

# Schattengutachten

mit Schattenausbreitungskarte  
zur Ermittlung des Schattenwurfes von 5 neuen  
Windenergieanlagen an einem Standort bei  
Südergellersen (Niedersachsen)

Landwind Planung GmbH & Co. KG



Juli 2025

## Schattengutachten

mit Schattenausbreitungskarte  
zur Ermittlung des Schattenwurfes von 5 neuen  
Windenergieanlagen an einem Standort bei  
Südergellersen(Niedersachsen)

Berichtsnummer: **G250722LG1a**

Aufgestellt, Gevensleben im Juli 2025

## Auftragnehmer

SOWIWAS - Energie GmbH  
Watenstedter Straße 11  
38384 Gevensleben

Telefon 05354 - 99 06.235  
Telefax 05354 - 99 06.109

E-Mail [gutachten@sowiwas.de](mailto:gutachten@sowiwas.de)  
Internet [www.sowiwas.de](http://www.sowiwas.de)

## Auftraggeber

Landwind Planung GmbH & Co. KG  
Watenstedter Straße 11  
38384 Gevensleben

Telefon [REDACTED]  
Telefax [REDACTED]

E-Mail [REDACTED]  
Internet [www.landwind-gruppe.de](http://www.landwind-gruppe.de)



## INHALT

<b>1</b>	<b>EINLEITUNG</b>	<b>3</b>
<b>2</b>	<b>DER STANDORT</b>	<b>4</b>
<b>3</b>	<b>ALLGEMEINES ZUM SCHATTENWURF</b>	<b>5</b>
<b>4</b>	<b>BERECHNUNG DES SCHATTENWURFS</b>	<b>7</b>
<b>5</b>	<b>ERLÄUTERUNG ZU DEN RESULTATAUSDRUCKEN</b>	<b>10</b>
	SHADOW – HAUPTERGEBNIS	10
	SHADOW – KALENDER	10
	SHADOW – KALENDER, GRAFISCH	11
	SHADOW – KARTE DER SCHATTENDAUERLINIEN	12
<b>6</b>	<b>ERGEBNIS DER SCHATTENWURFBERECHNUNG</b>	<b>13</b>
<b>7</b>	<b>ZUSAMMENFASSUNG</b>	<b>18</b>
<b>8</b>	<b>LITERATURVERZEICHNIS</b>	<b>19</b>

## ANHANG

### ERGEBNISSE DER WINDPRO BERECHNUNG SHADOW:

#### Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand

Hauptergebnis	4 Seiten
Kalender	100 Seiten
Grafischer Kalender	12 Seiten
Karte	1 Seite

#### Berechnung: Zusatzbelastung Repowering 5x N175

Hauptergebnis	4 Seiten
Grafischer Kalender	12 Seiten
Karte	1 Seite

#### Berechnung: Vorbelastung Repowering 18 Bestand

Hauptergebnis	4 Seiten
Grafischer Kalender	12 Seiten
Karte	1 Seite

## **1                      Einleitung**

Die Landwind Planung GmbH & Co. KG plant südlich der Ortschaft Südergellersen (Landkreis Lüneburg, Niedersachsen) als Repowering-Projekt den Neubau eines Windparks, bestehend aus 5 Anlagen mit 179 m Nabenhöhe. Dazu wird der bestehende Windpark um 5 Anlagen zurückgebaut. Zwei weitere Anlagen (A4, A5) werden bis zur Inbetriebnahme der geplanten Anlagen zurückgebaut.

Für dieses Vorhaben wird in dem vorliegenden Gutachten eine Prognose über den zu erwartenden Schattenwurf in der Umgebung erstellt. Dazu werden an den vom Auftraggeber vorgesehenen Standorten 5 neue Windenergieanlagen neben 18 weiteren zu berücksichtigenden Anlagen angesetzt.

Es wird die aus dem Betrieb aller 23 Windenergieanlagen resultierende Beschattung im Umfeld der Anlagen, insbesondere an ausgewählten Gebäuden mit Wohnnutzung in den umliegenden Ortschaften, ermittelt.

## **2 Der Standort**

Eine Standortbesichtigung des Anlagenstandortes und der Immissionsorte fand am 27.06.2025 durch den Mitarbeiter Herrn Helms statt. Eine Fotodokumentation wurde dabei erstellt.

Die geplanten Anlagen liegen ca. 8,5 km südwestlich von der Kreisstadt Lüneburg. Im Westen (ca. 2 km) liegt Oerzen und im Norden (ca. 1 km) liegt Südergellersen. Die nähere Standortumgebung ist gekennzeichnet durch großflächige, landwirtschaftliche Nutzflächen, sowie kleinere Waldflächen innerhalb des Windparks sowie größere Waldgebiete im Süden und im Westen.

Das Gelände ist im nahen Umfeld eben mit Höhen zwischen 35 m und 70 m ü. NHN. Im westlichen Waldgebiet werden Höhen über 80 m ü. NHN erreicht. Die geplanten Windanlagen stehen auf Höhen zwischen 42 und 49 m ü. NHN.

Im vorliegenden Gutachten werden als Schatten-Verursacher die 5 geplanten Anlagen - NORDEX N175/6.X-6.800, mit 179 m Nabenhöhe, neben 18 bestehenden Anlagen, an den vom Auftraggeber vorgegebenen Positionen angesetzt. Überlagerungen durch den gleichzeitigen Betrieb aller 23 Anlagen werden bei der Berechnung berücksichtigt.

