12 (GRS))	07:55	06:54	06:37	05:29	05:56 (WEA 05 (GRN))	04:46
	16:11	11 09:20 (WEA 12 (GRS))	17:07	18:04	20:03	20:59	2 05:58 (WEA 05 (GRN))	21:45
8	08:35	09:08 (WEA 12 (GRS))	07:53	06:51	06:35	05:27	05:54 (WEA 05 (GRN))	04:46
	16:12	12 09:20 (WEA 12 (GRS))	17:09	18:06	20:04	21:00	4 05:58 (WEA 05 (GRN))	21:46
9	08:34	09:07 (WEA 12 (GRS))	07:51	06:49	06:32	05:25	05:53 (WEA 05 (GRN))	04:45
	16:14	14 09:21 (WEA 12 (GRS))	17:11	18:08	20:06	21:02	5 05:58 (WEA 05 (GRN))	21:47
10	08:34	09:06 (WEA 12 (GRS))	07:49	06:46	06:30	05:24	05:51 (WEA 05 (GRN))	04:44
	16:15	15 09:21 (WEA 12 (GRS))	17:14	18:09	20:08	21:04	7 05:58 (WEA 05 (GRN))	21:48
11	08:33	09:06 (WEA 12 (GRS))	07:47	06:44	06:27	05:22	05:49 (WEA 05 (GRN))	04:44
	16:17	17 09:23 (WEA 12 (GRS))	17:16	18:11	20:10	21:06	9 05:58 (WEA 05 (GRN))	21:49
12	08:32	09:05 (WEA 12 (GRS))	07:45	06:41	06:25	05:20	05:47 (WEA 05 (GRN))	04:44
	16:18	18 09:23 (WEA 12 (GRS))	17:18	18:13	20:12	21:08	10 05:57 (WEA 05 (GRN))	21:50
13	08:31	09:03 (WEA 12 (GRS))	07:43	06:39	06:22	05:18	05:46 (WEA 05 (GRN))	04:43
	16:20	20 09:23 (WEA 12 (GRS))	17:20	18:15	20:14	21:09	11 05:57 (WEA 05 (GRN))	21:50
14	08:30	09:04 (WEA 12 (GRS))	07:41	06:36	06:20	05:16	05:47 (WEA 05 (GRN))	04:43
	16:21	20 09:24 (WEA 12 (GRS))	17:22	18:17	20:16	21:11	8 05:55 (WEA 05 (GRN))	21:51
15	08:29	09:04 (WEA 12 (GRS))	07:39	06:34	06:18	05:15	05:49 (WEA 05 (GRN))	04:43
	16:23	20 09:24 (WEA 12 (GRS))	17:24	18:19	20:18	21:13	5 05:54 (WEA 05 (GRN))	21:52
16	08:28	09:05 (WEA 12 (GRS))	07:37	06:32	06:15	05:13		04:43
	16:25	20 09:25 (WEA 12 (GRS))	17:26	18:21	3 06:58 (WEA_G1)	20:20	21:15	3 05:19 (WEA 04 (GRN))
17	08:27	09:05 (WEA 12 (GRS))	07:35	06:29	06:53 (WEA_G1)	06:13	05:11	04:42
	16:27	20 09:25 (WEA 12 (GRS))	17:28	18:23	6 06:59 (WEA_G1)	20:21	21:16	4 05:20 (WEA 04 (GRN))
18	08:26	09:05 (WEA 12 (GRS))	07:33	06:27	06:50 (WEA_G1)	06:11	05:10	04:42
	16:28	20 09:25 (WEA 12 (GRS))	17:30	18:25	9 06:59 (WEA_G1)	20:23	21:18	4 05:20 (WEA 04 (GRN))
19	08:25	09:06 (WEA 12 (GRS))	07:31	06:24	06:48 (WEA_G1)	06:08	05:08	04:42
	16:30	19 09:25 (WEA 12 (GRS))	17:32	18:27	11 06:59 (WEA_G1)	20:25	21:20	4 05:20 (WEA 04 (GRN))
20	08:24	09:07 (WEA 12 (GRS))	07:28	06:22	06:45 (WEA_G1)	06:06	05:06	04:42
	16:32	19 09:26 (WEA 12 (GRS))	17:34	18:29	13 06:58 (WEA_G1)	20:27	21:21	1 05:36 (WEA 02 (GRN))
21	08:23	09:07 (WEA 12 (GRS))	07:26	06:19	06:43 (WEA_G1)	06:04	05:05	04:43
	16:34	18 09:25 (WEA 12 (GRS))	17:36	18:31	15 06:58 (WEA_G1)	20:29	21:23	3 05:37 (WEA 02 (GRN))
22	08:21	09:09 (WEA 12 (GRS))	07:24	06:17	06:40 (WEA_G1)	06:01	05:03	04:43
	16:36	16 09:25 (WEA 12 (GRS))	17:38	18:32	17 06:57 (WEA_G1)	20:31	21:24	4 05:37 (WEA 02 (GRN))
23	08:20	09:09 (WEA 12 (GRS))	07:22	06:14	06:41 (WEA_G1)	06:01	05:02	04:43
	16:38	15 09:24 (WEA 12 (GRS))	17:40	18:34	15 06:56 (WEA_G1)	20:33	21:26	4 05:36 (WEA 02 (GRN))
24	08:19	09:11 (WEA 12 (GRS))	07:19	06:12	06:42 (WEA_G1)	06:01	05:01	04:43
	16:39	13 09:24 (WEA 12 (GRS))	17:42	18:36	12 06:54 (WEA_G1)	20:35	21:27	5 05:35 (WEA 02 (GRN))
25	08:17	09:13 (WEA 12 (GRS))	07:17	06:09	06:45 (WEA_G1)	06:01	05:01	04:44
	16:41	9 09:22 (WEA 12 (GRS))	17:44	18:38	6 06:51 (WEA_G1)	20:36	21:29	4 05:34 (WEA 02 (GRN))
26	08:16	09:16 (WEA 12 (GRS))	07:15	06:07	05:52	04:58		04:44
	16:43	3 09:19 (WEA 12 (GRS))	17:46	18:40	20:38	21:30		21:55
27	08:14		07:12	06:04	05:50	04:57		04:45
	16:45		17:48	18:42	20:40	21:32		21:55
28	08:13		07:10	06:02	05:48	04:56		04:45
	16:47		17:50	18:44	20:42	21:33		21:54
29	08:11			06:59	05:46	04:54		04:46
	16:49			19:46	20:44	21:35		21:54
30	08:10			06:57	05:44	04:53		04:46
	16:51			19:48	20:46	21:36		21:54
31	08:08			06:54		04:52		
	16:53			19:49		21:37		
Sonnenscheinstunden	248		272		421	496		513
astr.max.mögl.Beschattung	352			107		85		64

**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) Schatteneende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 45 - IO 45 Bäderstraße 20-22 (Kabelhorst)  
**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

Juli		August		September		Oktober		November		Dezember	
1	04:47	05:21 (WEA 04 (GRN))	05:28	05:59 (WEA 05 (GRN))	06:23	07:17	07:16			08:12	08:47 (WEA 12 (GRS))
	21:54	1 05:22 (WEA 04 (GRN))	21:18	9 06:06 (WEA 05 (GRN))	20:10	19:55	16:44			15:59	09:04 (WEA 12 (GRS))
2	04:48	05:21 (WEA 04 (GRN))	05:29	06:00 (WEA 05 (GRN))	06:25	07:19	07:18			08:14	08:49 (WEA 12 (GRS))
	21:53	1 05:22 (WEA 04 (GRN))	21:16	8 06:08 (WEA 05 (GRN))	20:08	18:53	16:42			15:58	09:04 (WEA 12 (GRS))
3	04:48		05:31	06:02 (WEA 05 (GRN))	06:26	07:21	07:20			08:15	08:51 (WEA 12 (GRS))
	21:53		21:14	7 06:09 (WEA 05 (GRN))	20:05	18:50	16:40			15:57	09:05 (WEA 12 (GRS))
4	04:49		05:33	06:03 (WEA 05 (GRN))	06:28	07:23	07:22			08:17	08:52 (WEA 12 (GRS))
	21:52		21:12	5 06:06 (WEA 05 (GRN))	20:03	18:48	16:38			15:56	09:04 (WEA 12 (GRS))
5	04:50		05:34	06:05 (WEA 05 (GRN))	06:30	07:24	07:24			08:18	08:54 (WEA 12 (GRS))
	21:52		21:10	3 06:08 (WEA 05 (GRN))	20:00	18:46	16:36			15:56	09:05 (WEA 12 (GRS))
6	04:51		05:36	06:07 (WEA 05 (GRN))	06:32	07:26	07:26			08:20	08:55 (WEA 12 (GRS))
	21:51		21:08	1 06:08 (WEA 05 (GRN))	19:58	18:43	16:34			15:55	09:04 (WEA 12 (GRS))
7	04:52		05:38	06:08 (WEA 03 (GRN))	06:34	07:28	07:28			08:21	08:57 (WEA 12 (GRS))
	21:50		21:06	1 06:09 (WEA 03 (GRN))	19:55	18:41	16:32			15:55	09:05 (WEA 12 (GRS))
8	04:53		05:40	06:10 (WEA 03 (GRN))	06:35	07:30	07:30			08:22	08:58 (WEA 12 (GRS))
	21:50		21:04	2 06:12 (WEA 03 (GRN))	19:53	18:38	16:30			15:54	09:04 (WEA 12 (GRS))
9	04:54		05:41	06:12 (WEA 03 (GRN))	06:37	07:32	07:32			08:23	09:00 (WEA 12 (GRS))
	21:49		21:02	1 06:13 (WEA 03 (GRN))	19:50	18:36	16:28			15:54	09:05 (WEA 12 (GRS))
10	04:55		05:43		06:39	07:34	07:34			08:25	09:01 (WEA 12 (GRS))
	21:48		21:00		19:48	18:33	16:27			15:54	09:04 (WEA 12 (GRS))
11	04:56		05:45		06:41	07:36	07:36			08:26	09:02 (WEA 12 (GRS))
	21:47		20:58		19:45	18:31	16:25			15:53	09:04 (WEA 12 (GRS))
12	04:56		05:47		06:43	07:38	07:38			08:27	09:03 (WEA 12 (GRS))
	21:46		20:56		19:43	18:29	16:23			15:53	09:04 (WEA 12 (GRS))
13	04:59		05:49		06:44	07:39	07:40			08:28	
	21:45		20:54		19:40	18:26	16:22			15:53	
14	05:00		05:50		06:46	07:41	07:42			08:29	
	21:44		20:52		19:38	18:24	16:20			15:53	
15	05:01		05:52		06:48	07:43	07:44			08:30	
	21:43		20:49		19:35	18:21	16:18			15:53	
16	05:03		05:54		06:50	07:45	07:46			08:31	
	21:42		20:47		19:33	18:19	16:17			15:53	
17	05:04		05:56		06:52	07:47	07:48		4	08:32 (WEA 12 (GRS))	08:32
	21:41		20:45		19:30	18:17	16:15		9	08:55 (WEA 12 (GRS))	15:53
18	05:06		05:58		06:53	07:49	07:49			08:44 (WEA 12 (GRS))	08:33
	21:39	2 05:42 (WEA 02 (GRN))	20:43		19:28	4 07:37 (WEA_G1)	18:14	16:14	13	08:57 (WEA 12 (GRS))	15:53
19	05:07	2 05:39 (WEA 02 (GRN))	05:59		06:55	07:30 (WEA_G1)	07:51	07:51		08:44 (WEA 12 (GRS))	08:33
	21:38	5 05:44 (WEA 02 (GRN))	20:41		19:25	11 07:41 (WEA_G1)	18:12	16:12	15	08:59 (WEA 12 (GRS))	15:54
20	05:08	05:41 (WEA 02 (GRN))	06:01		06:57	07:28 (WEA_G1)	07:53	07:53		08:44 (WEA 12 (GRS))	08:34
	21:37	5 05:46 (WEA 02 (GRN))	20:38		19:23	14 07:42 (WEA_G1)	18:10	16:11	16	09:00 (WEA 12 (GRS))	15:54
21	05:10	05:42 (WEA 02 (GRN))	06:03		06:59	07:25 (WEA_G1)	07:55	07:55		08:43 (WEA 12 (GRS))	08:35
	21:35	4 05:46 (WEA 02 (GRN))	20:36		19:20	17 07:42 (WEA_G1)	18:08	16:09	18	09:01 (WEA 12 (GRS))	15:54
22	05:11	05:44 (WEA 02 (GRN))	06:05		07:01	07:27 (WEA_G1)	07:57	07:57		08:43 (WEA 12 (GRS))	08:35
	21:34	3 05:47 (WEA 02 (GRN))	20:34		19:18	16 07:43 (WEA_G1)	18:05	16:08	19	09:02 (WEA 12 (GRS))	15:55
23	05:13	05:45 (WEA 02 (GRN))	06:07		07:02	07:19 (WEA_G1)	07:59	07:59		08:43 (WEA 12 (GRS))	08:36
	21:33	2 05:47 (WEA 02 (GRN))	20:31		19:15	14 07:43 (WEA_G1)	18:03	16:07	19	09:02 (WEA 12 (GRS))	15:55
24	05:14	05:46 (WEA 02 (GRN))	06:08		07:04	07:31 (WEA_G1)	08:01	08:00		08:43 (WEA 12 (GRS))	08:36
	21:31	1 05:47 (WEA 02 (GRN))	20:29		19:13	12 07:43 (WEA_G1)	18:01	16:06	20	09:03 (WEA 12 (GRS))	15:56
25	05:16		06:10		07:06	07:33 (WEA_G1)	07:02	08:02		08:44 (WEA 12 (GRS))	08:36
	21:29		20:27		19:10	10 07:43 (WEA_G1)	16:59	16:05	19	09:03 (WEA 12 (GRS))	15:57
26	05:18		06:12		07:08	07:34 (WEA_G1)	07:04	08:04		08:43 (WEA 12 (GRS))	08:37
	21:28		20:24		19:08	7 07:41 (WEA_G1)	16:56	16:03	20	09:03 (WEA 12 (GRS))	15:57
27	05:19		06:14		07:10	07:36 (WEA_G1)	07:06	08:06		08:43 (WEA 12 (GRS))	08:37
	21:26		20:22		19:05	4 07:40 (WEA_G1)	16:54	16:02	20	09:03 (WEA 12 (GRS))	15:58
28	05:21		06:16		07:12	07:38 (WEA_G1)	07:08	08:07		08:44 (WEA 12 (GRS))	08:37
	21:25		20:20		19:03	1 07:39 (WEA_G1)	16:52	16:01	20	09:04 (WEA 12 (GRS))	15:59
29	05:23		06:17		07:13		07:10	08:09		08:45 (WEA 12 (GRS))	08:37
	21:23	6 06:05 (WEA 05 (GRN))	20:17		19:00		16:50	16:00	19	09:04 (WEA 12 (GRS))	16:00
30	05:24	05:57 (WEA 05 (GRN))	06:19		07:15		07:12	08:11		08:46 (WEA 12 (GRS))	08:37
	21:21	9 06:06 (WEA 05 (GRN))	20:15		18:58		16:48	15:59	19	09:05 (WEA 12 (GRS))	16:01
31	05:26	05:57 (WEA 05 (GRN))	06:21				07:14			08:37	
	21:19	10 06:07 (WEA 05 (GRN))	20:12				16:46			16:02	
Sonnenscheinstunden		461		383		328		257		231	
astr.max.mögl.Beschattung		49		37		110		250		162	

**Tabellen-Layout: Die Daten für jeden Tag sind 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) Schattende	(WEA mit letztem Schatten)
	Minuten mit Schatten		

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 46 - IO 46 Bäderstraße 15 (Kabelhorst)  
**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	08:37	09:12 (WEA 12 (GRS))	08:06	07:08	06:52	05:42	06:08 (WEA 05 (GRN))	04:51	05:22 (WEA 04 (GRN))		
2	16:03	09:14 (WEA 12 (GRS))	16:55	17:52	19:51	20:48	1 06:09 (WEA 05 (GRN))	21:39	6 05:28 (WEA 04 (GRN))		
3	08:37	09:15 (WEA 12 (GRS))	16:57	17:54	19:53	20:50	3 06:09 (WEA 05 (GRN))	21:40	7 05:28 (WEA 04 (GRN))		
4	16:05	09:11 (WEA 12 (GRS))	16:59	17:56	19:55	20:51	5 06:09 (WEA 05 (GRN))	21:41	8 05:29 (WEA 04 (GRN))		
5	08:37	09:11 (WEA 12 (GRS))	16:59	17:56	19:55	20:51	7 06:09 (WEA 05 (GRN))	21:42	9 05:29 (WEA 04 (GRN))		
6	16:07	09:16 (WEA 12 (GRS))	17:01	17:58	19:57	20:53	8 06:08 (WEA 05 (GRN))	21:43	10 05:29 (WEA 04 (GRN))		
7	08:36	09:10 (WEA 12 (GRS))	17:59	18:56	20:01	20:57	9 06:07 (WEA 05 (GRN))	21:44	11 05:29 (WEA 04 (GRN))		
8	16:08	09:17 (WEA 12 (GRS))	17:03	18:00	19:59	20:55	5 06:04 (WEA 05 (GRN))	21:45	12 05:29 (WEA 04 (GRN))		
9	08:36	09:10 (WEA 12 (GRS))	17:57	18:54	20:01	20:57	1 05:44 (WEA 02 (GRN))	21:50	9 05:28 (WEA 04 (GRN))		
10	16:09	09:18 (WEA 12 (GRS))	17:05	18:02	19:59	20:55	1 05:45 (WEA 02 (GRN))	21:51	9 05:29 (WEA 04 (GRN))		
11	08:35	09:08 (WEA 12 (GRS))	17:53	18:50	20:03	20:59	3 05:46 (WEA 02 (GRN))	21:52	10 05:29 (WEA 04 (GRN))		
12	16:12	09:19 (WEA 12 (GRS))	17:09	18:06	20:04	20:59	4 05:44 (WEA 02 (GRN))	21:53	9 05:29 (WEA 04 (GRN))		
13	08:34	09:07 (WEA 12 (GRS))	17:51	18:48	20:06	21:02	5 05:43 (WEA 02 (GRN))	21:53	9 05:29 (WEA 04 (GRN))		
14	16:14	09:20 (WEA 12 (GRS))	17:11	18:08	20:06	21:02	1 05:45 (WEA 02 (GRN))	21:51	9 05:29 (WEA 04 (GRN))		
15	08:34	09:06 (WEA 12 (GRS))	17:49	18:46	20:06	21:02	3 05:43 (WEA 02 (GRN))	21:52	10 05:29 (WEA 04 (GRN))		
16	16:15	09:20 (WEA 12 (GRS))	17:14	18:11	20:08	21:04	4 05:41 (WEA 02 (GRN))	21:53	9 05:29 (WEA 04 (GRN))		
17	08:33	09:06 (WEA 12 (GRS))	17:47	18:44	20:08	21:04	5 05:40 (WEA 02 (GRN))	21:54	9 05:29 (WEA 04 (GRN))		
18	16:17	09:22 (WEA 12 (GRS))	17:16	18:13	20:10	21:06	1 05:44 (WEA 02 (GRN))	21:50	9 05:28 (WEA 04 (GRN))		
19	08:32	09:05 (WEA 12 (GRS))	17:45	18:42	20:06	21:02	1 05:45 (WEA 02 (GRN))	21:51	9 05:29 (WEA 04 (GRN))		
20	16:18	09:22 (WEA 12 (GRS))	17:18	18:15	20:12	21:08	3 05:43 (WEA 02 (GRN))	21:52	10 05:29 (WEA 04 (GRN))		
21	08:31	09:03 (WEA 12 (GRS))	17:43	18:40	20:06	21:02	4 05:44 (WEA 02 (GRN))	21:53	9 05:29 (WEA 04 (GRN))		
22	16:20	09:22 (WEA 12 (GRS))	17:20	18:17	20:14	21:09	5 05:43 (WEA 02 (GRN))	21:53	9 05:29 (WEA 04 (GRN))		
23	08:30	09:04 (WEA 12 (GRS))	17:41	18:38	20:09	21:05	1 05:44 (WEA 02 (GRN))	21:50	9 05:28 (WEA 04 (GRN))		
24	16:21	09:22 (WEA 12 (GRS))	17:22	18:19	20:16	21:11	1 05:45 (WEA 02 (GRN))	21:51	9 05:29 (WEA 04 (GRN))		
25	08:29	09:04 (WEA 12 (GRS))	17:39	18:36	20:18	21:13	3 05:43 (WEA 02 (GRN))	21:52	10 05:29 (WEA 04 (GRN))		
26	16:23	09:23 (WEA 12 (GRS))	17:24	18:21	20:18	21:13	4 05:41 (WEA 02 (GRN))	21:53	9 05:29 (WEA 04 (GRN))		
27	08:28	09:05 (WEA 12 (GRS))	17:37	18:34	20:15	21:13	5 05:40 (WEA 02 (GRN))	21:54	9 05:29 (WEA 04 (GRN))		
28	16:25	09:23 (WEA 12 (GRS))	17:26	18:23	20:20	21:15	1 05:44 (WEA 02 (GRN))	21:50	9 05:28 (WEA 04 (GRN))		
29	08:27	09:06 (WEA 12 (GRS))	17:35	18:32	20:13	21:09	3 05:43 (WEA 02 (GRN))	21:52	10 05:29 (WEA 04 (GRN))		
30	16:27	09:24 (WEA 12 (GRS))	17:28	18:25	20:21	21:16	4 05:44 (WEA 02 (GRN))	21:53	9 05:29 (WEA 04 (GRN))		
31	08:26	09:06 (WEA 12 (GRS))	17:33	18:30	20:11	21:07	5 05:43 (WEA 02 (GRN))	21:53	9 05:29 (WEA 04 (GRN))		
1	16:28	09:23 (WEA 12 (GRS))	17:30	18:27	20:23	21:18					
2	08:25	09:07 (WEA 12 (GRS))	17:31	18:28	20:18	21:18					
3	16:30	09:23 (WEA 12 (GRS))	17:32	18:29	20:25	21:20					
4	08:24	09:08 (WEA 12 (GRS))	17:28	18:25	20:06	21:06					
5	16:32	09:23 (WEA 12 (GRS))	17:34	18:31	20:27	21:21					
6	08:23	09:08 (WEA 12 (GRS))	17:26	18:23	20:04	21:04					
7	16:34	09:22 (WEA 12 (GRS))	17:36	18:33	20:29	21:23					
8	08:21	09:10 (WEA 12 (GRS))	17:24	18:21	20:01	21:03					
9	16:36	09:22 (WEA 12 (GRS))	17:38	18:35	20:31	21:24					
10	08:20	09:11 (WEA 12 (GRS))	17:22	18:19	20:02	21:02					
11	16:38	09:21 (WEA 12 (GRS))	17:40	18:34	20:33	21:26					
12	08:19	09:15 (WEA 12 (GRS))	17:19	18:12	20:01	21:01					
13	16:39	09:19 (WEA 12 (GRS))	17:42	18:36	20:35	21:27					
14	08:17	09:17 (WEA 12 (GRS))	17:17	18:09	20:09	21:09					
15	16:41		17:44	18:38	20:36	21:29					
16	08:16		17:15	18:07	20:05	21:05					
17	16:43		17:46	18:40	20:38	21:30					
18	08:14		17:12	18:04	20:04	21:04					
19	16:45		17:48	18:42	20:40	21:32					
20	08:13		17:10	18:02	20:08	21:08					
21	16:47		17:50	18:44	20:42	21:33					
22	08:11			19:05	20:46	21:36					
23	16:49			19:46	20:44	21:35					
24	08:10			19:57	20:44	21:35					
25	16:51			19:48	20:46	21:36					
26	08:08			19:49	20:46	21:36					
27	16:53			19:49	20:46	21:37					
28	248			367	421	496					
Sonnenscheinstunden			272		421	496				513	281
astr.max.mögl.Beschattung		290		95	1	78					

**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) Schattenden	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 46 - IO 46 Bäderstraße 15 (Kabelhorst)

### 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

	Juli		August		September		Oktober		November		Dezember	
1	04:47	05:23 (WEA 04 (GRN))	05:28		06:23		07:17	07:16			08:12	08:47 (WEA 12 (GRS))
	21:54	05:33 (WEA 04 (GRN))	21:10		20:10		19:55	16:44			15:59	09:03 (WEA 12 (GRS))
2	04:48	05:22 (WEA 04 (GRN))	05:29		06:25		07:19	07:18			08:14	08:49 (WEA 12 (GRS))
	21:53	05:33 (WEA 04 (GRN))	21:16		20:08		18:53	16:42			15:58	14 09:03 (WEA 12 (GRS))
3	04:48	05:22 (WEA 04 (GRN))	05:31		06:26		07:21	07:20			08:15	08:51 (WEA 12 (GRS))
	21:53	05:34 (WEA 04 (GRN))	21:14		20:05		18:50	16:40			15:57	13 09:04 (WEA 12 (GRS))
4	04:49	05:23 (WEA 04 (GRN))	05:33		06:28		07:23	07:22			08:17	08:52 (WEA 12 (GRS))
	21:52	05:34 (WEA 04 (GRN))	21:12		20:03		18:48	16:38			15:56	11 09:03 (WEA 12 (GRS))
5	04:50	05:24 (WEA 04 (GRN))	05:34		06:30		07:24	07:24			08:18	08:54 (WEA 12 (GRS))
	21:52	05:35 (WEA 04 (GRN))	21:10	7	06:15 (WEA 05 (GRN))	20:00	18:46	16:36			15:56	10 09:04 (WEA 12 (GRS))
6	04:51	05:25 (WEA 04 (GRN))	05:36		06:32		07:26	07:26			08:20	08:55 (WEA 12 (GRS))
	21:51	05:35 (WEA 04 (GRN))	21:08	10	06:17 (WEA 05 (GRN))	19:58	18:43	16:34			15:55	8 09:03 (WEA 12 (GRS))
7	04:52	05:26 (WEA 04 (GRN))	05:38		06:34		07:28	07:28			08:21	08:57 (WEA 12 (GRS))
	21:50	05:36 (WEA 04 (GRN))	21:06	9	06:17 (WEA 05 (GRN))	19:55	18:41	16:32			15:55	7 09:04 (WEA 12 (GRS))
8	04:53	05:27 (WEA 04 (GRN))	05:40		06:35		07:30	07:30			08:22	08:58 (WEA 12 (GRS))
	21:50	05:36 (WEA 04 (GRN))	21:04	8	06:18 (WEA 05 (GRN))	19:53	18:38	16:30			15:54	6 09:04 (WEA 12 (GRS))
9	04:54	05:28 (WEA 04 (GRN))	05:41		06:37		07:32	07:32			08:23	09:00 (WEA 12 (GRS))
	21:49	05:36 (WEA 04 (GRN))	21:02	6	06:18 (WEA 05 (GRN))	19:50	18:36	16:28			15:54	4 09:04 (WEA 12 (GRS))
10	04:55	05:29 (WEA 04 (GRN))	05:43		06:39		07:34	07:34			08:25	09:01 (WEA 12 (GRS))
	21:48	05:37 (WEA 04 (GRN))	21:00	4	06:17 (WEA 05 (GRN))	19:48	18:33	16:27			15:54	3 09:04 (WEA 12 (GRS))
11	04:56	05:30 (WEA 04 (GRN))	05:45		06:41		07:36	07:36			08:26	09:02 (WEA 12 (GRS))
	21:47	05:37 (WEA 04 (GRN))	20:58	2	06:17 (WEA 05 (GRN))	19:45	18:31	16:25			15:53	2 09:04 (WEA 12 (GRS))
12	04:58	05:31 (WEA 04 (GRN))	05:47		06:43		07:38	07:38			08:27	
	21:46	05:37 (WEA 04 (GRN))	20:56	1	06:17 (WEA 05 (GRN))	19:43	18:29	16:23			15:53	
13	04:59	05:32 (WEA 04 (GRN))	05:49		06:44		07:39	07:40			08:28	
	21:45	05:37 (WEA 04 (GRN))	20:54	1	06:19 (WEA 05 (GRN))	19:40	18:26	16:22			15:53	
14	05:00	05:33 (WEA 04 (GRN))	05:50		06:46		07:41	07:42			08:29	
	21:44	05:37 (WEA 04 (GRN))	20:52		19:38		18:24	16:20			15:53	
15	05:01	05:34 (WEA 04 (GRN))	05:52		06:48		07:43	07:44			08:30	
	21:43	05:36 (WEA 04 (GRN))	20:49		19:35		18:21	16:18			15:53	
16	05:03	05:36 (WEA 04 (GRN))	05:54		06:50		07:45	07:46			08:31	
	21:42	05:33 (WEA 04 (GRN))	20:47		19:33		18:19	16:17			15:53	
17	05:04	05:37 (WEA 04 (GRN))	05:56		06:52		07:47	07:48			08:32	
	21:41		20:45		19:30		18:17	16:15			15:53	
18	05:06		05:58		06:53		07:49	07:49		08:46 (WEA 12 (GRS))	08:33	
	21:39		20:43		19:28		18:14	16:14	4	08:52 (WEA 12 (GRS))	15:53	
19	05:07		05:59		06:55		07:51	07:51		08:46 (WEA 12 (GRS))	08:33	
	21:38		20:41		19:25		18:12	16:12	10	08:56 (WEA 12 (GRS))	15:54	
20	05:08		06:01		06:57		07:53	07:53		08:45 (WEA 12 (GRS))	08:34	
	21:37		20:38		19:23		18:10	16:11	12	08:57 (WEA 12 (GRS))	15:54	
21	05:10		06:03		06:59		07:55	07:55		08:44 (WEA 12 (GRS))	08:35	
	21:35		20:36		19:20	7	07:42 (WEA_G1)	18:08	14	08:58 (WEA 12 (GRS))	15:54	
22	05:11		06:05		07:01		07:57	07:57		08:44 (WEA 12 (GRS))	08:35	
	21:34		20:34		19:18	12	07:44 (WEA_G1)	18:05	15	08:59 (WEA 12 (GRS))	15:55	
23	05:13		06:07		07:02		07:59	07:59		08:44 (WEA 12 (GRS))	08:36	
	21:33		20:31		19:15	16	07:46 (WEA_G1)	18:03	16	09:00 (WEA 12 (GRS))	15:55	
24	05:14		06:08		07:04		07:51 (WEA_G1)	18:01		08:00	08:36	
	21:31		20:29		19:13	15	07:46 (WEA_G1)	18:01	16	09:01 (WEA 12 (GRS))	15:56	
25	05:16	2	05:50 (WEA 02 (GRN))	06:10	07:06		07:53 (WEA_G1)	18:02		08:02	08:36	
	21:29	2	05:52 (WEA 02 (GRN))	20:27	19:10	14	07:47 (WEA_G1)	18:00		08:05	08:37	
26	05:18		05:49 (WEA 02 (GRN))	06:12	07:08		07:54 (WEA_G1)	18:04		08:04	08:37	
	21:28	5	05:54 (WEA 02 (GRN))	20:24	19:08	12	07:46 (WEA_G1)	18:00		08:03	08:37	
27	05:19		05:51 (WEA 02 (GRN))	06:14	07:10		07:56 (WEA_G1)	18:06		08:06	08:37	
	21:26	4	05:55 (WEA 02 (GRN))	20:22	19:05	10	07:46 (WEA_G1)	18:04		08:06	08:37	
28	05:21		05:52 (WEA 02 (GRN))	06:16	07:12		07:58 (WEA_G1)	18:08		08:07	08:37	
	21:25	3	05:55 (WEA 02 (GRN))	20:20	19:03	7	07:45 (WEA_G1)	18:05		08:07	08:37	
29	05:23		05:54 (WEA 02 (GRN))	06:17	07:13		07:40 (WEA_G1)	18:10		08:09	08:37	
	21:23	2	05:56 (WEA 02 (GRN))	20:17	19:00	5	07:45 (WEA_G1)	18:10		08:10	08:37	
30	05:24		05:55 (WEA 02 (GRN))	06:19	07:15		07:42 (WEA_G1)	18:12		08:11	08:37	
	21:21	1	05:56 (WEA 02 (GRN))	20:15	18:58	1	07:43 (WEA_G1)	18:14		08:11	08:37	
31	05:26		06:21				07:14				16:02	
	21:19		20:12				16:46				231	
	Sonnenscheinstunden											
	astr.max.mögl.Beschattung	142	461	48	383	99	328	257	197		94	

**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) Schattende	(WEA mit letztem Schatten)

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 47 - IO 47 Bäderstraße 18 (Kabelhorst)