Die Lage der Immissionsorte wird auf der Kartengrundlage gewählt und ist den Karten im Anhang zu entnehmen.



### **3 Allgemeines zum Schattenwurf**

Bei der Ermittlung des Standortes von geplanten Windenergieanlagen sind viele Faktoren zu beachten. Neben den positiven Aspekten gehören dazu auch negative Einflüsse der Anlagen auf ihre nähere Umgebung. Einen dieser Einflüsse stellt der Schattenwurf der Anlage dar. Zum einen werfen Turm und Maschinenhaus einen ruhenden Schatten, dieser wird in der Regel jedoch nicht als störend empfunden. Zum anderen verursacht der Rotor durch seine Bewegung einen häufigen Helligkeitswechsel im Beschattungsbereich. Dieser dynamische Schatten wird schnell als unangenehm empfunden und kann bei längerer Dauer stark belastend sein. Aus diesem Grund wird der Schattenwurf einer Windenergieanlage als erhebliche Belästigung im Sinne des Bundes-Immissionsschutzgesetz (BImSchG) angesehen [1].

Um eine unzumutbare Beeinträchtigung der Bewohner in der Nähe einer geplanten Windenergieanlage zu vermeiden, ist daher vor dem Bau der Anlage eine Genehmigung nach Bundes-Immissionsschutzgesetz nötig. Dafür wird im Rahmen eines Schattengutachtens der zu erwartende Schattenwurf der Anlage simuliert und auf seine Auswirkungen auf die Anwohner untersucht. Für die Bewertung dieser Auswirkungen gibt es keine rechtsverbindlichen Vorschriften, stattdessen wird hierbei auf die Schattenwurfhinweise der Bund/Länder-Arbeitsgemeinschaft Immissionsschutz (LAI) zurückgegriffen. Dort werden allgemein anerkannte Richtwerte zur maximalen Dauer der Schatteneinwirkung gegeben. [2].

Für die Simulation des Schattenwurfs sind zunächst die genauen Standorte der Anlagen erforderlich. Hierbei sind neben den geplanten Anlagen auch bereits bestehenden Anlagen in der Umgebung zu berücksichtigen, da diese ebenfalls das betrachtete Gebiet beschatten können. Für jede der betrachteten Anlagen wird anschließend der Schattenwurf simuliert. Hierbei müssen auch die Eigenschaften des Geländes wie etwa Höhenunterschiede berücksichtigt werden. Das zu betrachtende Gebiet richtet sich hierbei nach der Entfernung zu den Windenergieanlagen: Alle Orte, an denen die Sonnenfläche zu mindestens 20 % durch einen Rotorflügel verdeckt werden kann, müssen berücksichtigt werden. Zur Vereinfachung wird dabei von einem rechteckigen Rotorflügel mit mittlerer Blatattiefe ausgegangen.

Einen großen Einfluss auf den Schatten hat die Bewölkung. Durch sie kann zu jeder Tageszeit ein Schattenwurf verhindert werden. Den größten Einfluss hat jedoch die Position der Sonne. Zum einen bestimmt sie durch ihre Himmelsrichtung die Richtung in die der Schatten fällt. Zum anderen beeinflusst sie durch ihre Höhe über dem Horizont die Länge des Schattens. Da sich die Himmelsrichtung der Sonne im Verlauf des Tages und die Höhe der Sonne über dem Horizont sowohl im Tages- als auch im Jahresverlauf ändern, entsteht hierbei ein wandernder Schatten. Dabei ist der Schatten morgens und abends länger als am Mittag, und im Winter länger als im Sommer. Der längste Schattenwurf ist hierbei kurz nach Sonnenaufgang und kurz vor Sonnenuntergang zu erwarten. Da sich die Höhe der Sonne über dem Horizont zu diesen Zeiten aber besonders schnell ändert, ändert sich auch die Länge des Schattens entsprechend schnell. Für die Berechnung werden nur Zeiten betrachtet, bei denen die Sonne mindestens 3 Grad über dem Horizont steht. Für einen niedrigeren Sonnenstand ist aufgrund von Bebauung, Bewuchs und der zu durchdringenden Atmosphärenschicht nicht mit Schattenwurf zu rechnen.

Zur Bewertung des Schattenwurfs ist die Ermittlung der Standorte der maßgeblichen Immissionsorte erforderlich. Hierbei handelt es sich um Räume in Gebäuden, bei denen aufgrund ihrer Nutzung die potenzielle Beeinträchtigung durch Schatten besonders groß



sind. Diese Räume sind vor allem in Wohngebäuden zu finden (z.B. Wohn- und Schlaf-  
räume), aber auch Unterrichts-, Praxis-, Büro- und Arbeitsräume zählen dazu. Um den  
Berechnungsaufwand zu begrenzen, werden lediglich die Immissionsorte betrachtet, bei  
denen aufgrund ihrer Position eine besonders starke Beeinflussung durch Schattenwurf  
zu erwarten ist.