### 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	08:37	09:32 (WEA 11 (GRS))	08:06	07:08	06:52			05:42	06:08 (WEA 05 (GRN))	04:51	05:22 (WEA 01 (GRN))
	16:03	09:53 (WEA 11 (GRS))	16:55	17:52	19:51			20:48	06:14 (WEA 05 (GRN))	21:39	05:24 (WEA 01 (GRN))
2	08:37	09:33 (WEA 11 (GRS))	08:04	07:05	06:49			05:40	06:07 (WEA 05 (GRN))	04:50	05:21 (WEA 01 (GRN))
	16:04	09:54 (WEA 11 (GRS))	16:57	17:54	19:53			20:50	06:13 (WEA 05 (GRN))	21:40	05:24 (WEA 01 (GRN))
3	08:37	09:34 (WEA 11 (GRS))	08:03	07:03	06:47			05:37		04:49	05:21 (WEA 01 (GRN))
	16:05	09:53 (WEA 11 (GRS))	16:59	17:56	19:55			20:51		21:41	05:24 (WEA 01 (GRN))
4	08:37	09:35 (WEA 11 (GRS))	08:01	07:01	06:44			05:35		04:48	05:20 (WEA 01 (GRN))
	16:07	09:54 (WEA 11 (GRS))	17:01	17:58	19:57			20:53		21:42	05:24 (WEA 01 (GRN))
5	08:36	09:35 (WEA 11 (GRS))	07:59	06:58	06:42			05:33		04:48	05:19 (WEA 01 (GRN))
	16:08	09:54 (WEA 11 (GRS))	17:03	18:00	19:59			20:55		21:43	05:23 (WEA 01 (GRN))
6	08:36	09:37 (WEA 11 (GRS))	07:57	06:56	06:39			05:31		04:47	05:19 (WEA 01 (GRN))
	16:09	09:54 (WEA 11 (GRS))	17:05	18:02	20:01			20:57		21:44	05:23 (WEA 01 (GRN))
7	08:35	09:37 (WEA 11 (GRS))	07:55	06:54	06:37			05:29		04:46	05:18 (WEA 01 (GRN))
	16:11	09:54 (WEA 11 (GRS))	17:07	18:04	20:03			20:59		21:45	05:22 (WEA 01 (GRN))
8	08:35	09:38 (WEA 11 (GRS))	07:53	06:51	06:35			05:27		04:46	05:20 (WEA 01 (GRN))
	16:12	09:53 (WEA 11 (GRS))	17:09	18:06	20:05			21:00		21:46	05:22 (WEA 01 (GRN))
9	08:34	09:39 (WEA 11 (GRS))	07:51	06:49	06:32			05:26		04:45	
	16:14	09:53 (WEA 11 (GRS))	17:11	18:08	20:06			21:02		21:47	
10	08:34	09:40 (WEA 11 (GRS))	07:49	06:46	06:30			05:24	05:51 (WEA 02 (GRN))	04:44	
	16:15	09:52 (WEA 11 (GRS))	17:14	18:09	20:08			21:04	05:52 (WEA 02 (GRN))	21:48	
11	08:33	09:43 (WEA 11 (GRS))	07:47	06:44	06:27			05:22	05:49 (WEA 02 (GRN))	04:44	
	16:17	09:52 (WEA 11 (GRS))	17:16	18:11	20:10			21:06	05:51 (WEA 02 (GRN))	21:49	
12	08:32	09:45 (WEA 11 (GRS))	07:45	06:41	06:25			05:20	05:48 (WEA 02 (GRN))	04:44	
	16:18	09:50 (WEA 11 (GRS))	17:18	18:13	20:12			21:08	05:50 (WEA 02 (GRN))	21:50	
13	08:31		07:43	06:39	06:23			05:18		04:43	
	16:20		17:20	18:15	20:14			21:09		21:50	
14	08:30		07:41	06:36	06:20			05:16		04:43	
	16:21		17:22	18:17	20:16			21:11		21:51	
15	08:29		07:39	06:34	06:18			05:15		04:43	
	16:23		17:24	18:19	20:18			21:13		21:52	
16	08:28		07:37	06:32	06:15			05:13		04:43	
	16:25		17:26	18:21	20:20			21:15		21:52	
17	08:27	08:59 (WEA 12 (GRS))	07:35	06:29	06:13			05:11		04:42	
	16:27	09:00 (WEA 12 (GRS))	17:28	18:23	20:21			21:16		21:53	
18	08:26	08:57 (WEA 12 (GRS))	07:33	06:27	06:11			05:10		04:42	
	16:28	09:00 (WEA 12 (GRS))	17:30	18:25	20:23			21:18		21:53	
19	08:25	08:56 (WEA 12 (GRS))	07:31	06:24	06:08			05:08	05:37 (WEA 04 (GRN))	04:42	
	16:30	09:02 (WEA 12 (GRS))	17:32	18:27	20:25			21:20	05:39 (WEA 04 (GRN))	21:54	
20	08:24	08:55 (WEA 12 (GRS))	07:28	06:22	06:06			05:06	05:35 (WEA 04 (GRN))	04:42	
	16:32	09:03 (WEA 12 (GRS))	17:34	18:29	20:27			21:21	05:38 (WEA 04 (GRN))	21:54	
21	08:23	08:53 (WEA 12 (GRS))	07:26	06:19	06:04			05:05	05:34 (WEA 04 (GRN))	04:43	
	16:34	09:03 (WEA 12 (GRS))	17:36	18:31	20:29			21:23	05:38 (WEA 04 (GRN))	21:54	
22	08:21	08:52 (WEA 12 (GRS))	07:24	06:17	06:01			05:03	05:33 (WEA 04 (GRN))	04:43	
	16:36	09:04 (WEA 12 (GRS))	17:38	18:32	20:31			21:24	05:39 (WEA 04 (GRN))	21:54	
23	08:20	08:50 (WEA 12 (GRS))	07:22	06:14	05:59			05:02	05:32 (WEA 04 (GRN))	04:43	
	16:38	09:04 (WEA 12 (GRS))	17:40	18:34	20:33			21:26	05:39 (WEA 04 (GRN))	21:55	
24	08:19	08:49 (WEA 12 (GRS))	07:19	06:12	05:57			05:01	05:30 (WEA 04 (GRN))	04:43	
	16:39	09:04 (WEA 12 (GRS))	17:42	18:36	20:35			21:27	05:37 (WEA 04 (GRN))	21:55	
25	08:17	08:48 (WEA 12 (GRS))	07:17	06:09	05:55			04:59	05:29 (WEA 04 (GRN))	04:44	
	16:41	09:04 (WEA 12 (GRS))	17:44	18:38	20:36			21:29	05:37 (WEA 04 (GRN))	21:55	
26	08:16	08:48 (WEA 12 (GRS))	07:15	06:07	05:52			04:58	05:29 (WEA 04 (GRN))	04:44	
	16:43	09:04 (WEA 12 (GRS))	17:46	18:40	20:38			21:30	05:36 (WEA 04 (GRN))	21:55	
27	08:14	08:50 (WEA 12 (GRS))	07:13	06:04	05:50			04:57	05:30 (WEA 04 (GRN))	04:45	
	16:45	09:04 (WEA 12 (GRS))	17:48	18:42	20:40			21:32	05:35 (WEA 04 (GRN))	21:55	
28	08:13	08:50 (WEA 12 (GRS))	07:10	06:02	05:48		06:14 (WEA 05 (GRN))	04:56		04:45	
	16:47	09:03 (WEA 12 (GRS))	17:50	18:44	20:42	2	06:16 (WEA 05 (GRN))	21:33		21:54	
29	08:11	08:51 (WEA 12 (GRS))		06:59	05:46		06:12 (WEA 05 (GRN))	04:54		04:46	
	16:49	09:02 (WEA 12 (GRS))		19:46	20:44	4	06:16 (WEA 05 (GRN))	21:35		21:54	
30	08:10	08:53 (WEA 12 (GRS))		06:57	05:44		06:10 (WEA 05 (GRN))	04:53		04:46	
	16:51	09:00 (WEA 12 (GRS))		19:48	20:46	5	06:15 (WEA 05 (GRN))	21:36		21:54	
31	08:08			06:54				04:52	05:23 (WEA 01 (GRN))		
	16:53			19:49				21:37	05:24 (WEA 01 (GRN))		
Sonnenscheinstunden	248		272		421			496		513	
astr.max.mögl.Beschattung	334			367		421	11	67		26	

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:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 47 - IO 47 Bäderstraße 18 (Kabelhorst)

### 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

Juli		August		September		Oktober		November		Dezember				
1	04:47	05:28	05:59 (WEA 02 (GRN))	06:23	07:17	07:16				08:12	09:24 (WEA 11 (GRS))			
	21:54	21:18	2	06:01 (WEA 02 (GRN))	20:10	18:55	16:44			15:59	9	09:33 (WEA 11 (GRS))		
2	04:48	05:29		06:00 (WEA 02 (GRN))	06:25	07:19	07:18			08:14		09:23 (WEA 11 (GRS))		
	21:53	21:16	2	06:02 (WEA 02 (GRN))	20:08	18:53	16:42			15:58	12	09:35 (WEA 11 (GRS))		
3	04:48	05:31		06:02 (WEA 02 (GRN))	06:26	07:21	07:20			08:15		09:23 (WEA 11 (GRS))		
	21:53	21:14	1	06:03 (WEA 02 (GRN))	20:05	18:50	16:40			15:57	14	09:37 (WEA 11 (GRS))		
4	04:49	05:33			06:28	07:23	07:22			08:17		09:22 (WEA 11 (GRS))		
	21:52	21:12			20:03	18:48	16:38			15:56	15	09:37 (WEA 11 (GRS))		
5	04:50	05:24 (WEA 01 (GRN))	05:34		06:30	07:24	07:24			08:18		09:22 (WEA 11 (GRS))		
	21:52	05:28 (WEA 01 (GRN))	21:10		20:00	18:46	16:36			15:56		09:39 (WEA 11 (GRS))		
6	04:51	05:25 (WEA 01 (GRN))	05:36		06:32	07:26	07:26			08:20		09:23 (WEA 11 (GRS))		
	21:51	4	05:29 (WEA 01 (GRN))	21:08	19:58	18:43	16:34			15:55	17	09:40 (WEA 11 (GRS))		
7	04:52	05:26 (WEA 01 (GRN))	05:38		06:34	07:28	07:28			08:21		09:22 (WEA 11 (GRS))		
	21:50	4	05:30 (WEA 01 (GRN))	21:06	19:55	18:41	16:32			15:55	19	09:41 (WEA 11 (GRS))		
8	04:53	05:27 (WEA 01 (GRN))	05:40		06:35	07:30	07:30			08:22		09:22 (WEA 11 (GRS))		
	21:50	4	05:31 (WEA 01 (GRN))	21:04	19:53	18:38	16:30			15:54	19	09:41 (WEA 11 (GRS))		
9	04:54	05:28 (WEA 01 (GRN))	05:41		06:37	07:32	07:32			08:23		09:23 (WEA 11 (GRS))		
	21:49	4	05:32 (WEA 01 (GRN))	21:02	19:50	18:36	16:28			15:54	19	09:42 (WEA 11 (GRS))		
10	04:55	05:29 (WEA 01 (GRN))	05:43		06:39	07:34	07:34			08:25		09:23 (WEA 11 (GRS))		
	21:48	3	05:32 (WEA 01 (GRN))	21:00	19:48	18:33	16:27			15:54	20	09:43 (WEA 11 (GRS))		
11	04:56	05:30 (WEA 01 (GRN))	05:45		06:41	07:36	07:36			08:26		09:23 (WEA 11 (GRS))		
	21:47	2	05:32 (WEA 01 (GRN))	20:58	7	06:22 (WEA 05 (GRN))	19:45	18:31	16:25	15:53	20	09:43 (WEA 11 (GRS))		
12	04:58	05:31 (WEA 01 (GRN))	05:47		06:43	07:38	07:38			08:27		09:23 (WEA 11 (GRS))		
	21:46	2	05:33 (WEA 01 (GRN))	20:56	6	06:23 (WEA 05 (GRN))	19:43	18:29	16:23	7	08:25 (WEA 12 (GRS))	15:53	21	09:44 (WEA 11 (GRS))
13	04:59	05:32 (WEA 01 (GRN))	05:49		06:44	07:39	07:40			08:28		09:23 (WEA 11 (GRS))		
	21:45	1	05:33 (WEA 01 (GRN))	20:54	5	06:23 (WEA 05 (GRN))	19:40	18:26	16:22	11	08:24 (WEA 12 (GRS))	15:53	21	09:44 (WEA 11 (GRS))
14	05:00		05:50		06:46	07:41	07:42			08:29		09:24 (WEA 11 (GRS))		
	21:44		20:52	4	06:24 (WEA 05 (GRN))	19:38	18:24	16:20	13	08:35 (WEA 12 (GRS))	15:53	22	09:46 (WEA 11 (GRS))	
15	05:01		05:52		06:48	07:43	07:44			08:22 (WEA 12 (GRS))	08:30		09:24 (WEA 11 (GRS))	
	21:43		20:49	2	06:24 (WEA 05 (GRN))	19:35	18:21	16:18	14	08:36 (WEA 12 (GRS))	15:53	21	09:45 (WEA 11 (GRS))	
16	05:03	05:41 (WEA 04 (GRN))	05:54		06:50	07:45	07:46			08:21 (WEA 12 (GRS))	08:31		09:24 (WEA 11 (GRS))	
	21:42	3	05:44 (WEA 04 (GRN))	20:47	19:33	18:19	16:17	16	08:37 (WEA 12 (GRS))	15:53	22	09:46 (WEA 11 (GRS))		
17	05:04	05:39 (WEA 04 (GRN))	05:56		06:52	07:47	07:48			08:21 (WEA 12 (GRS))	08:32		09:25 (WEA 11 (GRS))	
	21:41	7	05:46 (WEA 04 (GRN))	20:45	19:30	18:17	16:15	16	08:37 (WEA 12 (GRS))	15:53	22	09:47 (WEA 11 (GRS))		
18	05:06	05:38 (WEA 04 (GRN))	05:58		06:53	07:49	07:49			08:22 (WEA 12 (GRS))	08:33		09:25 (WEA 11 (GRS))	
	21:39	8	05:46 (WEA 04 (GRN))	20:43	19:28	18:14	16:14	15	08:37 (WEA 12 (GRS))	15:53	22	09:47 (WEA 11 (GRS))		
19	05:07	05:39 (WEA 04 (GRN))	05:59		06:55	07:51	07:51			08:25 (WEA 12 (GRS))	08:33		09:26 (WEA 11 (GRS))	
	21:38	8	05:47 (WEA 04 (GRN))	20:41	19:25	18:12	16:12	14	08:39 (WEA 12 (GRS))	15:54	22	09:48 (WEA 11 (GRS))		
20	05:08	05:41 (WEA 04 (GRN))	06:01		06:57	07:53	07:53			08:27 (WEA 12 (GRS))	08:34		09:26 (WEA 11 (GRS))	
	21:37	7	05:48 (WEA 04 (GRN))	20:38	19:23	18:10	16:11	12	08:39 (WEA 12 (GRS))	15:54	22	09:48 (WEA 11 (GRS))		
21	05:10	05:42 (WEA 04 (GRN))	06:03		06:59	07:55	07:55			08:29 (WEA 12 (GRS))	08:35		09:27 (WEA 11 (GRS))	
	21:35	6	05:48 (WEA 04 (GRN))	20:36	19:20	18:08	16:09	10	08:39 (WEA 12 (GRS))	15:54	22	09:49 (WEA 11 (GRS))		
22	05:11	05:44 (WEA 04 (GRN))	06:05		07:01	07:57	07:57			08:31 (WEA 12 (GRS))	08:35		09:27 (WEA 11 (GRS))	
	21:34	5	05:49 (WEA 04 (GRN))	20:34	19:18	18:05	16:08	8	08:39 (WEA 12 (GRS))	15:55	22	09:49 (WEA 11 (GRS))		
23	05:13	05:45 (WEA 04 (GRN))	06:07		07:02	07:59	07:59			08:33 (WEA 12 (GRS))	08:36		09:28 (WEA 11 (GRS))	
	21:33	4	05:49 (WEA 04 (GRN))	20:31	19:15	18:03	16:07	6	08:39 (WEA 12 (GRS))	15:55	22	09:50 (WEA 11 (GRS))		
24	05:14	05:46 (WEA 04 (GRN))	06:08		07:04	08:01	08:00			08:35 (WEA 12 (GRS))	08:36		09:28 (WEA 11 (GRS))	
	21:31	3	05:49 (WEA 04 (GRN))	20:29	19:13	18:01	16:06	3	08:38 (WEA 12 (GRS))	15:56	22	09:50 (WEA 11 (GRS))		
25	05:16	05:48 (WEA 04 (GRN))	06:10		07:06	07:02	08:02			08:37 (WEA 12 (GRS))	08:36		09:28 (WEA 11 (GRS))	
	21:29	1	05:49 (WEA 04 (GRN))	20:27	19:10	16:59	16:05	1	08:38 (WEA 12 (GRS))	15:57	22	09:50 (WEA 11 (GRS))		
26	05:18		06:12		07:08	07:04	08:04			08:37			09:29 (WEA 11 (GRS))	
	21:28		20:24		19:08	16:56	16:03			15:57	22		09:51 (WEA 11 (GRS))	
27	05:19		06:14		07:10	07:06	08:06			08:37			09:30 (WEA 11 (GRS))	
	21:26		20:22		19:05	16:54	16:02			15:58	22		09:52 (WEA 11 (GRS))	
28	05:21		06:16		07:12	07:08	08:07			08:37			09:30 (WEA 11 (GRS))	
	21:25		20:20		19:03	16:52	16:01			15:59	22		09:52 (WEA 11 (GRS))	
29	05:23		06:17		07:13	07:10	08:09			08:37			09:31 (WEA 11 (GRS))	
	21:23		20:17		19:00	16:50	16:00			16:00	21		09:52 (WEA 11 (GRS))	
30	05:24		06:19		07:15	07:12	08:11			08:37			09:32 (WEA 11 (GRS))	
	21:21		20:15		18:58	16:48	15:59	4	09:31 (WEA 11 (GRS))	16:01	21		09:53 (WEA 11 (GRS))	
31	05:26		06:21			07:14				08:37			09:31 (WEA 11 (GRS))	
	21:19		20:12			16:46				16:02	21		09:52 (WEA 11 (GRS))	
Sonnenscheinstunden		515	461	383	328	257	150	231	615					
astr.max.mögl.Beschattung		80	29											

**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:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 48 - IO 48 Bäderstraße 13 (Kabelhorst)

### 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	08:37	08:06	07:08	06:52		05:42	04:51	05:25 (WEA 01 (GRN))
	16:03	16:55	17:52	19:51		20:48	21:39	05:26 (WEA 01 (GRN))
2	08:37	08:04	07:05	06:49		05:40	04:50	
	16:04	16:57	17:54	19:53		20:50	21:40	
3	08:37	08:03	07:03	06:47		05:37	04:49	
	16:05	16:59	17:56	19:55		20:51	21:41	
4	08:37	08:01	07:01	06:44		05:35	04:48	
	16:07	17:01	17:58	19:57		20:53	21:42	
5	08:36	07:59	06:58	06:42		05:33	04:48	
	16:08	17:03	18:00	19:59		20:55	21:43	
6	08:36	07:57	06:56	06:39		05:31	04:47	
	16:09	17:05	18:02	20:01		20:57	21:44	
7	08:35	07:55	06:54	06:37		05:29	04:46	
	16:11	17:07	18:04	20:03		20:59	21:45	
8	08:35	07:53	06:51	06:35		05:27	04:46	
	16:12	17:09	18:06	20:05		21:01	21:46	
9	08:34	09:07 (WEA 12 (GRS))	07:51	06:49	06:32	05:26	04:45	
	16:14	09:08 (WEA 12 (GRS))	17:11	18:08	20:06	21:02	21:47	
10	08:34	09:06 (WEA 12 (GRS))	07:49	06:46	06:30	05:24	04:44	
	16:15	09:09 (WEA 12 (GRS))	17:14	18:09	20:08	21:04	21:48	
11	08:33	09:06 (WEA 12 (GRS))	07:47	06:44	06:27	05:22	04:44	
	16:17	09:11 (WEA 12 (GRS))	17:16	18:11	20:10	21:06	21:49	
12	08:32	09:05 (WEA 12 (GRS))	07:45	06:41	06:25	05:20	04:44	
	16:18	09:11 (WEA 12 (GRS))	17:18	18:13	20:12	21:08	21:50	
13	08:31	09:03 (WEA 12 (GRS))	07:43	06:39	06:23	05:18	04:43	
	16:20	09:11 (WEA 12 (GRS))	17:20	18:15	20:14	21:09	21:50	
14	08:30	09:02 (WEA 12 (GRS))	07:41	06:36	06:20	05:16	04:43	
	16:21	09:12 (WEA 12 (GRS))	17:22	18:17	20:16	21:11	21:51	
15	08:29	09:01 (WEA 12 (GRS))	07:39	06:34	06:18	05:15	04:43	21:15 (WEA 32 (LR))
	16:23	09:12 (WEA 12 (GRS))	17:24	18:19	20:18	21:13	21:52	21:16 (WEA 32 (LR))
16	08:28	09:00 (WEA 12 (GRS))	07:37	06:32	06:15	05:13	04:43	
	16:25	09:13 (WEA 12 (GRS))	17:26	18:21	20:20	21:15	21:52	
17	08:27	08:59 (WEA 12 (GRS))	07:35	06:29	06:13	05:11	04:42	21:16 (WEA 32 (LR))
	16:27	09:13 (WEA 12 (GRS))	17:28	18:23	20:21	21:16	21:53	21:17 (WEA 32 (LR))
18	08:26	08:57 (WEA 12 (GRS))	07:33	06:27	06:11	05:10	04:42	21:16 (WEA 32 (LR))
	16:28	09:13 (WEA 12 (GRS))	17:30	18:25	20:23	21:18	21:53	21:17 (WEA 32 (LR))
19	08:25	08:58 (WEA 12 (GRS))	07:31	06:24	06:08	05:08	04:42	21:16 (WEA 32 (LR))
	16:30	09:13 (WEA 12 (GRS))	17:32	18:27	20:25	21:20	21:54	21:17 (WEA 32 (LR))
20	08:24	08:59 (WEA 12 (GRS))	07:28	06:22	06:06	05:06	04:42	21:16 (WEA 32 (LR))
	16:32	09:14 (WEA 12 (GRS))	17:34	18:29	20:27	21:21	21:54	21:18 (WEA 32 (LR))
21	08:23	08:59 (WEA 12 (GRS))	07:26	06:19	06:04	05:05	04:43	21:16 (WEA 32 (LR))
	16:34	09:13 (WEA 12 (GRS))	17:36	18:31	20:29	21:23	21:54	21:18 (WEA 32 (LR))
22	08:21	09:01 (WEA 12 (GRS))	07:24	06:17	06:01	05:03	04:43	21:16 (WEA 32 (LR))
	16:36	09:13 (WEA 12 (GRS))	17:38	18:32	20:31	21:24	21:54	21:18 (WEA 32 (LR))
23	08:20	09:02 (WEA 12 (GRS))	07:22	06:14	05:59	05:02	04:43	21:17 (WEA 32 (LR))
	16:38	09:12 (WEA 12 (GRS))	17:40	18:34	20:33	21:26	21:55	21:18 (WEA 32 (LR))
24	08:19	09:04 (WEA 12 (GRS))	07:19	06:12	05:57	06:22 (WEA 05 (GRN))	05:01	21:17 (WEA 32 (LR))
	16:39	09:11 (WEA 12 (GRS))	17:42	18:36	20:35	06:25 (WEA 05 (GRN))	21:27	21:18 (WEA 32 (LR))
25	08:17	07:17	06:09	05:55	06:20 (WEA 05 (GRN))	04:59	05:29 (WEA 01 (GRN))	21:17 (WEA 32 (LR))
	16:41	17:44	18:38	20:36	06:24 (WEA 05 (GRN))	21:29	05:30 (WEA 01 (GRN))	21:18 (WEA 32 (LR))
26	08:16	07:15	06:07	05:52	06:18 (WEA 05 (GRN))	04:58	05:28 (WEA 01 (GRN))	21:17 (WEA 32 (LR))
	16:43	17:46	18:40	20:38	06:24 (WEA 05 (GRN))	21:30	05:30 (WEA 01 (GRN))	21:18 (WEA 32 (LR))
27	08:14	07:13	06:04	05:50	06:16 (WEA 05 (GRN))	04:57	05:27 (WEA 01 (GRN))	21:17 (WEA 32 (LR))
	16:45	17:48	18:42	20:40	06:23 (WEA 05 (GRN))	21:32	05:30 (WEA 01 (GRN))	21:18 (WEA 32 (LR))
28	08:13	07:10	06:02	05:48	06:15 (WEA 05 (GRN))	04:56	05:26 (WEA 01 (GRN))	21:17 (WEA 32 (LR))
	16:47	17:50	18:44	20:42	06:21 (WEA 05 (GRN))	21:33	05:30 (WEA 01 (GRN))	21:18 (WEA 32 (LR))
29	08:11		06:59	05:46		04:54	05:25 (WEA 01 (GRN))	21:17 (WEA 32 (LR))
	16:49		19:46	20:44		21:35	05:30 (WEA 01 (GRN))	21:18 (WEA 32 (LR))
30	08:10		06:57	05:44		04:53	05:24 (WEA 01 (GRN))	21:17 (WEA 32 (LR))
	16:51		19:48	20:46		21:36	05:29 (WEA 01 (GRN))	21:18 (WEA 32 (LR))
31	08:08		06:54			04:52	05:23 (WEA 01 (GRN))	21:17 (WEA 32 (LR))
	16:53		19:49			21:37	05:28 (WEA 01 (GRN))	21:18 (WEA 32 (LR))
Sonnenscheinstunden	248					496		
astr.max.mögl.Beschattung	160	272	367	421	26	83	513	14

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:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6,0) **Schattenrezeptor:** IO 48 - IO 48 Bäderstraße 13 (Kabelhorst)

### 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

Juli		August		September		Oktober		November		Dezember	
1	04:47	05:28		06:23	07:17	07:16				08:12	08:47 (WEA 12 (GRS))
	21:54	21:18		20:10	18:55	16:44				15:59	5 08:52 (WEA 12 (GRS))
2	04:48	05:29		06:25	07:19	07:18				08:14	08:49 (WEA 12 (GRS))
	21:53	21:16		20:08	18:53	16:42				15:58	3 08:52 (WEA 12 (GRS))
3	04:48	05:31		06:26	07:21	07:20				08:15	08:51 (WEA 12 (GRS))
	21:53	21:14		20:05	18:50	16:40				15:57	1 08:52 (WEA 12 (GRS))
4	04:49	05:33	06:03 (WEA 02 (GRN))	06:28	07:23	07:22				08:17	
	21:52	21:12	2 06:05 (WEA 02 (GRN))	20:03	18:48	16:38				15:56	
5	04:50	05:34	06:05 (WEA 02 (GRN))	06:30	07:24	07:24				08:18	
	21:52	21:10	3 06:08 (WEA 02 (GRN))	20:00	18:46	16:36				15:56	
6	04:51	05:36	06:07 (WEA 02 (GRN))	06:32	07:26	07:26				08:20	
	21:51	21:08	2 06:09 (WEA 02 (GRN))	19:58	18:43	16:34				15:55	
7	04:52	05:38	06:08 (WEA 02 (GRN))	06:34	07:28	07:28				08:21	
	21:50	21:06	1 06:09 (WEA 02 (GRN))	19:55	18:41	16:32				15:55	
8	04:53	05:40		06:35	07:30	07:30				08:22	
	21:50	21:04		19:53	18:38	16:30				15:54	
9	04:54	05:41		06:37	07:32	07:32				08:23	
	21:49	21:02		19:50	18:36	16:28				15:54	
10	04:55	05:43		06:39	07:34	07:34				08:25	
	21:48	21:00		19:48	18:33	16:27				15:54	
11	04:56	05:45		06:41	07:36	07:36				08:26	
	21:47	20:58		19:45	18:31	16:25				15:53	
12	04:58	05:47	05:32 (WEA 01 (GRN))	06:43	07:38	07:38				08:27	
	21:46	20:56	4 05:36 (WEA 01 (GRN))	19:43	18:29	16:23				15:53	
13	04:59	05:49	05:32 (WEA 01 (GRN))	06:44	07:39	07:40				08:28	
	21:45	20:54	5 05:37 (WEA 01 (GRN))	19:40	18:26	16:22				15:53	
14	05:00	05:50	05:33 (WEA 01 (GRN))	06:46	07:41	07:42				08:29	
	21:44	20:52	5 05:38 (WEA 01 (GRN))	19:38	18:24	16:20				15:53	
15	05:01	05:52	05:34 (WEA 01 (GRN))	06:48	07:43	07:44				08:30	
	21:43	20:49	4 05:38 (WEA 01 (GRN))	19:35	18:21	16:18				15:53	1 09:48 (WEA 11 (GRS))
16	05:03	05:54	7 06:29 (WEA 05 (GRN))	06:50	07:45	07:46				08:31	5 09:50 (WEA 11 (GRS))
	21:42	20:47	7 06:23 (WEA 05 (GRN))	19:33	18:19	16:17				15:53	6 09:45 (WEA 11 (GRS))
17	05:04	05:56	7 06:30 (WEA 05 (GRN))	06:52	07:47	07:48				08:32	8 09:51 (WEA 11 (GRS))
	21:41	20:45	6 06:25 (WEA 05 (GRN))	19:30	18:17	16:15				15:53	6 09:45 (WEA 11 (GRS))
18	05:06	05:58	6 06:27 (WEA 05 (GRN))	06:53	07:49	07:49	08:38 (WEA 12 (GRS))			08:33	8 09:46 (WEA 11 (GRS))
	21:39	20:43	4 06:31 (WEA 05 (GRN))	19:28	18:14	16:14	7 08:45 (WEA 12 (GRS))			15:53	8 09:54 (WEA 11 (GRS))
19	05:07	05:59	6 06:28 (WEA 05 (GRN))	06:55	07:51	07:51	08:37 (WEA 12 (GRS))			08:33	8 09:46 (WEA 11 (GRS))
	21:38	20:41	2 06:30 (WEA 05 (GRN))	19:25	18:12	16:12	10 08:47 (WEA 12 (GRS))			15:54	9 09:55 (WEA 11 (GRS))
20	05:08	06:01		06:57	07:53	07:53	08:36 (WEA 12 (GRS))			08:34	9 09:46 (WEA 11 (GRS))
	21:37	20:38		19:23	18:10	16:11	12 08:48 (WEA 12 (GRS))			15:54	9 09:55 (WEA 11 (GRS))
21	05:10	06:03		06:59	07:55	07:55	08:35 (WEA 12 (GRS))			08:35	9 09:47 (WEA 11 (GRS))
	21:35	20:36		19:20	18:08	16:09	14 08:49 (WEA 12 (GRS))			15:54	9 09:56 (WEA 11 (GRS))
22	05:11	06:05	05:49 (WEA 04 (GRN))	07:01	07:57	07:57	08:35 (WEA 12 (GRS))			08:35	9 09:47 (WEA 11 (GRS))
	21:34	20:34	4 05:53 (WEA 04 (GRN))	19:18	18:05	16:08	15 08:50 (WEA 12 (GRS))			15:55	9 09:56 (WEA 11 (GRS))
23	05:13	06:07	05:47 (WEA 04 (GRN))	07:02	07:59	07:59	08:35 (WEA 12 (GRS))			08:36	9 09:48 (WEA 11 (GRS))
	21:33	20:31	7 05:54 (WEA 04 (GRN))	19:15	18:03	16:07	15 08:50 (WEA 12 (GRS))			15:55	9 09:57 (WEA 11 (GRS))
24	05:14	06:08	05:46 (WEA 04 (GRN))	07:04	08:01	08:00	08:35 (WEA 12 (GRS))			08:36	9 09:48 (WEA 11 (GRS))
	21:31	20:29	9 05:55 (WEA 04 (GRN))	19:13	18:01	16:06	16 08:51 (WEA 12 (GRS))			15:56	9 09:57 (WEA 11 (GRS))
25	05:16	06:10	05:48 (WEA 04 (GRN))	07:06	08:02	08:02	08:37 (WEA 12 (GRS))			08:36	9 09:48 (WEA 11 (GRS))
	21:29	20:27	8 05:56 (WEA 04 (GRN))	19:10	16:59	16:05	14 08:51 (WEA 12 (GRS))			15:57	9 09:57 (WEA 11 (GRS))
26	05:18	06:12	05:49 (WEA 04 (GRN))	07:08	08:04	08:04	08:38 (WEA 12 (GRS))			08:37	9 09:50 (WEA 11 (GRS))
	21:28	20:24	7 05:56 (WEA 04 (GRN))	19:08	16:56	16:03	13 08:51 (WEA 12 (GRS))			15:57	8 09:58 (WEA 11 (GRS))
27	05:19	06:14	05:51 (WEA 04 (GRN))	07:10	08:06	08:06	08:40 (WEA 12 (GRS))			08:37	9 09:51 (WEA 11 (GRS))
	21:26	20:22	6 05:57 (WEA 04 (GRN))	19:05	16:54	16:02	11 08:51 (WEA 12 (GRS))			15:58	7 09:58 (WEA 11 (GRS))
28	05:21	06:16	05:52 (WEA 04 (GRN))	07:12	08:08	08:07	08:42 (WEA 12 (GRS))			08:37	9 09:52 (WEA 11 (GRS))
	21:25	20:20	5 05:57 (WEA 04 (GRN))	19:03	16:52	16:01	10 08:52 (WEA 12 (GRS))			15:59	5 09:57 (WEA 11 (GRS))
29	05:23	06:17	05:54 (WEA 04 (GRN))	07:13	08:09	08:09	08:44 (WEA 12 (GRS))			08:37	9 09:54 (WEA 11 (GRS))
	21:23	20:17	3 05:57 (WEA 04 (GRN))	19:00	16:50	16:00	8 08:52 (WEA 12 (GRS))			16:00	3 09:57 (WEA 11 (GRS))
30	05:24	06:19	05:55 (WEA 04 (GRN))	07:15	08:11	08:11	08:46 (WEA 12 (GRS))			08:37	
	21:21	20:15	2 05:57 (WEA 04 (GRN))	18:58	16:48	15:59	6 08:52 (WEA 12 (GRS))			16:01	
31	05:26	06:21			07:14					08:37	
	21:19	20:12			16:46					16:02	
Sonnenscheinstunden	515	461		363	328	257	151			231	123
astr.max.mögl.Beschattung	79		34								

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schatteneende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 49 - IO 49 Bäderstraße 10 (Kabelhorst)  
**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	08:37	09:22 (WEA 11 (GRS))	08:06	07:08	06:52	05:42	06:08 (WEA 02 (GRN))	04:51
	16:03	18 09:40 (WEA 11 (GRS))	16:55	17:52	19:51	20:48	1 06:09 (WEA 02 (GRN))	21:39
2	08:37	09:23 (WEA 11 (GRS))	08:04	07:05	06:49	05:40	06:06 (WEA 02 (GRN))	04:50
	16:04	18 09:41 (WEA 11 (GRS))	16:57	17:54	19:53	20:50	2 06:08 (WEA 02 (GRN))	21:40
3	08:37	09:23 (WEA 11 (GRS))	08:03	07:03	06:47	05:37		04:49
	16:05	17 09:40 (WEA 11 (GRS))	16:59	17:56	19:55	20:51		21:41
4	08:37	09:25 (WEA 11 (GRS))	08:01	07:01	06:44	05:35		04:48
	16:07	16 09:41 (WEA 11 (GRS))	17:01	17:58	19:57	20:53		21:42
5	08:36	09:25 (WEA 11 (GRS))	07:59	06:58	06:42	05:33		04:48
	16:08	16 09:41 (WEA 11 (GRS))	17:03	18:00	19:59	20:55		21:43
6	08:36	09:26 (WEA 11 (GRS))	07:57	06:56	06:39	05:31	05:58 (WEA 04 (GRN))	04:47
	16:09	15 09:41 (WEA 11 (GRS))	17:05	18:02	20:01	20:57	2 06:00 (WEA 04 (GRN))	21:44
7	08:35	09:27 (WEA 11 (GRS))	07:55	06:54	06:37	05:29	05:56 (WEA 04 (GRN))	04:46
	16:11	14 09:41 (WEA 11 (GRS))	17:07	18:04	20:03	20:59	4 06:00 (WEA 04 (GRN))	21:45
8	08:35	09:28 (WEA 11 (GRS))	07:53	06:51	06:35	05:27	05:54 (WEA 04 (GRN))	04:46
	16:12	13 09:41 (WEA 11 (GRS))	17:09	18:06	20:05	21:01	5 05:59 (WEA 04 (GRN))	21:46
9	08:34	09:29 (WEA 11 (GRS))	07:51	06:49	06:32	05:26	05:53 (WEA 04 (GRN))	04:45
	16:14	11 09:40 (WEA 11 (GRS))	17:11	18:08	20:06	21:02	6 05:59 (WEA 04 (GRN))	21:47
10	08:34	09:30 (WEA 11 (GRS))	07:49	06:46	06:30	05:24	05:51 (WEA 04 (GRN))	04:44
	16:15	9 09:39 (WEA 11 (GRS))	17:14	18:10	20:08	21:04	7 05:58 (WEA 04 (GRN))	21:48
11	08:33	09:33 (WEA 11 (GRS))	07:47	06:44	06:27	05:22	05:51 (WEA 04 (GRN))	04:44
	16:17	6 09:39 (WEA 11 (GRS))	17:16	18:11	20:10	21:06	5 05:56 (WEA 04 (GRN))	21:49
12	08:32		07:45	06:41	06:25	05:20		04:44
	16:18		17:18	18:13	20:12	21:08		21:50
13	08:31		07:43	06:39	06:23	05:18		04:43
	16:20		17:20	18:15	20:14	21:09		21:50
14	08:30		07:41	06:36	06:20	05:16		04:43
	16:21		17:22	18:17	20:16	21:11		21:51
15	08:29		07:39	06:34	06:18	05:15		04:43
	16:23		17:24	18:19	20:18	21:13		21:52
16	08:28		07:37	06:32	06:15	05:13	05:41 (WEA 01 (GRN))	04:43
	16:25		17:26	18:21	20:20	21:15	2 05:43 (WEA 01 (GRN))	21:52
17	08:27		07:35	06:29	06:13	05:11	05:40 (WEA 01 (GRN))	04:42
	16:27		17:28	18:23	20:21	21:16	3 05:43 (WEA 01 (GRN))	21:53
18	08:26	08:57 (WEA 12 (GRS))	07:33	06:27	06:11	05:10	05:38 (WEA 01 (GRN))	04:42
	16:28	1 08:58 (WEA 12 (GRS))	17:30	18:25	20:23	21:18	3 05:41 (WEA 01 (GRN))	21:53
19	08:25	08:56 (WEA 12 (GRS))	07:31	06:24	06:08	05:08	05:37 (WEA 01 (GRN))	04:42
	16:30	3 08:59 (WEA 12 (GRS))	17:32	18:27	20:25	21:20	4 05:41 (WEA 01 (GRN))	21:54
20	08:24	08:55 (WEA 12 (GRS))	07:28	06:22	06:06	05:06	05:35 (WEA 43 (RW))	04:42
	16:32	6 09:01 (WEA 12 (GRS))	17:34	18:29	20:27	21:21	1 05:36 (WEA 43 (RW))	21:54
21	08:23	08:53 (WEA 12 (GRS))	07:26	06:19	06:04	05:05	06:29 (WEA 05 (GRN))	04:43
	16:34	7 09:00 (WEA 12 (GRS))	17:36	18:31	20:29	21:23	5 06:34 (WEA 05 (GRN))	21:54
22	08:21	08:52 (WEA 12 (GRS))	07:24	06:17	06:01	05:03	06:26 (WEA 05 (GRN))	04:43
	16:36	9 09:01 (WEA 12 (GRS))	17:38	18:32	20:31	21:24	6 06:32 (WEA 05 (GRN))	21:54
23	08:20	08:50 (WEA 12 (GRS))	07:22	06:14	05:59	05:02		04:43
	16:38	11 09:01 (WEA 12 (GRS))	17:40	18:34	20:33	21:26		21:55
24	08:19	08:49 (WEA 12 (GRS))	07:19	06:12	05:57	05:01		04:43
	16:39	13 09:02 (WEA 12 (GRS))	17:42	18:36	20:35	21:27		21:55
25	08:17	08:48 (WEA 12 (GRS))	07:17	06:09	05:55	04:59		04:44
	16:41	13 09:01 (WEA 12 (GRS))	17:44	18:38	20:36	21:29		21:55
26	08:16	08:49 (WEA 12 (GRS))	07:15	06:07	05:52	04:58		04:44
	16:43	11 09:00 (WEA 12 (GRS))	17:46	18:40	20:38	21:30		21:55
27	08:14	08:51 (WEA 12 (GRS))	07:13	06:04	05:50	04:57		04:45
	16:45	9 09:00 (WEA 12 (GRS))	17:48	18:42	20:40	21:32		21:55
28	08:13	08:52 (WEA 12 (GRS))	07:10	06:02	05:48	04:56		04:45
	16:47	7 08:59 (WEA 12 (GRS))	17:50	18:44	20:42	21:33		21:54
29	08:11			06:59	05:46	04:54		04:46
	16:49			19:46	20:44	21:35		21:54
30	08:10			06:57	05:44	04:53		04:46
	16:51			19:48	20:46	21:36		21:54
31	08:08			06:54		04:52		
	16:53			19:49		21:37		
Sonnenscheinstunden	248					496		513
astr. max. mögl. Beschattung	243	272	367	421	16	45		