Um eine übermäßige Belastung der Anwohner möglichst sicher ausschließen zu können,  
wird bei der Berechnung der „Worst Case“ angewendet. Es wird davon ausgegangen,  
dass die Sonne nie durch Bewölkung verdeckt wird, sowie dass die Anlagen immer in Be-  
trieb sind. Es gibt also keinen Stillstand aufgrund von Windmangel, Defekten oder War-  
tungsarbeiten. Des Weiteren wird davon ausgegangen, dass der Wind immer aus der glei-  
chen Richtung weht, wie die Sonne scheint. Auch wird eine Verdeckung der Immission-  
sorte durch Bewuchs oder Bebauung ausgeschlossen. Durch diese Annahmen wird si-  
chergestellt, dass für die Immissionsorte die astronomisch maximal mögliche Beschat-  
tungsdauer errechnet wird. Die Berechnung soll für einen punktförmigen Rezeptor in 2 m  
Höhe erfolgen. Für die hier vorliegende Betrachtung wird von den oben genannten Be-  
dingungen ausgegangen. Der Rezeptor wird aus programmtechnischen Gründen jedoch  
nicht punktförmig, sondern mit einer Fläche von 10 cm x 10 cm angenommen. Dadurch  
liegen die berechneten Schattenwurfdauern leicht über den Ergebnissen für punktför-  
mige Rezeptoren. Die Rezeptoren sind wegen der großen Anzahl von Windenergieanla-  
gen auf den Gewächshausmodus eingestellt. Hier wird der Schatten im Gegensatz zum  
Fenstermodus aus allen Richtungen empfangen.

Die Ergebnisse der Berechnungen werden anschließend für jeden Immissionsort mit den  
Vorgaben des LAI abgeglichen: Um eine unzumutbare Beeinträchtigung zu verhindern,  
darf die maximale tägliche Verschattungsdauer 30 Minuten und die maximale jährli-  
che Verschattungsdauer 30 Stunden nicht überschreiten. Sollte an einem Immissionsort  
durch den Bau einer neuen Anlage eine Überschreitung der Grenzwerte zu erwarten sein,  
so sind Maßnahmen zur Einhaltung des Grenzwertes zu ergreifen: Dazu kann eine Ab-  
schalteinrichtung in der Anlage installiert werden. Diese schaltet die Anlage ab, wenn sie  
den betroffenen Immissionsort verschatten würde.



## 4 Berechnung des Schattenwurfs

In Berechnungen von Schattenwurf-Weiten und Zeiten werden alle Randbedingungen, die vorstehend geschildert wurden, mit ihren ungünstigsten Ausprägungen angesetzt. D.h. es wird davon ausgegangen, dass es nie Wolken gibt, keine Flaute herrscht und somit die Windenergieanlagen sich immer drehen und der Wind immer aus der gleichen Richtung wie die Sonne kommt und damit die größte mögliche Fläche von Schatten betroffen ist.

Die Berechnung des Schattenwurfes wird mit dem Programm WindPRO von EMD International A/S (Aalborg-Dänemark) in der aktuellen Version 4.1.287 vom Juni 2025 mit dem Programmteil *Shadow* vorgenommen.

Als Schattenverursacher werden 23 Windenergieanlagen an den vom Auftraggeber vorgegebenen Positionen angenommen. Diese sind die 5 vom Auftraggeber beantragten Standort und 18 einer bereits genehmigten bestehende bzw. geplanten Windenergieanlagen. Die angesetzten Koordinaten sind dem Anhang (Shadow-Hauptergebnis) zu entnehmen. Dabei werden die folgenden technischen Daten der Windenergieanlagen zugrunde gelegt. Die Nummerierung der Anlagen bezieht sich auf die im Berechnungsausdruck SHADOW (siehe Anhang) angegebene Liste:

- o **Gesamtbelastung:**  
alle 23 WEA im Windpark Südergellersen
- o **Zusatzbelastung:**  
  
**5 x Nordex N175 6.X-6.800**  
6.800 kW Nennleistung  
175 m Rotordurchmesser  
179 m Nabenhöhe
- o **Vorbelastung:**  
18 weiter bestehende WEA

**Tabelle 1:** Die Windenergieanlagen der Vorbelastung

WEA	Hersteller	Typ, Generator	Leistung [kW]	Rotor [m]	Nabe [m]
B 01	NORDEX	N149/4.0-4.5-4.500	4.500	149,0	125,0
B 02	NORDEX	N131/3300-3.300	3.300	131,0	134,0
B 03	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0
B 04	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0
B 05	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0
B 06	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0
B 07	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0
B 08	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0
B 09	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0
B 10	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0
B 11	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0
B 12	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0
B 13	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0
Oerzen 1	NORDEX	N175/6.X-6.800	6.800	175,0	179,0
Oerzen 2	NORDEX	N175/6.X-6.800	6.800	175,0	179,0
Oerzen 3	NORDEX	N175/6.X-6.800	6.800	175,0	179,0
Oerzen 4	NORDEX	N175/6.X-6.800	6.800	175,0	179,0
Oerzen 5	NORDEX	N175/6.X-6.800	6.800	175,0	179,0

In einem ersten Schritt werden die Schattenwurfzeiten an ausgewählten, auf der Karten-grundlage erkennbaren Gebäuden, im Umfeld der Windenergieanlagen mit vermuteter Wohnnutzung ermittelt, die den neu zu errichtenden Windenergieanlagen am nächsten liegen.