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:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6,0) **Schattenrezeptor:** IO 49 - IO 49 Bäderstraße 10 (Kabelhorst)

### 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

Juli		August		September		Oktober		November		Dezember	
1	04:47	05:28		06:23	07:17	07:16				08:12	09:15 (WEA 11 (GRS))
	21:54	21:18		20:10	18:55	16:44				15:59	6 09:21 (WEA 11 (GRS))
2	04:48	05:29	06:01 (WEA 04 (GRN))	06:25	07:19	07:18				08:14	09:13 (WEA 11 (GRS))
	21:53	21:16	6 06:07 (WEA 04 (GRN))	20:08	18:53	16:42				15:58	9 09:22 (WEA 11 (GRS))
3	04:48	05:31	06:02 (WEA 04 (GRN))	06:26	07:21	07:20				08:15	09:13 (WEA 11 (GRS))
	21:53	21:14	7 06:09 (WEA 04 (GRN))	20:05	18:50	16:40				15:57	11 09:24 (WEA 11 (GRS))
4	04:49	05:33	06:03 (WEA 04 (GRN))	06:28	07:23	07:22				08:17	09:12 (WEA 11 (GRS))
	21:52	21:12	6 06:09 (WEA 04 (GRN))	20:03	18:48	16:38				15:56	13 09:25 (WEA 11 (GRS))
5	04:50	05:34	06:05 (WEA 04 (GRN))	06:30	07:24	07:24				08:18	09:12 (WEA 11 (GRS))
	21:52	21:10	5 06:10 (WEA 04 (GRN))	20:00	18:46	16:36				15:56	14 09:26 (WEA 11 (GRS))
6	04:51	05:36	06:07 (WEA 04 (GRN))	06:32	07:26	07:26				08:20	09:12 (WEA 11 (GRS))
	21:51	21:08	3 06:10 (WEA 04 (GRN))	19:58	18:43	16:34				15:55	15 09:27 (WEA 11 (GRS))
7	04:52	05:38	06:08 (WEA 04 (GRN))	06:34	07:28	07:28				08:21	09:12 (WEA 11 (GRS))
	21:50	21:06	2 06:10 (WEA 04 (GRN))	19:55	18:41	16:32				15:55	16 09:28 (WEA 11 (GRS))
8	04:53	05:40		06:35	07:30	07:30				08:22	09:12 (WEA 11 (GRS))
	21:50	21:04		19:53	18:38	16:30				15:54	16 09:28 (WEA 11 (GRS))
9	04:54	05:41		06:37	07:32	07:32				08:23	09:13 (WEA 11 (GRS))
	21:49	21:02		19:50	18:36	16:28				15:54	16 09:29 (WEA 11 (GRS))
10	04:55	05:43	06:13 (WEA 02 (GRN))	06:39	07:34	07:34				08:25	09:12 (WEA 11 (GRS))
	21:48	21:00	1 06:14 (WEA 02 (GRN))	19:48	18:33	16:27				15:54	18 09:30 (WEA 11 (GRS))
11	04:56	05:45	06:15 (WEA 02 (GRN))	06:41	07:36	07:36				08:26	09:13 (WEA 11 (GRS))
	21:47	20:58	2 06:17 (WEA 02 (GRN))	19:45	18:31	16:25				15:53	17 09:30 (WEA 11 (GRS))
12	04:58	05:47	06:17 (WEA 02 (GRN))	06:43	07:38	07:38				08:27	09:13 (WEA 11 (GRS))
	21:46	20:56	1 06:18 (WEA 02 (GRN))	19:43	18:29	16:23				15:53	18 09:31 (WEA 11 (GRS))
13	04:59	05:49		06:44	07:39	07:40				08:28	09:13 (WEA 11 (GRS))
	21:45	20:54		19:40	18:26	16:22				15:53	18 09:31 (WEA 11 (GRS))
14	05:00	05:50		06:46	07:41	07:42	08:24 (WEA 12 (GRS))			08:29	09:14 (WEA 11 (GRS))
	21:44	20:52		19:38	18:24	16:20	7 08:31 (WEA 12 (GRS))			15:53	19 09:33 (WEA 11 (GRS))
15	05:01	05:52		06:48	07:43	07:44	08:22 (WEA 12 (GRS))			08:30	09:15 (WEA 11 (GRS))
	21:43	20:49		19:35	18:21	16:18	10 08:32 (WEA 12 (GRS))			15:53	18 09:33 (WEA 11 (GRS))
16	05:03	05:54		06:50	07:45	07:46	08:22 (WEA 12 (GRS))			08:31	09:14 (WEA 11 (GRS))
	21:42	20:47		19:33	18:19	16:17	11 08:33 (WEA 12 (GRS))			15:53	19 09:33 (WEA 11 (GRS))
17	05:04	05:56		06:52	07:47	07:48	08:21 (WEA 12 (GRS))			08:32	09:15 (WEA 11 (GRS))
	21:41	20:45		19:30	18:17	16:15	13 08:34 (WEA 12 (GRS))			15:53	18 09:33 (WEA 11 (GRS))
18	05:06	05:58		06:53	07:49	07:49	08:23 (WEA 12 (GRS))			08:33	09:15 (WEA 11 (GRS))
	21:39	20:43		19:28	18:14	16:14	13 08:36 (WEA 12 (GRS))			15:53	19 09:34 (WEA 11 (GRS))
19	05:07	05:59		06:55	07:51	07:51	08:25 (WEA 12 (GRS))			08:33	09:16 (WEA 11 (GRS))
	21:38	20:41		19:25	18:12	16:12	11 08:36 (WEA 12 (GRS))			15:54	19 09:35 (WEA 11 (GRS))
20	05:08	06:01	06:33 (WEA 05 (GRN))	06:57	07:53	07:53	08:27 (WEA 12 (GRS))			08:34	09:16 (WEA 11 (GRS))
	21:37	20:38	2 06:35 (WEA 05 (GRN))	19:23	18:10	16:11	9 08:36 (WEA 12 (GRS))			15:54	19 09:35 (WEA 11 (GRS))
21	05:10	06:03	06:32 (WEA 05 (GRN))	06:59	07:55	07:55	08:29 (WEA 12 (GRS))			08:35	09:17 (WEA 11 (GRS))
	21:35	20:36	5 06:37 (WEA 05 (GRN))	19:20	18:08	16:09	8 08:37 (WEA 12 (GRS))			15:54	19 09:36 (WEA 11 (GRS))
22	05:11	06:05	06:33 (WEA 05 (GRN))	07:01	07:57	07:57	08:31 (WEA 12 (GRS))			08:35	09:17 (WEA 11 (GRS))
	21:34	20:34	5 06:38 (WEA 05 (GRN))	19:18	18:05	16:08	6 08:37 (WEA 12 (GRS))			15:55	19 09:36 (WEA 11 (GRS))
23	05:13	06:07	06:35 (WEA 05 (GRN))	07:02	07:59	07:59	08:33 (WEA 12 (GRS))			08:36	09:18 (WEA 11 (GRS))
	21:33	1 05:45 (WEA 43 (RW))	20:31	3 06:38 (WEA 05 (GRN))	19:15	18:03	16:07	4 08:37 (WEA 12 (GRS))		15:55	19 09:37 (WEA 11 (GRS))
24	05:14	05:46 (WEA 01 (GRN))	06:08	06:37 (WEA 05 (GRN))	07:04	08:01	08:00	08:35 (WEA 12 (GRS))		08:36	09:18 (WEA 11 (GRS))
	21:31	4 05:50 (WEA 01 (GRN))	20:29	1 06:38 (WEA 05 (GRN))	19:13	18:01	16:06	1 08:36 (WEA 12 (GRS))		15:56	19 09:37 (WEA 11 (GRS))
25	05:16	05:48 (WEA 01 (GRN))	06:10		07:06	07:03	08:02			08:36	09:18 (WEA 11 (GRS))
	21:30	4 05:52 (WEA 01 (GRN))	20:27		19:10	16:59	16:05			15:57	19 09:37 (WEA 11 (GRS))
26	05:18	05:49 (WEA 01 (GRN))	06:12		07:08	07:04	08:04			08:37	09:20 (WEA 11 (GRS))
	21:28	3 05:52 (WEA 01 (GRN))	20:24		19:08	16:56	16:03			15:57	18 09:38 (WEA 11 (GRS))
27	05:19	05:51 (WEA 01 (GRN))	06:14		07:10	07:06	08:06			08:37	09:20 (WEA 11 (GRS))
	21:26	2 05:53 (WEA 01 (GRN))	20:22		19:05	16:54	16:02			15:58	19 09:39 (WEA 11 (GRS))
28	05:21	05:52 (WEA 01 (GRN))	06:16		07:12	07:08	08:07			08:37	09:20 (WEA 11 (GRS))
	21:25	1 05:53 (WEA 01 (GRN))	20:20		19:03	16:52	16:01			15:59	19 09:39 (WEA 11 (GRS))
29	05:23		06:17		07:13	07:10	08:09			08:37	09:21 (WEA 11 (GRS))
	21:23		20:17		19:00	16:50	16:00			16:00	18 09:39 (WEA 11 (GRS))
30	05:24		06:19		07:15	07:12	08:11			08:37	09:22 (WEA 11 (GRS))
	21:21		20:15		18:58	16:48	15:59			16:01	18 09:40 (WEA 11 (GRS))
31	05:26		06:21			07:14				08:37	09:21 (WEA 11 (GRS))
	21:19		20:12			16:46				16:02	18 09:39 (WEA 11 (GRS))
Sonnenscheinstunden	515	461	363	328	257	93	231			523	
astr.max.mögl.Beschattung	15	49									

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) Schatteneende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 50 - IO 50 Schmiedeberg 26 (Kabelhorst)

### 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	08:37	08:06	07:08		06:52	8	07:17 (WEA 05 (GRN))	05:42	06:08 (WEA 43 (RW))	04:51	05:22 (WEA 23 (Kab))	
	16:03	16:55	17:52		19:51		07:25 (WEA 05 (GRN))	20:48	20:18 (WEA 32 (LR))	21:39	05:28 (WEA 23 (Kab))	
2	08:37	08:04	07:05		06:49			05:40	06:07 (WEA 43 (RW))	04:50	05:21 (WEA 23 (Kab))	
	16:04	16:57	17:54		19:53			20:50	20:20 (WEA 32 (LR))	21:40	05:28 (WEA 23 (Kab))	
3	08:37	08:03	07:03		06:47			05:37	20:14 (WEA 32 (LR))	04:49	05:21 (WEA 23 (Kab))	
	16:05	16:59	17:56		19:55			20:51	20:21 (WEA 32 (LR))	21:41	05:29 (WEA 23 (Kab))	
4	08:37	08:01	07:01		06:44			05:35	20:14 (WEA 32 (LR))	04:48	05:20 (WEA 23 (Kab))	
	16:07	17:01	17:58		19:57			20:53	20:23 (WEA 32 (LR))	21:42	05:29 (WEA 23 (Kab))	
5	08:36	07:59	06:58		06:42			05:33	20:14 (WEA 32 (LR))	04:48	05:19 (WEA 41 (RW))	
	16:08	17:03	18:00		19:59	1	07:06 (WEA 03 (GRN))	20:55	20:24 (WEA 32 (LR))	21:43	05:29 (WEA 23 (Kab))	
6	08:36	07:57	06:56		06:39		07:07 (WEA 03 (GRN))	05:31	20:13 (WEA 32 (LR))	04:47	05:19 (WEA 41 (RW))	
	16:09	17:05	18:02		20:01			20:57	20:26 (WEA 32 (LR))	21:44	05:30 (WEA 23 (Kab))	
7	08:35	07:55	06:54		06:37			05:29	20:13 (WEA 32 (LR))	04:46	05:18 (WEA 41 (RW))	
	16:11	17:07	18:04		20:03			20:59	20:27 (WEA 32 (LR))	21:45	05:29 (WEA 23 (Kab))	
8	08:35	07:53	06:51		06:35			05:27	20:14 (WEA 32 (LR))	04:46	05:18 (WEA 41 (RW))	
	16:12	17:09	18:06		20:05			21:01	20:27 (WEA 32 (LR))	21:46	05:30 (WEA 23 (Kab))	
9	08:34	07:51	06:49		06:32			05:25	20:15 (WEA 32 (LR))	04:45	05:17 (WEA 41 (RW))	
	16:14	17:11	18:08		20:06			21:02	20:27 (WEA 32 (LR))	21:47	05:29 (WEA 23 (Kab))	
10	08:34	07:49	06:46		06:30			05:24	20:16 (WEA 32 (LR))	04:44	05:17 (WEA 41 (RW))	
	16:15	17:14	18:09		20:08			21:04	20:26 (WEA 32 (LR))	21:48	05:30 (WEA 23 (Kab))	
11	08:33	07:47	06:44		06:27			05:22	20:17 (WEA 32 (LR))	04:44	05:17 (WEA 41 (RW))	
	16:17	17:16	18:11		20:10	3	06:54 (WEA 04 (GRN))	21:06	20:24 (WEA 32 (LR))	21:49	05:30 (WEA 23 (Kab))	
12	08:32	07:45	06:41		06:25			05:20		04:44	05:16 (WEA 41 (RW))	
	16:18	17:18	18:13		20:12	6	06:55 (WEA 04 (GRN))	21:08		21:50	05:29 (WEA 23 (Kab))	
13	08:31	07:43	06:39		06:22			05:18		04:43	05:16 (WEA 41 (RW))	
	16:20	17:20	18:15		20:14	8	06:56 (WEA 04 (GRN))	21:09		21:51	05:30 (WEA 23 (Kab))	
14	08:30	07:41	06:36		06:20			05:16		04:43	05:16 (WEA 41 (RW))	
	16:21	17:22	18:17		20:16	10	06:54 (WEA 04 (GRN))	21:11		21:51	05:30 (WEA 23 (Kab))	
15	08:29	07:39	06:34		06:18			05:15		04:43	05:16 (WEA 41 (RW))	
	16:23	17:24	18:19		20:18	11	06:53 (WEA 04 (GRN))	21:13		21:52	05:30 (WEA 23 (Kab))	
16	08:28	07:37	06:32		06:15			05:13		04:43	05:16 (WEA 41 (RW))	
	16:25	17:26	18:21		20:20	10	06:52 (WEA 04 (GRN))	21:15		21:52	05:30 (WEA 23 (Kab))	
17	08:27	07:35	06:29		06:13			05:11		04:42	05:16 (WEA 41 (RW))	
	16:27	17:28	18:23		20:21	7	06:50 (WEA 04 (GRN))	21:16		21:53	05:31 (WEA 23 (Kab))	
18	08:26	07:33	06:27		06:11			05:10		04:42	05:16 (WEA 41 (RW))	
	16:28	17:30	18:25		20:23			21:18		21:53	05:31 (WEA 23 (Kab))	
19	08:25	07:31	06:24		06:08			05:08		04:42	05:16 (WEA 41 (RW))	
	16:30	17:32	18:27		20:25			21:20		21:54	05:31 (WEA 23 (Kab))	
20	08:24	07:28	06:22		06:06			05:06		04:42	05:16 (WEA 41 (RW))	
	16:32	17:34	18:29		20:27			21:21		21:54	05:31 (WEA 23 (Kab))	
21	08:23	07:26	06:19		06:04			05:05		04:43	05:16 (WEA 41 (RW))	
	16:34	17:36	18:31		20:29			21:23		21:54	05:31 (WEA 23 (Kab))	
22	08:21	07:24	06:17		06:01			05:03		04:43	05:16 (WEA 41 (RW))	
	16:36	17:38	18:32		20:31			21:24		21:54	05:31 (WEA 23 (Kab))	
23	08:20	07:22	06:14		05:59			05:02		04:43	05:17 (WEA 41 (RW))	
	16:38	17:40	18:34		20:33	3	06:27 (WEA 01 (GRN))	21:26		21:55	05:32 (WEA 23 (Kab))	
24	08:19	07:19	06:12		05:57			05:01		04:43	05:17 (WEA 41 (RW))	
	16:39	17:42	18:36		20:35	5	06:27 (WEA 01 (GRN))	21:27		21:55	05:32 (WEA 23 (Kab))	
25	08:17	07:17	06:09		05:55			04:59		04:44	05:17 (WEA 41 (RW))	
	16:41	17:44	18:38		20:36	6	06:26 (WEA 01 (GRN))	21:29		21:55	05:32 (WEA 23 (Kab))	
26	08:16	07:15	06:07		05:52			04:58		04:44	05:18 (WEA 41 (RW))	
	16:43	17:46	18:40		20:38	8	06:26 (WEA 01 (GRN))	21:30		21:55	05:32 (WEA 23 (Kab))	
27	08:14	07:13	06:04		05:50			04:57		04:44	05:18 (WEA 41 (RW))	
	16:45	17:48	18:42		20:40	9	06:25 (WEA 01 (GRN))	21:32		21:55	05:32 (WEA 23 (Kab))	
28	08:13	07:10	06:02		05:48			04:55		04:45	05:19 (WEA 41 (RW))	
	16:47	17:50	18:44	2	06:27 (WEA 05 (GRN))	6	06:23 (WEA 01 (GRN))	21:33	1	05:26 (WEA 23 (Kab))	21:54	05:33 (WEA 23 (Kab))
29	08:11		06:59		05:46			04:54		04:46	05:19 (WEA 41 (RW))	
	16:49		19:46	5	07:28 (WEA 05 (GRN))	3	06:15 (WEA 43 (RW))	21:35	2	05:27 (WEA 23 (Kab))	21:54	05:33 (WEA 23 (Kab))
30	08:10		06:57		05:44			04:53		04:46	05:20 (WEA 41 (RW))	
	16:51		19:48	7	07:28 (WEA 05 (GRN))	4	06:14 (WEA 43 (RW))	21:36	4	05:28 (WEA 23 (Kab))	21:54	05:34 (WEA 23 (Kab))
31	08:08		06:54		05:44			04:52		04:45	05:23 (WEA 23 (Kab))	
	16:53		19:49	8	07:26 (WEA 05 (GRN))			21:37	5	05:28 (WEA 23 (Kab))		
Sonnenscheinstunden	248	272	367		421			496			513	386
astr.max.mögl.Beschattung				22		108			123			