Die dadurch entstehenden Untersuchungspunkte werden im Vokabular der verwendeten Software als „Schattenrezeptoren“ bezeichnet. Hier im Text werden sie auch Immissionsorte (IO) genannt. Die Schattenrezeptoren werden entsprechend der Vorgabe des „Arbeitskreises Schattenwurf von Windenergieanlagen“ angesetzt. Konkret sind jeweils über den entsprechenden Hauswänden in einer Höhe von 2 m ebene Rezeptoren (Neigung des Fensters gleich 0°) mit einer Größe von 0,1 m x 0,1 m angenommen (annähernd punktförmig). Als Ausrichtungsmodus wird der Gewächshausmodus gewählt, da dieser Schatteneinfall aus allen Richtungen berücksichtigt. Für real in den Gebäuden vorhandene Fenster können sich andere Beschattungsdauern, als hier rechnerisch ermittelt, ergeben, da die Positionen und Größen von den hier getroffenen Annahmen abweichen werden. Allerdings bleibt auch ggf. vorhandener schattenverdeckender Bewuchs vor den Fenstern hier unbeachtet.

In einem *zweiten Schritt* werden Schattendauerlinien für die Umgebung des Windparks berechnet. Hier wird für jeden Punkt auf einem Raster von 20 \* 20 Metern die im Jahresverlauf auftretende Beschattung ermittelt und Punkte gleicher Beschattungsdauer werden durch Linien verbunden. Im Anhang befinden sich die Ausdrucke der Berechnungen.

Die folgende Tabelle gibt eine Übersicht über die Lage der Immissionsorte.

**Tabelle 2:** Koordinaten der Immissionsorte, Alle Koordinatenangaben in: UTM (north)- ETRS89 Zone: 32

IO-Nr.	Name	Ost	Nord	Z [m]
s01	Neu Oerzen, Soltauer Straße 1	588.101,7	5.893.084,2	46,4
s02	Oerzen, Am Ohfeld 1	588.404,8	5.894.762,2	45,3
s03	Oerzen, Am Ohfeld 4	588.478,4	5.894.877,5	40,0
s04	Oerzen, Am Ohfeld 9	588.431,5	5.894.865,5	40,0
s05	Oerzen, Am Ohfeld 15	588.429,4	5.894.972,8	43,6
s06	Oerzen, Im Dorfe 14	588.496,1	5.894.607,3	48,1
s07	Oerzen, Im Dorfe 16	588.303,1	5.894.557,6	47,8
s08	Oerzen, Im Dorfe 19	588.526,8	5.894.534,4	50,0
s09	Oerzen, Im Dorfe 25	588.443,9	5.894.543,8	50,0
s10	Oerzen, Westerheide 1	588.389,1	5.894.636,1	49,6
s11	Oerzen, Westerheide 3	588.370,1	5.894.675,9	47,7
s12	Oerzen, Westerheide 4	588.427,4	5.894.685,8	48,0
s13	Oerzen, Westerheide 5	588.381,0	5.894.813,7	42,6
s14	Oerzen, Westerheide 12A	588.325,0	5.894.865,9	42,6
s15	Oerzen, Westerheide 12C	588.306,5	5.894.823,7	44,5
s16	Oerzen, Westerheide 18	588.256,0	5.894.856,0	45,0
s17	Oerzen, Westerheide 19	588.291,4	5.894.974,5	48,1
s18	Oerzen, Westerheide 20	588.229,9	5.894.881,8	47,7
s19	Oerzen, Westerheide 22	588.185,2	5.894.847,2	46,0
s20	Oerzen, Westerheide 28	588.102,7	5.894.825,3	47,2
s21	Oerzen, Zum Hasel 5	587.786,3	5.893.215,0	57,9
s22	Oerzen, Zum Hasel 10	588.158,0	5.893.781,7	45,8
s23	Oerzen, Mühlenweg 10	588.545,4	5.894.776,2	44,6
s24	Oerzen, Mühlenweg 18	588.468,7	5.894.823,3	42,4
s25	Südergellersen, Auf dem Brink 6	586.477,5	5.896.246,7	67,4
s26	Südergellersen, Auf dem Brink 7	586.498,2	5.896.189,4	65,8
s27	Südergellersen, Birkenweg 7	586.547,8	5.896.410,5	65,2
s28	Südergellersen, Forstweg 4	586.302,3	5.896.127,2	65,0
s29	Südergellersen, Forstweg 8	586.230,1	5.896.140,7	65,0
s30	Südergellersen, Forstweg 11	586.166,4	5.896.101,6	63,6



s31	Südergellersen, Forstweg 16	586.112,1	5.896.167,0	64,0
s32	Südergellersen, Forstweg 17	586.094,1	5.896.128,7	62,5
s33	Südergellersen, Gewerbegebiet 587	587.007,3	5.895.062,8	43,3
s34	Südergellersen, Heidberg 2	586.177,4	5.896.183,9	66,8
s35	Südergellersen, Heidberg 3	586.154,2	5.896.223,0	66,9
s36	Südergellersen, Heiligenthaler Weg 2	586.863,9	5.896.155,5	55,9
s37	Südergellersen, Heiligenthaler Weg 3	586.792,8	5.896.190,0	58,8
s38	Südergellersen, Heiligenthaler Weg 3c	586.833,1	5.896.217,7	58,1
s39	Südergellersen, Heiligenthaler Weg 11	586.911,1	5.896.239,1	52,2
s40	Südergellersen, Im Alten Dorfe 2	586.402,6	5.896.082,0	64,0
s41	Südergellersen, Im Alten Dorfe 3	586.453,7	5.896.115,5	65,2
s42	Südergellersen, Im Alten Dorfe 4	586.480,0	5.896.021,4	61,1
s43	Südergellersen, Im Alten Dorfe 5	586.561,2	5.896.156,3	63,0
s44	Südergellersen, Im Alten Dorfe 7	586.616,6	5.896.197,1	62,0
s45	Südergellersen, Im Alten Dorfe 8	586.561,9	5.896.067,6	60,9
s46	Südergellersen, Im Alten Dorfe 10A	586.625,5	5.896.101,5	60,2
s47	Südergellersen, Kirchgellerser Straße 2	586.638,0	5.896.277,9	62,7
s48	Südergellersen, Kirchgellerser Straße 3	586.594,8	5.896.327,3	63,8
s49	Südergellersen, Kirchgellerser Straße 6	586.637,2	5.896.375,2	63,6
s50	Südergellersen, Kirchgellerser Straße 9	586.617,5	5.896.432,1	64,5
s51	Südergellersen, Kirchgellerser Straße 10	586.660,0	5.896.465,5	63,2
s52	Südergellersen, Kirchgellerser Straße 13	586.632,2	5.896.499,1	64,0
s53	Südergellersen, Kirchgellerser Straße 15	586.747,3	5.896.191,6	60,0
s54	Südergellersen, Kirchgellerser Straße 16	586.731,0	5.896.121,0	59,3
s55	Südergellersen, Oerzer Str. 13A	586.909,5	5.895.981,7	53,8
s56	Südergellersen, Oerzer Str. 15	587.010,6	5.895.899,8	50,0
s57	Südergellersen, Oerzer Str. 18	586.781,3	5.896.062,2	56,4
s58	Südergellersen, Oerzer Str. 19	586.879,7	5.895.864,2	49,3
s59	Südergellersen, Poggenpohl 7	586.751,1	5.895.922,0	55,9
s60	Südergellersen, Poggenpohl 8	586.640,6	5.895.995,8	58,5
s61	Südergellersen, Schwarzer Weg 2	586.403,0	5.896.246,5	71,4
s62	Südergellersen, Schwarzer Weg 9	586.404,8	5.896.338,8	69,4
s63	Südergellersen, Westergellerser Weg 1	586.545,3	5.896.256,4	63,9
s64	Südergellersen, Westergellerser Weg 4	586.498,9	5.896.338,8	65,0
s65	Südergellersen, Wetzter Weg 3	586.268,4	5.896.052,0	63,3
s66	Südergellersen, Wetzter Weg 6	586.172,4	5.895.854,5	57,8
s67	Südergellersen, In de Masch 8	586.717,4	5.896.250,8	61,1
s68	Wetzen, Zum Lerchenberg 5	583.085,3	5.892.839,1	65,0
s69	Wetzen, Zum Lerchenberg 10	583.242,4	5.892.711,0	60,0
s70	Wetzen, Zum Lerchenberg 37	582.866,7	5.892.994,9	69,4

## **5 Erläuterung zu den Resultatausdrucken**

Die Berechnungsergebnisse des Programmes WindPRO, Programmteil Shadow zum Berechnen des Schattenwurfes im Rahmen dieses Gutachtens befinden sich im Anhang, nachfolgend einige ergänzende Erläuterungen zu den einzelnen Berechnungsergebnissen.

### **SHADOW – Hauptergebnis**

Auf dieser Ausgabeseite werden die Berechnungsgrundlagen und eine Kurzfassung der Berechnungsergebnisse aufgeführt. Das Berechnungsverfahren ist kurz textlich erläutert und die berücksichtigten Anlagenstandorte und Schattenrezeptoren sind tabellarisch angegeben.

Für die Windenergieanlagen sind neben den genauen Standorten und den entscheidenden technischen Daten Nabenhöhe und Rotordurchmesser auch weitere Angaben enthalten, wie z.B. den Beschattungsbereich (s Kapitel 3) und wenn vorhanden die Rotordrehzahl.

Die Schattenrezeptoren (Immissionsorte) sind in einer gesonderten Tabelle mit allen relevanten Daten abgedruckt. Im Ausrichtungsmodus „Gewächshaus-Modus“ wird Schatten aus allen Himmelsrichtungen empfangen. Die „Neigung des Fensters“ bezieht sich auf die Neigung gegenüber dem Boden. Fenster in den Außenwänden haben einen Winkel von 90 Grad, gegebenenfalls vorhandene Dachfenster haben entsprechend abweichende Ausrichtungen. Ebene Rezeptoren (Flachdach, Terrasse) haben eine Neigung von 0°.

Unter „Berechnungsergebnisse“ werden die unter „Worst Case“-Annahmen, (d. h. die astronomische, maximale Beschattungsdauer) berechneten Ergebnisse kurz zusammengefasst. Diese sind neben der Anzahl der Tage im Jahr an denen Schattenwurf am Immissionsort auftritt, die Gesamtdauer in Stunden und Minuten pro Jahr sowie die maximalen täglichen Schattendauern in Stunden und Minuten pro Tag.

### **SHADOW – Kalender**

Der Ausdruck Kalender (nur ausgedruckt für die Rezeptoren an denen Schatten auftritt) zeigt für jeden Schattenrezeptor separat, an welchen Tagen im Jahr und über welche Dauer am einzelnen Tag mit Schatten zu rechnen ist.

In einer Tabelle sind spaltenweise die Monate und zeilenweise die Tage (zwei Zeilen pro Tag) angegeben. Für jeden Tag sind die Sonnenaufgangs- und die Sonnenuntergangszeit ausgedruckt. Fällt an dem entsprechenden Tag ein Schatten einer Windenergieanlage auf das Fenster wird die Schattendauer, die Anfangs- und Endzeit des Schattens sowie die Bezeichnung der verursachenden Windenergieanlage aufgeführt.