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:

**SWP Windpark Großenholz**

Lizenzierter Anwender:

**GL Garrad Hassan Deutschland GmbH**  
Sommerdeich 14 b  
DE-25709 Kaiser-Wilhelm-Koog  
(0 48 56)901-0



Berechnet:

22.06.2022 20:19/3.5.584

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 50 - IO 50 Schmiedeberg 26 (Kabelhorst)

### 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

Juli		August		September		Oktober		November		Dezember	
1	04:47	05:21 (WEA 41 (RW))	05:28	20:30 (WEA 32 (LR))	06:23	06:51 (WEA 04 (GRN))	07:17	07:16	08:12		
	21:54	13 05:34 (WEA 23 (Kab))	21:18	3 20:33 (WEA 32 (LR))	20:10	3 06:54 (WEA 04 (GRN))	18:55	16:44	15:59		
2	04:48	05:21 (WEA 41 (RW))	05:29	20:27 (WEA 32 (LR))	06:25		07:19	07:18	08:14		
	21:53	13 05:34 (WEA 23 (Kab))	21:16	8 20:35 (WEA 32 (LR))	20:08		18:53	16:42	15:58		
3	04:48	05:22 (WEA 41 (RW))	05:31	20:26 (WEA 32 (LR))	06:26		07:21	07:20	08:15		
	21:53	12 05:34 (WEA 23 (Kab))	21:14	10 20:36 (WEA 32 (LR))	20:05		18:50	16:40	15:57		
4	04:49	05:23 (WEA 41 (RW))	05:33	20:24 (WEA 32 (LR))	06:28		07:23	07:22	08:17		
	21:52	12 05:35 (WEA 23 (Kab))	21:12	13 20:37 (WEA 32 (LR))	20:03		18:48	16:38	15:56		
5	04:50	05:24 (WEA 41 (RW))	05:34	20:24 (WEA 32 (LR))	06:30		07:24	07:24	08:18		
	21:52	11 05:35 (WEA 23 (Kab))	21:10	14 20:38 (WEA 32 (LR))	20:00		18:46	16:36	15:56		
6	04:51	05:25 (WEA 41 (RW))	05:36	20:24 (WEA 32 (LR))	06:32		07:26	07:26	08:20		
	21:51	11 05:36 (WEA 23 (Kab))	21:08	13 20:37 (WEA 32 (LR))	19:58		18:43	16:34	15:55		
7	04:52	05:26 (WEA 41 (RW))	05:38	20:23 (WEA 32 (LR))	06:34	07:01 (WEA 03 (GRN))	07:28	07:28	08:21		
	21:50	10 05:36 (WEA 23 (Kab))	21:06	12 20:35 (WEA 32 (LR))	19:55	1 07:02 (WEA 03 (GRN))	18:41	16:32	15:55		
8	04:53	05:27 (WEA 23 (Kab))	05:40	20:23 (WEA 32 (LR))	06:35		07:30	07:30	08:22		
	21:50	9 05:36 (WEA 23 (Kab))	21:04	10 20:33 (WEA 32 (LR))	19:53	1 07:04 (WEA 03 (GRN))	18:38	16:30	15:54		
9	04:54	05:28 (WEA 23 (Kab))	05:41	20:23 (WEA 32 (LR))	06:37		07:32	07:32	08:24		
	21:49	9 05:37 (WEA 23 (Kab))	21:02	9 20:32 (WEA 32 (LR))	19:50		18:36	16:28	15:54		
10	04:55	05:29 (WEA 23 (Kab))	05:43	20:23 (WEA 32 (LR))	06:39		07:34	07:34	08:25		
	21:48	8 05:37 (WEA 23 (Kab))	21:00	6 20:29 (WEA 32 (LR))	19:48		18:33	16:27	15:54		
11	04:56	05:30 (WEA 23 (Kab))	05:45	06:15 (WEA 43 (RW))	06:41	07:10 (WEA 05 (GRN))	07:36	07:36	08:26		
	21:47	7 05:37 (WEA 23 (Kab))	20:58	9 20:28 (WEA 32 (LR))	19:45	7 07:17 (WEA 05 (GRN))	18:31	16:25	15:53		
12	04:58	05:31 (WEA 23 (Kab))	05:47	06:16 (WEA 43 (RW))	06:43	07:10 (WEA 05 (GRN))	07:38	07:38	08:27		
	21:46	5 05:36 (WEA 23 (Kab))	20:56	6 20:25 (WEA 32 (LR))	19:43	8 07:18 (WEA 05 (GRN))	18:29	16:23	15:53		
13	04:59	05:32 (WEA 23 (Kab))	05:49	06:18 (WEA 43 (RW))	06:44	07:11 (WEA 05 (GRN))	07:39	07:40	08:28		
	21:45	4 05:36 (WEA 23 (Kab))	20:54	4 06:22 (WEA 43 (RW))	19:40	7 07:18 (WEA 05 (GRN))	18:26	16:21	15:53		
14	05:00	05:33 (WEA 23 (Kab))	05:50	06:20 (WEA 43 (RW))	06:46	07:13 (WEA 05 (GRN))	07:41	07:42	08:29		
	21:44	3 05:36 (WEA 23 (Kab))	20:52	2 06:22 (WEA 43 (RW))	19:38	5 07:18 (WEA 05 (GRN))	18:24	16:20	15:53		
15	05:01	05:34 (WEA 23 (Kab))	05:52	06:25 (WEA 01 (GRN))	06:48	07:15 (WEA 05 (GRN))	07:43	07:44	08:30		
	21:43	1 05:35 (WEA 23 (Kab))	20:49	6 06:31 (WEA 01 (GRN))	19:35	3 07:18 (WEA 05 (GRN))	18:21	16:18	15:53		
16	05:03		05:54	06:23 (WEA 01 (GRN))	06:50		07:45	07:46	08:31		
	21:42		20:47	8 06:31 (WEA 01 (GRN))	19:33		18:19	16:17	15:53		
17	05:04		05:56	06:25 (WEA 01 (GRN))	06:52		07:47	07:48	08:32		
	21:41		20:45	7 06:32 (WEA 01 (GRN))	19:30		18:17	16:15	15:53		
18	05:05		05:58	06:27 (WEA 01 (GRN))	06:53		07:49	07:49	08:33		
	21:39		20:43	6 06:33 (WEA 01 (GRN))	19:28		18:14	16:14	15:53		
19	05:07		05:59	06:28 (WEA 01 (GRN))	06:55		07:51	07:51	08:33		
	21:38		20:41	4 06:32 (WEA 01 (GRN))	19:25		18:12	16:12	15:54		
20	05:08		06:01	06:30 (WEA 01 (GRN))	06:57		07:53	07:53	08:34		
	21:37		20:38	2 06:32 (WEA 01 (GRN))	19:23		18:10	16:11	15:54		
21	05:10		06:03		06:59		07:55	07:55	08:35		
	21:35		20:36		19:20		18:08	16:09	15:54		
22	05:11		06:05		07:01		07:57	07:57	08:35		
	21:34		20:34		19:18		18:05	16:08	15:55		
23	05:13		06:07		07:02		07:59	07:59	08:36		
	21:33		20:31		19:15		18:03	16:07	15:55		
24	05:14		06:08		07:04		08:01	08:00	08:36		
	21:31		20:29		19:13		18:01	16:06	15:56		
25	05:16		06:10		07:06		08:03	08:02	08:36		
	21:30		20:27		19:10		16:59	16:04	15:57		
26	05:18		06:12	06:45 (WEA 04 (GRN))	07:08		07:04	08:04	08:37		
	21:28		20:24	8 06:53 (WEA 04 (GRN))	19:08		16:56	16:03	15:57		
27	05:19		06:14	06:44 (WEA 04 (GRN))	07:10		07:06	08:06	08:37		
	21:26		20:22	10 06:54 (WEA 04 (GRN))	19:05		16:54	16:02	15:58		
28	05:21		06:16	06:44 (WEA 04 (GRN))	07:12		07:08	08:07	08:37		
	21:25		20:20	11 06:55 (WEA 04 (GRN))	19:03		16:52	16:01	15:59		
29	05:22		06:17	06:45 (WEA 04 (GRN))	07:13		07:10	08:09	08:37		
	21:23		20:17	10 06:55 (WEA 04 (GRN))	19:00		16:50	16:00	16:00		
30	05:24		06:19	06:47 (WEA 04 (GRN))	07:15		07:12	08:11	08:37		
	21:21		20:15	8 06:55 (WEA 04 (GRN))	18:58		16:48	15:59	16:01		
31	05:26		06:21	06:49 (WEA 04 (GRN))			07:14		08:37		
	21:19		20:12	6 06:55 (WEA 04 (GRN))			16:46		16:02		
Sonneneinstunden	515		461		383		328	257	231		
astr. max. mögl. Beschattung	128		205		35						