Eine Erläuterung der einzelnen Werte befindet sich unterhalb der Tabelle. Als letzte Zeile der Tabelle sind die Schattendauern in Minuten pro Monat aufaddiert. Im Shadow Kalender sind nur die Schatten verursachenden Windenergieanlagen aufgeführt.

Anhand der Angaben kann ermittelt werden, welchen Beitrag zur Gesamtbeschattung die einzelnen Anlagen liefern.



## SHADOW – Kalender, grafisch

Die grafische Kalenderdarstellung ist eine übersichtliche Aufbereitung und Ergänzung zu den tabellarischen Kalendern. Die Darstellung ist für alle Schattenrezeptoren, die vom Schattenwurf der Windenergieanlagen betroffen sind, ausgeführt. In den Grafiken ist für die einzelnen Rezeptoren schnell erkennbar, wie sich die Beschattungszeiten über das Jahr und die einzelnen Tage verteilen. Als Anhaltspunkte sind jeweils die Zeiten des Sonnenauf- und -untergangs, für die Sommermonate unter Berücksichtigung der Sommerzeit, als Begrenzungslinien eingetragen. Die Schattenanteile der verschiedenen Anlagenstandorte sind durch die Farbgebung identifizierbar.

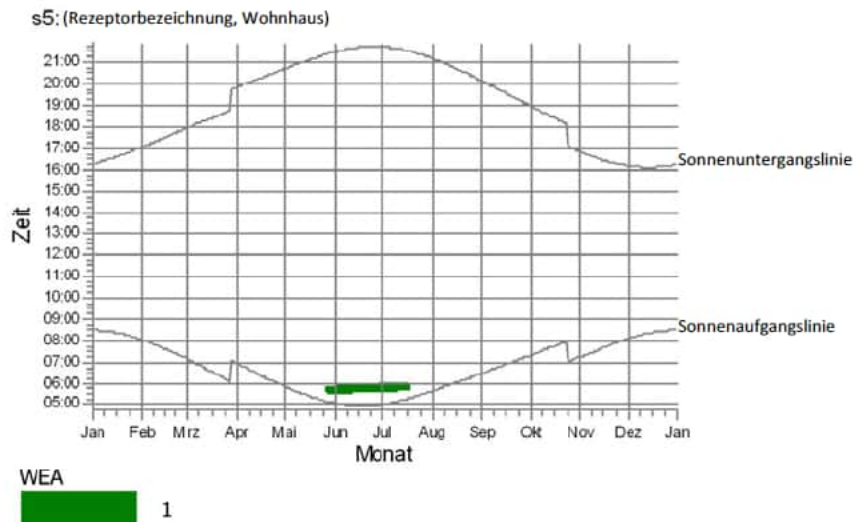
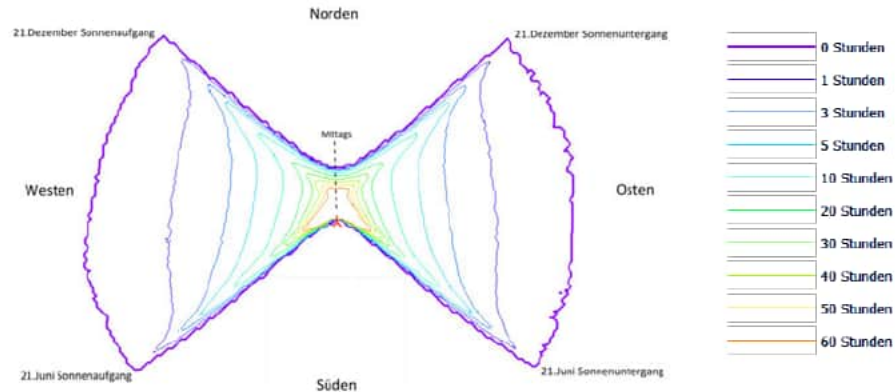


Abbildung 1: grafische Kalenderdarstellung



## SHADOW – Karte der Schattendauerlinien

Als letzter Ausdruck findet sich eine Karte mit eingetragenen Linien gleicher Schattendauer pro Jahr. Aus dieser Karte ist leicht ablesbar, welche Bereiche am stärksten vom Schattenwurf betroffen sind. Die Karte zeigt deutlich, dass die Schattenwirkung weit nach Osten und Westen reicht und in direkter Nord- bzw. Süd-Richtung unproblematischer ist.



**Abbildung 2:** Schattenwurfdiagramm für eine Windanlage für ein ganzes Jahr

Das Diagramm zeigt die komplette Fläche, auf der eine Windanlage im Laufe eines Jahres Schatten werfen kann.

Die Windanlage ist der rote Stern in der Mitte. Dort und in deren näherer Umgebung ist der meiste Schatten möglich, da dort die Sonne oben am Himmel steht (die rote bis zu den grünen Linien). Diese hohen Sonnenwinkel, in deren Folge der Schattenwurf auf einer Fläche weniger wird, sind häufiger als die sehr niedrigen zur Dämmerung, wenn auch weiter entfernte Gebiete erreicht werden (die blauen Linien).

Die violette Linie ist die Grenze, ab der kein Schatten mehr vorkommt.

Die Farben der Linien in der Karte im Anhang können von den hier beschriebenen abweichen.