**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	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 51 - IO 51 Grünbeck 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 Sonneneinstrahlungsrichtung
- Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni	
1	08:37	08:06		07:08	07:46 (WEA 04 (GRN))	06:52	07:22 (WEA 43 (RW))	05:42	06:08 (WEA 41 (RW))	04:51	05:33 (WEA K04)
	16:03	16:55		17:52	07:58 (WEA 04 (GRN))	19:51	19:25 (WEA 33 (LR))	20:48	06:12 (WEA 41 (RW))	21:39	05:54 (WEA 25 (Kab))
2	08:37	08:04		07:05	07:47 (WEA 04 (GRN))	06:49	07:24 (WEA 43 (RW))	05:39	06:08 (WEA 41 (RW))	04:50	05:34 (WEA K04)
	16:04	16:57		17:54	07:55 (WEA 04 (GRN))	19:53	19:26 (WEA 33 (LR))	20:50	06:12 (WEA 41 (RW))	21:40	05:54 (WEA 25 (Kab))
3	08:37	08:03		07:03		06:47	19:15 (WEA 33 (LR))	05:37	06:04 (WEA 41 (RW))	04:49	05:36 (WEA K04)
	16:05	16:59		17:56		19:55	19:28 (WEA 33 (LR))	20:51	06:13 (WEA 41 (RW))	21:41	05:55 (WEA 25 (Kab))
4	08:37	08:01		07:01		06:44	19:15 (WEA 33 (LR))	05:35	06:02 (WEA 41 (RW))	04:48	05:37 (WEA K04)
	16:07	17:01		17:58		19:57	19:28 (WEA 33 (LR))	20:53	06:13 (WEA 41 (RW))	21:42	05:54 (WEA 25 (Kab))
5	08:36	07:59		06:58	07:23 (WEA 03 (GRN))	06:42	19:17 (WEA 33 (LR))	05:33	06:08 (WEA 41 (RW))	04:48	05:18 (WEA 40 (RW))
	16:08	17:03		18:00	07:24 (WEA 03 (GRN))	19:59	19:27 (WEA 33 (LR))	20:55	06:13 (WEA 41 (RW))	21:43	05:54 (WEA 25 (Kab))
6	08:36	07:57		06:56	07:20 (WEA 03 (GRN))	06:39	19:18 (WEA 33 (LR))	05:31	06:08 (WEA 41 (RW))	04:47	05:19 (WEA 40 (RW))
	16:09	17:05		18:02	07:23 (WEA 03 (GRN))	20:01	19:23 (WEA 33 (LR))	20:57	06:12 (WEA 41 (RW))	21:44	05:54 (WEA 25 (Kab))
7	08:35	07:55		06:54	07:18 (WEA 03 (GRN))	06:37		05:29	06:07 (WEA 41 (RW))	04:46	05:18 (WEA 40 (RW))
	16:11	17:07		18:04	07:23 (WEA 03 (GRN))	20:03		20:59	06:12 (WEA 41 (RW))	21:45	05:53 (WEA 25 (Kab))
8	08:35	07:53		06:51	07:15 (WEA 03 (GRN))	06:35		05:27	06:08 (WEA 41 (RW))	04:45	05:18 (WEA 40 (RW))
	16:12	17:09		18:06	07:21 (WEA 03 (GRN))	20:04		21:01	06:11 (WEA 41 (RW))	21:46	05:53 (WEA 25 (Kab))
9	08:34	07:51		06:49	07:13 (WEA 02 (GRN))	06:32		05:25	06:09 (WEA 41 (RW))	04:45	05:17 (WEA 40 (RW))
	16:14	17:11		18:08	07:19 (WEA 02 (GRN))	20:06		21:02	06:11 (WEA 41 (RW))	21:47	05:53 (WEA 25 (Kab))
10	08:34	07:49		06:46	07:10 (WEA 02 (GRN))	06:30		05:24	06:00 (WEA 41 (RW))	04:44	05:17 (WEA 40 (RW))
	16:15	17:13		18:09	07:18 (WEA 02 (GRN))	20:08		21:04	06:10 (WEA 41 (RW))	21:48	05:53 (WEA 25 (Kab))
11	08:33	07:47		06:44	07:08 (WEA 02 (GRN))	06:27		05:22	06:01 (WEA 41 (RW))	04:44	05:18 (WEA 40 (RW))
	16:17	17:16		18:11	07:18 (WEA 02 (GRN))	20:10		21:06	06:08 (WEA 41 (RW))	21:49	05:52 (WEA 25 (Kab))
12	08:32	07:45		06:41	07:05 (WEA 01 (GRN))	06:25		05:20	06:00 (WEA 41 (RW))	04:44	05:16 (WEA 40 (RW))
	16:18	17:18		18:13	07:17 (WEA 02 (GRN))	20:12		21:08	06:09 (WEA 41 (RW))	21:50	05:52 (WEA 25 (Kab))
13	08:31	07:43	08:10 (WEA 05 (GRN))	06:39	07:03 (WEA 01 (GRN))	06:22		05:18	06:05 (WEA 41 (RW))	04:43	05:16 (WEA 40 (RW))
	16:20	17:20	08:13 (WEA 05 (GRN))	18:15	07:15 (WEA 02 (GRN))	20:14		21:09	06:11 (WEA 41 (RW))	21:51	05:51 (WEA 25 (Kab))
14	08:30	07:41	08:08 (WEA 05 (GRN))	06:36	07:00 (WEA 01 (GRN))	06:20		05:16	06:04 (WEA 41 (RW))	04:43	05:18 (WEA 40 (RW))
	16:21	17:22	08:14 (WEA 05 (GRN))	18:17	07:11 (WEA 02 (GRN))	20:16		21:11	06:10 (WEA 41 (RW))	21:51	05:51 (WEA 25 (Kab))
15	08:29	07:39	08:05 (WEA 05 (GRN))	06:34	06:58 (WEA 01 (GRN))	06:18		05:15	06:04 (WEA 41 (RW))	04:43	05:16 (WEA 40 (RW))
	16:23	17:24	08:13 (WEA 05 (GRN))	18:19	07:10 (WEA 01 (GRN))	20:18		21:13	06:09 (WEA 41 (RW))	21:52	05:51 (WEA 25 (Kab))
16	08:28	07:37	08:03 (WEA 05 (GRN))	06:32	06:55 (WEA 01 (GRN))	06:15		05:13	06:04 (WEA 41 (RW))	04:42	05:16 (WEA 40 (RW))
	16:25	17:26	08:14 (WEA 05 (GRN))	18:21	07:09 (WEA 01 (GRN))	20:20		21:15	06:09 (WEA 41 (RW))	21:52	05:50 (WEA 25 (Kab))
17	08:27	07:35	08:01 (WEA 05 (GRN))	06:29	06:53 (WEA 01 (GRN))	06:13		05:11	06:07 (WEA 41 (RW))	04:42	05:16 (WEA 40 (RW))
	16:27	17:28	08:14 (WEA 05 (GRN))	18:23	07:09 (WEA 01 (GRN))	20:21		21:16	06:10 (WEA 41 (RW))	21:53	05:51 (WEA 25 (Kab))
18	08:26	07:33	08:01 (WEA 05 (GRN))	06:27	06:53 (WEA 01 (GRN))	06:11		05:10	06:07 (WEA 41 (RW))	04:42	05:16 (WEA 40 (RW))
	16:28	17:30	08:14 (WEA 05 (GRN))	18:25	07:18 (WEA 02 (GRN))	20:23		21:18	06:11 (WEA 41 (RW))	21:53	05:51 (WEA 25 (Kab))
19	08:25	07:31	08:01 (WEA 05 (GRN))	06:24	06:54 (WEA 01 (GRN))	06:08		05:08	06:06 (WEA 41 (RW))	04:42	05:16 (WEA 40 (RW))
	16:30	17:32	08:12 (WEA 05 (GRN))	18:27	07:10 (WEA 01 (GRN))	20:25		21:20	06:12 (WEA 41 (RW))	21:54	05:51 (WEA 25 (Kab))
20	08:24	07:28	07:54 (WEA 04 (GRN))	06:22	06:54 (WEA 01 (GRN))	06:06		05:06	06:04 (WEA 41 (RW))	04:42	05:16 (WEA 40 (RW))
	16:32	17:34	08:11 (WEA 05 (GRN))	18:29	07:11 (WEA 02 (GRN))	20:27		21:21	06:11 (WEA 41 (RW))	21:54	05:51 (WEA 25 (Kab))
21	08:23	07:26	07:52 (WEA 04 (GRN))	06:19	06:56 (WEA 01 (GRN))	06:04		05:05	06:03 (WEA 41 (RW))	04:42	05:16 (WEA 40 (RW))
	16:34	17:36	08:00 (WEA 04 (GRN))	18:31	07:14 (WEA 02 (GRN))	20:29		21:23	06:11 (WEA 41 (RW))	21:54	05:51 (WEA 25 (Kab))
22	08:21	07:24	07:49 (WEA 04 (GRN))	06:17	06:56 (WEA 01 (GRN))	06:01		05:03	06:02 (WEA 41 (RW))	04:43	05:16 (WEA 40 (RW))
	16:36	17:38	08:00 (WEA 04 (GRN))	18:32	07:15 (WEA 02 (GRN))	20:31		21:24	06:12 (WEA 41 (RW))	21:54	05:51 (WEA 25 (Kab))
23	08:20	07:22	07:47 (WEA 04 (GRN))	06:14	06:54 (WEA 01 (GRN))	06:00		05:02	06:01 (WEA 41 (RW))	04:43	05:17 (WEA 40 (RW))
	16:38	17:40	08:01 (WEA 04 (GRN))	18:34		20:33		21:26	06:12 (WEA 41 (RW))	21:55	05:51 (WEA 25 (Kab))
24	08:19	07:19	07:45 (WEA 04 (GRN))	06:12		06:57		05:01	06:05 (WEA 41 (RW))	04:43	05:17 (WEA 40 (RW))
	16:39	17:42	08:02 (WEA 04 (GRN))	18:36		20:35		21:27	06:13 (WEA 41 (RW))	21:55	05:51 (WEA 25 (Kab))
25	08:17	07:17	07:43 (WEA 04 (GRN))	06:09		06:55		05:00	06:06 (WEA 41 (RW))	04:44	05:17 (WEA 40 (RW))
	16:41	17:44	08:01 (WEA 04 (GRN))	18:38		20:36		21:29	06:14 (WEA 41 (RW))	21:55	05:51 (WEA 25 (Kab))
26	08:16	07:15	07:43 (WEA 04 (GRN))	06:07	06:30 (WEA 43 (RW))	05:52		04:58	06:07 (WEA 41 (RW))	04:44	05:18 (WEA 40 (RW))
	16:43	17:46	08:01 (WEA 04 (GRN))	18:40	06:33 (WEA 43 (RW))	20:38		21:30	06:14 (WEA 41 (RW))	21:55	05:51 (WEA 25 (Kab))
27	08:14	07:13	07:43 (WEA 04 (GRN))	06:04	06:28 (WEA 43 (RW))	05:50		04:57	06:08 (WEA 41 (RW))	04:44	05:18 (WEA 40 (RW))
	16:45	17:48	08:00 (WEA 04 (GRN))	18:42	06:34 (WEA 43 (RW))	20:40		21:32	06:15 (WEA 41 (RW))	21:55	05:51 (WEA 25 (Kab))
28	08:13	07:10	07:44 (WEA 04 (GRN))	06:02	06:25 (WEA 43 (RW))	05:48		04:55	06:09 (WEA 41 (RW))	04:45	05:19 (WEA 40 (RW))
	16:47	17:50	07:59 (WEA 04 (GRN))	18:44	06:34 (WEA 43 (RW))	20:42		21:33	06:16 (WEA 41 (RW))	21:54	05:54 (WEA 25 (Kab))
29	08:11			06:59	07:23 (WEA 43 (RW))	05:46		04:54	06:10 (WEA 41 (RW))	04:46	05:19 (WEA 40 (RW))
	16:49			19:46	19:19 (WEA 33 (LR))	20:44		21:35	06:17 (WEA 41 (RW))	21:54	05:54 (WEA 25 (Kab))
30	08:10			06:57	07:21 (WEA 43 (RW))	05:44		04:53	06:11 (WEA 41 (RW))	04:46	05:20 (WEA 40 (RW))
	16:51			19:48	19:21 (WEA 33 (LR))	20:46		21:36	06:18 (WEA 41 (RW))	21:54	05:55 (WEA 25 (Kab))
31	08:08			06:54	07:21 (WEA 43 (RW))	05:44		04:52	06:12 (WEA 41 (RW))	04:46	05:20 (WEA 40 (RW))
	16:53			19:49	19:22 (WEA 33 (LR))	20:47		21:37	06:19 (WEA 41 (RW))	21:54	05:55 (WEA 25 (Kab))
	246	272		367		421		496		513	416
	Sonnenscheinstunden										
	astr. max. mögl. Beschattung	196		279		385		448		513	416

**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:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 51 - IO 51 Grünbeck 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 Sonneneinstrahlungsrichtung
- Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember			
1	04:47	05:21 (WEA 40 (RW))	05:27	06:14 (WEA 41 (RW))	06:23	06:53 (WEA 23 (Kab))	07:17	07:44 (WEA 01 (GRN))	07:16	08:12			
	17	05:57 (WEA 25 (Kab))	21:18	2	06:16 (WEA 41 (RW))	20:10	15	07:08 (WEA 23 (Kab))	18:55	12	07:56 (WEA 02 (GRN))	16:44	15:59
2	04:48	05:21 (WEA 40 (RW))	05:29		06:11 (WEA 41 (RW))	06:25		06:55 (WEA 23 (Kab))	07:19		07:46 (WEA 02 (GRN))	07:18	08:14
	17	05:57 (WEA 25 (Kab))	21:16	8	06:19 (WEA 41 (RW))	20:08	9	07:04 (WEA 23 (Kab))	18:53	11	07:57 (WEA 02 (GRN))	16:42	15:58
3	04:48	05:22 (WEA 40 (RW))	05:31		06:10 (WEA 41 (RW))	06:26			07:21		07:47 (WEA 02 (GRN))	07:20	08:15
	18	05:58 (WEA 25 (Kab))	21:14	10	06:20 (WEA 41 (RW))	20:05			18:50	9	07:56 (WEA 02 (GRN))	16:40	15:57
4	04:49	05:23 (WEA 40 (RW))	05:33		06:08 (WEA 41 (RW))	06:28			07:23		07:49 (WEA 02 (GRN))	07:22	08:17
	17	05:58 (WEA 25 (Kab))	21:12	13	06:21 (WEA 41 (RW))	20:03			18:48	7	07:56 (WEA 02 (GRN))	16:38	15:56
5	04:50	05:24 (WEA 40 (RW))	05:34		06:08 (WEA 41 (RW))	06:30			07:24		07:51 (WEA 02 (GRN))	07:24	08:18
	17	05:59 (WEA 25 (Kab))	21:10	14	06:22 (WEA 41 (RW))	20:00			18:46	6	07:57 (WEA 03 (GRN))	16:36	15:56
6	04:51	05:25 (WEA 40 (RW))	05:36		06:08 (WEA 41 (RW))	06:32		19:15 (WEA 33 (LR))	07:26		07:53 (WEA 03 (GRN))	07:26	08:20
	17	06:00 (WEA 25 (Kab))	21:08	14	06:22 (WEA 41 (RW))	19:58	4	19:19 (WEA 33 (LR))	18:43	6	07:59 (WEA 03 (GRN))	16:34	15:55
7	04:52	05:25 (WEA 40 (RW))	05:38		06:08 (WEA 41 (RW))	06:34		19:12 (WEA 33 (LR))	07:28		07:55 (WEA 03 (GRN))	07:28	08:21
	17	06:00 (WEA 25 (Kab))	21:06	14	06:22 (WEA 41 (RW))	19:55	10	19:22 (WEA 33 (LR))	18:41	4	07:59 (WEA 03 (GRN))	16:32	15:55
8	04:53	05:26 (WEA 40 (RW))	05:40		06:10 (WEA 41 (RW))	06:35		19:10 (WEA 33 (LR))	07:30		07:57 (WEA 03 (GRN))	07:30	08:22
	17	06:00 (WEA 25 (Kab))	21:04	12	06:22 (WEA 41 (RW))	19:53	13	19:23 (WEA 33 (LR))	18:38	2	07:59 (WEA 03 (GRN))	16:30	15:54
9	04:54	05:43 (WEA K04)	05:41		06:11 (WEA 41 (RW))	06:37		19:08 (WEA 33 (LR))	07:32			07:32	08:24
	18	06:01 (WEA 25 (Kab))	21:02	10	06:21 (WEA 41 (RW))	19:50	14	19:22 (WEA 33 (LR))	18:36			16:28	15:54
10	04:55	05:42 (WEA K04)	05:43		06:13 (WEA 41 (RW))	06:39		19:08 (WEA 33 (LR))	07:34			07:34	08:25
	20	06:02 (WEA 25 (Kab))	21:00	8	06:21 (WEA 41 (RW))	19:48	11	19:19 (WEA 33 (LR))	18:33			16:27	15:54
11	04:56	05:42 (WEA K04)	05:45		06:15 (WEA 41 (RW))	06:41		07:14 (WEA 43 (RW))	07:36		08:25 (WEA 04 (GRN))	07:36	08:26
	21	06:03 (WEA 25 (Kab))	20:58	6	06:21 (WEA 41 (RW))	19:45	18	19:17 (WEA 33 (LR))	18:31	1	08:26 (WEA 04 (GRN))	16:25	15:53
12	04:58	05:41 (WEA K04)	05:47		06:16 (WEA 41 (RW))	06:43		07:13 (WEA 43 (RW))	07:38		08:20 (WEA 04 (GRN))	07:38	08:27
	22	06:03 (WEA 25 (Kab))	20:56	3	06:19 (WEA 41 (RW))	19:43	18	19:15 (WEA 33 (LR))	18:29	10	08:30 (WEA 04 (GRN))	16:23	15:53
13	04:59	05:40 (WEA K04)	05:49			06:44		07:11 (WEA 43 (RW))	07:39		08:18 (WEA 04 (GRN))	07:40	08:28
	23	06:03 (WEA 25 (Kab))	20:54			19:40	18	19:12 (WEA 33 (LR))	18:26	14	08:32 (WEA 04 (GRN))	16:21	15:53
14	05:00	05:40 (WEA K04)	05:50			06:46		07:13 (WEA 43 (RW))	07:41		08:17 (WEA 04 (GRN))	07:42	08:29
	24	06:04 (WEA 25 (Kab))	20:52			19:38	13	19:10 (WEA 33 (LR))	18:24	16	08:33 (WEA 04 (GRN))	16:20	15:53
15	05:01	05:39 (WEA K04)	05:52			06:48		07:15 (WEA 43 (RW))	07:43		08:16 (WEA 04 (GRN))	07:44	08:30
	25	06:04 (WEA 25 (Kab))	20:49			19:35	9	07:24 (WEA 43 (RW))	18:21	17	08:33 (WEA 04 (GRN))	16:18	15:53
16	05:03	05:38 (WEA K04)	05:54			06:50		07:17 (WEA 43 (RW))	07:45		08:15 (WEA 04 (GRN))	07:46	08:31
	26	06:04 (WEA 25 (Kab))	20:47			19:33	7	07:24 (WEA 43 (RW))	18:19	18	08:33 (WEA 04 (GRN))	16:17	15:53
17	05:04	05:39 (WEA K04)	05:56			06:52		07:18 (WEA 43 (RW))	07:47		08:15 (WEA 04 (GRN))	07:48	08:32
	26	06:05 (WEA 25 (Kab))	20:45			19:30	4	07:22 (WEA 43 (RW))	18:17	18	08:33 (WEA 04 (GRN))	16:15	15:53
18	05:05	05:38 (WEA K04)	05:58		06:59 (WEA 23 (Kab))	06:53		08:17 (WEA 04 (GRN))	07:49		08:17 (WEA 04 (GRN))	07:49	08:33
	26	06:04 (WEA 25 (Kab))	20:43	10	07:09 (WEA 23 (Kab))	19:28		18:14		16	08:33 (WEA 04 (GRN))	16:14	15:53
19	05:07	05:39 (WEA K04)	05:59		06:29 (WEA 42 (RW))	06:55		07:51			08:19 (WEA 04 (GRN))	07:51	08:33
	25	06:04 (WEA 25 (Kab))	20:41	18	07:10 (WEA 23 (Kab))	19:25		18:12		13	08:32 (WEA 04 (GRN))	16:12	15:54
20	05:08	05:41 (WEA K04)	06:01		06:30 (WEA 42 (RW))	06:57		07:53			08:21 (WEA 04 (GRN))	07:53	08:34
	24	06:05 (WEA 25 (Kab))	20:38	22	07:12 (WEA 23 (Kab))	19:23		18:10		10	08:31 (WEA 04 (GRN))	16:11	15:54
21	05:10	05:42 (WEA K04)	06:03		06:32 (WEA 42 (RW))	06:59		18:42 (WEA 32 (LR))	07:55		08:23 (WEA 04 (GRN))	07:55	08:35
	22	06:04 (WEA 25 (Kab))	20:36	23	07:13 (WEA 23 (Kab))	19:20	5	18:47 (WEA 32 (LR))	18:08	11	08:39 (WEA 05 (GRN))	16:09	15:54
22	05:11	05:43 (WEA K04)	06:05		06:33 (WEA 42 (RW))	07:01		07:42 (WEA 01 (GRN))	07:57		08:25 (WEA 04 (GRN))	07:57	08:35
	21	06:04 (WEA 25 (Kab))	20:34	24	07:13 (WEA 23 (Kab))	19:18	14	18:49 (WEA 32 (LR))	18:05	12	08:41 (WEA 05 (GRN))	16:08	15:55
23	05:13	05:45 (WEA K04)	06:07		06:35 (WEA 42 (RW))	07:02		07:39 (WEA 01 (GRN))	07:59		08:31 (WEA 05 (GRN))	07:59	08:36
	19	06:04 (WEA 25 (Kab))	20:31	23	07:14 (WEA 23 (Kab))	19:15	19	18:47 (WEA 32 (LR))	18:03	12	08:43 (WEA 05 (GRN))	16:07	15:55
24	05:14	05:46 (WEA K04)	06:08		06:51 (WEA 23 (Kab))	07:04		07:38 (WEA 01 (GRN))	08:01		08:30 (WEA 05 (GRN))	08:00	08:36
	17	06:03 (WEA 25 (Kab))	20:29	23	07:14 (WEA 23 (Kab))	19:13	19	18:44 (WEA 32 (LR))	18:01	13	08:43 (WEA 05 (GRN))	16:06	15:56
25	05:16	05:48 (WEA K04)	06:10		06:50 (WEA 23 (Kab))	07:06		07:37 (WEA 01 (GRN))	07:03		07:31 (WEA 05 (GRN))	08:02	08:36
	15	06:03 (WEA 25 (Kab))	20:27	23	07:13 (WEA 23 (Kab))	19:10	19	18:42 (WEA 32 (LR))	16:59	12	07:43 (WEA 05 (GRN))	16:04	15:57
26	05:18	05:49 (WEA K04)	06:12		06:50 (WEA 23 (Kab))	07:08		07:35 (WEA 01 (GRN))	07:04		07:33 (WEA 05 (GRN))	08:04	08:37
	13	06:02 (WEA 25 (Kab))	20:24	23	07:13 (WEA 23 (Kab))	19:08	18	18:39 (WEA 32 (LR))	16:56	10	07:43 (WEA 05 (GRN))	16:03	15:57
27	05:19	05:51 (WEA K04)	06:14		06:50 (WEA 23 (Kab))	07:10		07:36 (WEA 01 (GRN))	07:06		07:35 (WEA 05 (GRN))	08:06	08:37
	10	06:01 (WEA 25 (Kab))	20:22	23	07:13 (WEA 23 (Kab))	19:05	15	07:51 (WEA 01 (GRN))	16:54	8	07:43 (WEA 05 (GRN))	16:02	15:58
28	05:21	05:52 (WEA K04)	06:16		06:51 (WEA 23 (Kab))	07:12		07:38 (WEA 01 (GRN))	07:08		07:38 (WEA 05 (GRN))	08:07	08:37
	7	05:59 (WEA 25 (Kab))	20:20	22	07:13 (WEA 23 (Kab))	19:03	13	07:51 (WEA 01 (GRN))	16:52	5	07:43 (WEA 05 (GRN))	16:01	15:59
29	05:22	05:54 (WEA 25 (Kab))	06:17		06:50 (WEA 23 (Kab))	07:13		07:40 (WEA 01 (GRN))	07:10		07:40 (WEA 05 (GRN))	08:09	08:37
	3	05:57 (WEA 25 (Kab))	20:17	21	07:11 (WEA 23 (Kab))	19:00	10	07:50 (WEA 01 (GRN))	16:50	2	07:42 (WEA 05 (GRN))	16:00	16:00
30	05:24		06:19		06:51 (WEA 23 (Kab))	07:15		07:42 (WEA 01 (GRN))	07:12			08:11	08:37
	21		20:15	19	07:10 (WEA 23 (Kab))	18:58	13	07:55 (WEA 02 (GRN))	16:48			15:59	16:01
31	05:26		06:21		06:52 (WEA 23 (Kab))				07:14				08:37
	19		20:12	17	07:09 (WEA 23 (Kab))				16:46				16:02
	515		461			383			328			257	231
Sonnenscheinstunden													
astr.max.mögl.Beschattung		543		405		308		275					