## 6 Ergebnis der Schattenwurfberechnung

An dieser Stelle werden kurz die Endergebnisse der im Anhang befindlichen Ausdrucke zusammengefasst. Die Berechnungen wurden für die 5 geplanten Windenergieanlagen (**Zusatzbelastung**), die 18 bestehenden (**Vorbelastung**) und für alle 23 Windenergieanlagen (**Gesamtbelastung**) durchgeführt.

Der real entstehende Anteil der Beschattung wird langfristig gesehen bei nur ca. 25% dieser berechneten Werte liegen. Hinzu kommt, dass bei diesen Werten eine Abschirmung der Fenster durch Hindernisse und auch Bäume nicht berücksichtigt wird, und so die Schattenwirkung besonders von Frühjahr bis Herbst weiter gemindert wird.

Auf dem Kalender und den grafischen Kalenderausdrucken ist der Schattenwurfanteil der vom Auftraggeber beantragten Windenergieanlagen gut zu erkennen. Der Kalender und der grafische Kalender, für die vom Schattenwurf betroffenen Rezeptoren, befinden sich im Anhang. An den im Einzelnen betrachteten Schattenrezeptoren ergibt sich folgende Situation der astronomisch maximal möglichen Beschattungsdauer:

**Tabelle 3:** Die jährlichen Schattenzeiten an den Rezeptoren für die Gesamtbelastung, sowie Vor- und Zusatz-Belastung. Überschreitungen sind fett gedruckt und grau hinterlegt.

IO Nr.	Name	Gesamt- belastung	Zusatz- belastung	Vorbelastung
		Stunden / Jahr [Std:Min]	Stunden / Jahr [Std:Min]	Stunden / Jahr [Std:Min]
s01	Neu Oerzen, Soltauer Straße 1	0:00	0:00	0:00
s02	Oerzen, Am Ohfeld 1	<b>54:40</b>	17:41	<b>38:32</b>
s03	Oerzen, Am Ohfeld 4	<b>47:02</b>	15:56	<b>34:15</b>
s04	Oerzen, Am Ohfeld 9	<b>50:47</b>	16:55	<b>37:04</b>
s05	Oerzen, Am Ohfeld 15	<b>49:31</b>	16:19	<b>38:01</b>
s06	Oerzen, Im Dorfe 14	<b>51:18</b>	16:02	<b>35:16</b>
s07	Oerzen, Im Dorfe 16	<b>71:46</b>	21:28	<b>51:06</b>
s08	Oerzen, Im Dorfe 19	<b>35:44</b>	0:00	<b>35:44</b>
s09	Oerzen, Im Dorfe 25	<b>57:14</b>	17:24	<b>40:22</b>
s10	Oerzen, Westerheide 1	<b>59:19</b>	18:20	<b>40:59</b>
s11	Oerzen, Westerheide 3	<b>59:58</b>	18:45	<b>41:31</b>
s12	Oerzen, Westerheide 4	<b>54:14</b>	17:14	<b>37:23</b>
s13	Oerzen, Westerheide 5	<b>55:53</b>	18:04	<b>40:17</b>
s14	Oerzen, Westerheide 12A	<b>60:09</b>	19:12	<b>44:42</b>
s15	Oerzen, Westerheide 12C	<b>62:51</b>	19:42	<b>46:09</b>
s16	Oerzen, Westerheide 18	<b>67:54</b>	20:59	<b>50:58</b>
s17	Oerzen, Westerheide 19	<b>61:44</b>	19:07	<b>48:29</b>
s18	Oerzen, Westerheide 20	<b>70:26</b>	21:24	<b>53:49</b>
s19	Oerzen, Westerheide 22	<b>77:16</b>	23:01	<b>58:29</b>
s20	Oerzen, Westerheide 28	<b>98:48</b>	<b>33:57</b>	<b>69:53</b>
s21	Oerzen, Zum Hasel 5	16:16	0:00	16:16
s22	Oerzen, Zum Hasel 10	<b>47:29</b>	26:11	23:07
s23	Oerzen, Mühlenweg 10	<b>30:40</b>	0:00	<b>30:40</b>
s24	Oerzen, Mühlenweg 18	<b>48:19</b>	16:11	<b>34:27</b>
s25	Südergellersen, Auf dem Brink 6	0:00	0:00	0:00
s26	Südergellersen, Auf dem Brink 7	0:00	0:00	0:00
s27	Südergellersen, Birkenweg 7	0:00	0:00	0:00
s28	Südergellersen, Forstweg 4	5:50	0:00	5:50