**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:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 52 - IO 52 Grünbeck 16  
**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 08:37 16:03	08:06 16:55	07:08 17:52	06:52 18:51	05:42 20:48	04:51 21:39	
2 08:37 16:04	10 08:36 (WEA 04 (GRN)) 16:57	17 08:53 (WEA 04 (GRN)) 17:54	2 07:54 (WEA 01 (GRN)) 18:51	22 06:51 (WEA 25 (Kab)) 20:50	04:50 21:40	
3 08:37 16:05	08:03 16:59	07:03 17:56	06:47 19:53	05:37 20:51	04:49 21:41	
4 08:37 16:07	08:01 17:01	07:01 17:58	06:44 19:57	05:35 20:53	04:48 21:42	
5 08:36 16:08	07:59 17:03	06:58 18:00	06:42 19:59	05:33 20:55	04:48 21:43	
6 08:36 16:09	07:57 17:05	06:56 18:02	06:39 20:01	05:31 20:57	04:47 21:44	
7 08:29 16:11	07:55 17:07	06:54 18:04	06:37 20:03	05:29 20:59	04:46 21:45	
8 08:25 16:12	07:53 17:09	06:51 18:06	06:35 20:04	15 05:59 (WEA 42 (RW)) 20:57	04:45 21:46	
9 08:24 16:14	07:51 17:11	06:49 18:08	2 07:24 (WEA 23 (Kab)) 06:32	2 07:01 (WEA 42 (RW)) 05:25	21 06:11 (WEA K04) 04:45	
10 08:24 16:15	07:49 17:13	06:46 18:09	16 07:31 (WEA 23 (Kab)) 06:30	4 07:00 (WEA 42 (RW)) 05:24	19 06:12 (WEA K04) 04:44	
11 08:23 16:17	07:47 17:16	06:44 18:11	23 07:33 (WEA 23 (Kab)) 06:27	6 07:00 (WEA 42 (RW)) 05:22	20 06:11 (WEA K04) 04:43	
12 08:22 16:18	07:45 17:18	06:41 18:13	27 07:35 (WEA 23 (Kab)) 06:25	7 06:58 (WEA 42 (RW)) 05:20	20 06:11 (WEA K04) 04:43	
13 08:21 16:20	07:43 17:20	06:39 18:15	31 07:46 (WEA 33 (LR)) 06:22	6 06:56 (WEA 42 (RW)) 05:18	19 06:10 (WEA K04) 04:43	
14 08:20 16:21	07:41 17:22	06:36 18:17	36 07:48 (WEA 33 (LR)) 06:20	6 06:53 (WEA 41 (RW)) 05:17	20 06:10 (WEA K04) 04:43	
15 08:20 16:23	07:39 17:24	06:34 18:19	40 07:50 (WEA 33 (LR)) 06:18	9 06:53 (WEA 41 (RW)) 05:15	21 06:09 (WEA K04) 04:43	
16 08:20 16:25	07:37 17:26	06:32 18:21	40 07:52 (WEA 33 (LR)) 06:15	12 06:54 (WEA 41 (RW)) 05:13	22 06:09 (WEA K04) 04:42	
17 08:20 16:27	07:35 17:28	06:29 18:23	40 07:54 (WEA 33 (LR)) 06:13	15 06:55 (WEA 41 (RW)) 05:11	22 06:07 (WEA K04) 04:42	
18 08:20 16:28	07:33 17:30	06:27 18:25	37 07:55 (WEA 33 (LR)) 06:11	17 06:54 (WEA 41 (RW)) 05:10	20 06:06 (WEA K04) 04:42	
19 08:20 16:30	07:31 17:32	06:24 18:27	34 07:57 (WEA 33 (LR)) 06:08	17 06:54 (WEA 41 (RW)) 05:08	17 06:03 (WEA K04) 04:42	
20 08:20 16:32	07:29 17:34	06:22 18:29	24 07:59 (WEA 33 (LR)) 06:06	16 06:53 (WEA 41 (RW)) 05:06	15 06:02 (WEA K04) 04:42	
21 08:20 16:34	07:26 17:36	06:19 18:31	23 07:59 (WEA 33 (LR)) 06:04	19 06:53 (WEA 41 (RW)) 05:05	18 06:01 (WEA K04) 04:42	
22 08:21 16:36	07:24 17:38	06:17 18:33	21 07:59 (WEA 33 (LR)) 06:02	19 06:51 (WEA 41 (RW)) 05:03	17 06:00 (WEA K04) 04:42	
23 08:20 16:38	07:22 17:40	06:14 18:34	19 07:30 (WEA 23 (Kab)) 06:00	20 06:51 (WEA 41 (RW)) 05:02	17 06:00 (WEA K04) 04:42	
24 08:19 16:39	07:19 17:42	06:12 18:36	15 07:28 (WEA 23 (Kab)) 05:57	22 06:52 (WEA 25 (Kab)) 05:01	17 06:00 (WEA K04) 04:43	
25 08:17 16:41	2 08:49 (WEA 05 (GRN)) 07:17	16 08:02 (WEA 01 (GRN)) 06:09	8 07:24 (WEA 23 (Kab)) 05:55	23 06:52 (WEA 25 (Kab)) 04:59	16 06:00 (WEA K04) 04:44	
26 08:16 16:43	4 08:51 (WEA 05 (GRN)) 07:15	16 08:01 (WEA 01 (GRN)) 06:07	20 07:34 (WEA 23 (Kab)) 05:52	23 06:52 (WEA 25 (Kab)) 04:58	15 06:00 (WEA K04) 04:44	
27 08:14 16:45	6 08:51 (WEA 05 (GRN)) 07:13	15 08:01 (WEA 01 (GRN)) 06:04	20 07:33 (WEA 23 (Kab)) 05:50	25 06:53 (WEA 25 (Kab)) 04:57	14 06:00 (WEA K04) 04:44	
28 08:13 16:47	9 08:53 (WEA 05 (GRN)) 07:10	13 07:46 (WEA 01 (GRN)) 06:02	20 07:32 (WEA 23 (Kab)) 05:48	25 06:53 (WEA 25 (Kab)) 04:55	13 06:00 (WEA K04) 04:45	
29 08:11 16:49	11 08:53 (WEA 05 (GRN)) 07:08	10 07:48 (WEA 01 (GRN)) 06:00	24 07:30 (WEA 23 (Kab)) 05:46	24 06:52 (WEA 25 (Kab)) 04:53	12 06:00 (WEA K04) 04:46	
30 08:10 16:51	12 08:52 (WEA 05 (GRN)) 07:06	19 07:46 (WEA 01 (GRN)) 05:59	24 07:28 (WEA 23 (Kab)) 05:44	24 06:52 (WEA 25 (Kab)) 04:53	11 06:00 (WEA K04) 04:46	
31 08:08 16:53	14 08:52 (WEA 05 (GRN)) 07:04	19 07:46 (WEA 01 (GRN)) 05:57	23 07:26 (WEA 23 (Kab)) 05:42	23 06:51 (WEA 25 (Kab)) 04:52	9 06:00 (WEA K04) 04:46	
Sonnenscheinstunden astr.max.mögl.Beschattung	248 74	272 222	367 438	421 364	496 552	513

**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:** Gesamtbelastung: Vorbelastung und Projekt Großenholz (3 x V150-6.0) **Schattenrezeptor:** IO 52 - IO 52 Grünbeck 16  
**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

Juli		August		September		Oktober		November		Dezember	
1	04:47	05:27	06:02 (WEA K04)	06:23	06:51 (WEA 42 (RW))	07:17	07:44 (WEA 43 (RW))	07:16			08:12
	21:54	21:10	06:20 (WEA K04)	20:10	06:56 (WEA 42 (RW))	18:55	18:27 (WEA 33 (LR))	16:44			15:59
2	04:48	05:29	06:02 (WEA K04)	06:25	06:52 (WEA 42 (RW))	07:19	07:46 (WEA 43 (RW))	07:18			08:14
	21:53	21:16	06:21 (WEA K04)	20:08	6	06:58 (WEA 42 (RW))	18:53	28	08:14 (WEA 23 (Kab))	16:42	15:58
3	04:48	05:31	06:02 (WEA K04)	06:26	06:54 (WEA 42 (RW))	07:21	07:47 (WEA 43 (RW))	07:20			08:15
	21:53	21:14	06:22 (WEA K04)	20:05	4	06:58 (WEA 42 (RW))	18:50	24	08:11 (WEA 23 (Kab))	16:40	15:57
4	04:49	05:33	06:03 (WEA K04)	06:28	06:56 (WEA 42 (RW))	07:23	07:49 (WEA 43 (RW))	07:22			08:17
	21:52	21:12	06:21 (WEA K04)	20:03	2	06:58 (WEA 42 (RW))	18:48	20	08:09 (WEA 23 (Kab))	16:38	15:56
5	04:50	05:34	06:05 (WEA K04)	06:30			07:24				08:18
	21:52	21:10	06:21 (WEA K04)	20:00			18:45	11	08:06 (WEA 23 (Kab))	16:36	15:56
6	04:51	05:36	06:07 (WEA K04)	06:32			07:26				08:20
	21:51	21:08	06:51 (WEA 25 (Kab))	19:58			18:43				15:55
7	04:52	05:38	06:08 (WEA K04)	06:34			07:28				08:21
	21:50	21:06	06:53 (WEA 25 (Kab))	19:55			18:41				15:55
8	04:53	05:40	06:10 (WEA K04)	06:35			07:30				08:22
	21:50	21:04	06:56 (WEA 25 (Kab))	19:53			18:38				15:54
9	04:54	05:41	06:11 (WEA K04)	06:37			07:32				08:24
	21:49	21:02	06:56 (WEA 25 (Kab))	19:50			18:36				15:54
10	04:55	05:43	06:13 (WEA K04)	06:39			07:34				08:25
	21:48	21:00	06:58 (WEA 25 (Kab))	19:48			18:33				15:54
11	04:56	05:45	06:15 (WEA K04)	06:41			07:36				08:26
	21:47	20:58	06:59 (WEA 25 (Kab))	19:45			18:31				15:53
12	04:57	05:47	06:36 (WEA 25 (Kab))	06:43			07:38				08:27
	21:46	4	05:54 (WEA 40 (RW))	20:56	22	06:58 (WEA 25 (Kab))	19:43				15:53
13	04:59	05:48 (WEA 40 (RW))	05:49	06:36 (WEA 25 (Kab))	06:44		07:39				08:28
	21:45	8	05:56 (WEA 40 (RW))	20:54	23	06:59 (WEA 25 (Kab))	19:40				15:53
14	05:00	05:47 (WEA 40 (RW))	05:50	06:38 (WEA 25 (Kab))	06:46		07:41				08:29
	21:44	10	05:57 (WEA 40 (RW))	20:52	24	07:00 (WEA 25 (Kab))	19:38				15:53
15	05:01	05:46 (WEA 40 (RW))	05:52	06:39 (WEA 25 (Kab))	06:48		07:43				08:30
	21:43	12	05:58 (WEA 40 (RW))	20:49	24	06:59 (WEA 25 (Kab))	19:35				15:53
16	05:03	05:46 (WEA 40 (RW))	05:54	06:39 (WEA 25 (Kab))	06:50		07:45				08:31
	21:42	12	05:58 (WEA 40 (RW))	20:47	24	06:59 (WEA 25 (Kab))	19:33				15:53
17	05:04	05:46 (WEA 40 (RW))	05:56	06:39 (WEA 25 (Kab))	06:52		07:47				08:32
	21:41	14	06:00 (WEA 40 (RW))	20:45	24	06:59 (WEA 25 (Kab))	19:30				15:53
18	05:05	05:45 (WEA 40 (RW))	05:58	06:39 (WEA 25 (Kab))	06:53		07:49				08:33
	21:40	15	06:00 (WEA 40 (RW))	20:43	24	06:59 (WEA 25 (Kab))	19:28				15:53
19	05:07	05:44 (WEA 40 (RW))	05:59	06:39 (WEA 25 (Kab))	06:55		07:51				08:33
	21:38	16	06:00 (WEA 40 (RW))	20:41	23	06:58 (WEA 25 (Kab))	19:25				15:54
20	05:08	05:45 (WEA 40 (RW))	06:01	06:38 (WEA 25 (Kab))	06:57		07:53				08:34
	21:37	16	06:01 (WEA 40 (RW))	20:38	21	06:57 (WEA 25 (Kab))	19:23				15:54
21	05:10	05:44 (WEA 40 (RW))	06:03	06:36 (WEA 25 (Kab))	06:59		07:55				08:35
	21:35	17	06:01 (WEA 40 (RW))	20:36	20	06:56 (WEA 25 (Kab))	19:20				15:54
22	05:11	05:44 (WEA 40 (RW))	06:05	06:37 (WEA 25 (Kab))	07:01		07:56 (WEA 23 (Kab))	07:57			08:35
	21:34	17	06:01 (WEA 40 (RW))	20:34	19	06:56 (WEA 41 (RW))	19:18				15:55
23	05:13	05:45 (WEA 40 (RW))	06:07	06:38 (WEA 25 (Kab))	07:02		07:55 (WEA 23 (Kab))	07:59			08:36
	21:33	17	06:02 (WEA 40 (RW))	20:31	19	06:57 (WEA 41 (RW))	19:15				15:55
24	05:14	05:46 (WEA 40 (RW))	06:08	06:41 (WEA 41 (RW))	07:04		07:54 (WEA 23 (Kab))	08:01			08:36
	21:31	15	06:01 (WEA 40 (RW))	20:29	16	06:57 (WEA 41 (RW))	19:13				15:56
25	05:16	05:48 (WEA 40 (RW))	06:10	06:39 (WEA 41 (RW))	07:06		07:53 (WEA 23 (Kab))	07:03			08:36
	21:30	14	06:02 (WEA 40 (RW))	20:27	17	06:58 (WEA 41 (RW))	19:10				15:57
26	05:18	05:49 (WEA 40 (RW))	06:12	06:40 (WEA 41 (RW))	07:08		07:52 (WEA 23 (Kab))	07:04			08:37
	21:28	18	06:14 (WEA K04)	20:24	17	06:57 (WEA 41 (RW))	19:08				15:57
27	05:19	05:51 (WEA 40 (RW))	06:14	06:42 (WEA 41 (RW))	07:10		07:51 (WEA 23 (Kab))	07:06			08:37
	21:26	21	06:17 (WEA K04)	20:22	14	06:56 (WEA 41 (RW))	19:05				15:58
28	05:21	05:52 (WEA 40 (RW))	06:16	06:44 (WEA 41 (RW))	07:12		07:46 (WEA 43 (RW))	07:08			08:37
	21:25	22	06:18 (WEA K04)	20:20	12	06:56 (WEA 41 (RW))	19:03				15:59
29	05:22	05:54 (WEA 40 (RW))	06:17	06:45 (WEA 41 (RW))	07:13		07:45 (WEA 43 (RW))	07:10			08:37
	21:23	21	06:19 (WEA K04)	20:17	9	06:54 (WEA 41 (RW))	19:00				16:00
30	05:24	05:55 (WEA 40 (RW))	06:19	06:47 (WEA 41 (RW))	07:15		07:44 (WEA 43 (RW))	07:12			08:37
	21:21	21	06:20 (WEA K04)	20:15	6	06:53 (WEA 41 (RW))	18:58				16:01
31	05:26	05:57 (WEA 40 (RW))	06:21	06:49 (WEA 41 (RW))			18:29 (WEA 33 (LR))	16:48			08:37
	21:19	19	06:21 (WEA K04)	20:12	5	06:56 (WEA 42 (RW))		16:46			16:02
Sonnenscheinstunden	515		461		383		328		257		231
astr.max.mögl.Beschattung	309		594		341		241		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) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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## **ÜBER DNV**

DNV agiert als unabhängiges Unternehmen im Bereich Assurance und Risikomanagement in mehr als 100 Ländern. Aufbauend auf seiner langjährigen Erfahrung und Expertise hat DNV das Ziel, Sicherheit und nachhaltige Leistungen zu fördern.

Von der Bewertung eines neuen Schiffsdesigns, der Leistungsoptimierung eines Windparks, der Analyse von Sensordaten einer Gaspipeline bis hin zur Zertifizierung der Lieferkette eines Lebensmittelunternehmens - DNV hilft Kunden und Partnern mit Sicherheit, die richtigen Entscheidungen zu treffen.

Der Schutz von Leben, Gütern und Umwelt ist für uns Aufgabe und Ansporn zugleich. DNV hilft seinen Kunden, sich ihren Herausforderungen und den globalen Transformationen der heutigen Zeit zu stellen. DNV versteht sich als vertrauensvolle Stimme für viele der weltweit erfolgreichsten und zukunftsorientierten Unternehmen.