**SOWIWAS – Energie GmbH**

s29	Südergellersen, Forstweg 8	11:10	2:23	8:47
s30	Südergellersen, Forstweg 11	28:05	12:28	15:37
s31	Südergellersen, Forstweg 16	20:52	7:51	13:01
s32	Südergellersen, Forstweg 17	<b>31:03</b>	14:18	16:45
s33	Südergellersen, Gewerbegebiet 729	<b>729:45</b>	<b>377:57</b>	<b>359:00</b>
s34	Südergellersen, Heidberg 2	7:45	0:00	7:45
s35	Südergellersen, Heidberg 3	5:56	0:00	5:56
s36	Südergellersen, Heiligenthaler Weg 2	<b>31:23</b>	6:38	24:45
s37	Südergellersen, Heiligenthaler Weg 3	19:41	0:00	19:41
s38	Südergellersen, Heiligenthaler Weg 3c	19:25	0:00	19:25
s39	Südergellersen, Heiligenthaler Weg 11	21:43	0:00	21:43
s40	Südergellersen, Im Alten Dorfe 2	3:43	0:00	3:43
s41	Südergellersen, Im Alten Dorfe 3	0:00	0:00	0:00
s42	Südergellersen, Im Alten Dorfe 4	28:18	6:22	21:56
s43	Südergellersen, Im Alten Dorfe 5	4:40	0:00	4:40
s44	Südergellersen, Im Alten Dorfe 7	5:15	0:00	5:15
s45	Südergellersen, Im Alten Dorfe 8	17:07	0:00	17:07
s46	Südergellersen, Im Alten Dorfe 10A	18:07	0:00	18:07
s47	Südergellersen, Kirchgellerser Straße 2	0:00	0:00	0:00
s48	Südergellersen, Kirchgellerser Straße 3	0:00	0:00	0:00
s49	Südergellersen, Kirchgellerser Straße 6	0:00	0:00	0:00
s50	Südergellersen, Kirchgellerser Straße 9	0:00	0:00	0:00
s51	Südergellersen, Kirchgellerser Straße 10	0:00	0:00	0:00
s52	Südergellersen, Kirchgellerser Straße 13	0:00	0:00	0:00
s53	Südergellersen, Kirchgellerser Straße 15	16:39	0:00	16:39
s54	Südergellersen, Kirchgellerser Straße 16	22:55	0:00	22:55
s55	Südergellersen, Oerzer Str. 13A	<b>84:16</b>	<b>66:04</b>	18:12
s56	Südergellersen, Oerzer Str. 15	<b>116:41</b>	<b>102:41</b>	14:00
s57	Südergellersen, Oerzer Str. 18	<b>45:20</b>	15:37	29:43
s58	Südergellersen, Oerzer Str. 19	<b>130:08</b>	<b>107:22</b>	22:46
s59	Südergellersen, Poggenpohl 7	<b>94:05</b>	<b>62:25</b>	<b>31:40</b>
s60	Südergellersen, Poggenpohl 8	<b>46:42</b>	14:55	<b>31:47</b>
s61	Südergellersen, Schwarzer Weg 2	0:00	0:00	0:00
s62	Südergellersen, Schwarzer Weg 9	0:00	0:00	0:00



s63	Südergellersen, Westergel- lenser Weg 1	0:00	0:00	0:00
s64	Südergellersen, Westergel- lenser Weg 4	0:00	0:00	0:00
s65	Südergellersen, Wetzter Weg 3	27:07	12:22	14:45
s66	Südergellersen, Wetzter Weg 6	<b>114:34</b>	<b>56:26</b>	<b>58:08</b>
s67	Südergellersen, In de Masch 8	8:07	0:00	8:07
s68	Wetzen, Zum Lerchenberg 5	20:25	0:00	20:25
s69	Wetzen, Zum Lerchenberg 10	13:47	0:00	13:47
s70	Wetzen, Zum Lerchenberg 37	<b>35:54</b>	0:00	<b>35:54</b>

**Tabelle 4:** Die **täglichen** Schattenzeiten an den Rezeptoren für die Gesamtbelastung, sowie Vor- und Zusatz-  
Belastung. Überschreitungen sind fett gedruckt und grau hinterlegt.

IO Nr.	Name	Gesamt- belastung	Zusatz- belastung	Vorbelastung
		Stunden / Jahr	Stunden / Jahr	Stunden / Jahr
		[Std:Min]	[Std:Min]	[Std:Min]
s01	Neu Oerzen, Soltauer Straße 1	0:00	0:00	0:00
s02	Oerzen, Am Ohfeld 1	<b>0:48</b>	0:23	<b>0:38</b>
s03	Oerzen, Am Ohfeld 4	<b>0:41</b>	0:22	<b>0:38</b>
s04	Oerzen, Am Ohfeld 9	<b>0:43</b>	0:23	<b>0:41</b>
s05	Oerzen, Am Ohfeld 15	<b>0:44</b>	0:23	<b>0:44</b>
s06	Oerzen, Im Dorfe 14	<b>0:48</b>	0:22	<b>0:32</b>
s07	Oerzen, Im Dorfe 16	<b>0:55</b>	0:24	<b>0:39</b>
s08	Oerzen, Im Dorfe 19	<b>0:32</b>	0:00	<b>0:32</b>
s09	Oerzen, Im Dorfe 25	<b>0:49</b>	0:23	<b>0:34</b>
s10	Oerzen, Westerheide 1	<b>0:53</b>	0:23	<b>0:35</b>
s11	Oerzen, Westerheide 3	<b>0:53</b>	0:24	<b>0:35</b>
s12	Oerzen, Westerheide 4	<b>0:50</b>	0:23	<b>0:33</b>
s13	Oerzen, Westerheide 5	<b>0:48</b>	0:23	<b>0:41</b>
s14	Oerzen, Westerheide 12A	<b>0:47</b>	0:24	<b>0:46</b>
s15	Oerzen, Westerheide 12C	<b>0:49</b>	0:24	<b>0:45</b>
s16	Oerzen, Westerheide 18	<b>0:50</b>	0:25	<b>0:49</b>
s17	Oerzen, Westerheide 19	<b>0:51</b>	0:25	<b>0:51</b>
s18	Oerzen, Westerheide 20	<b>0:52</b>	0:25	<b>0:52</b>
s19	Oerzen, Westerheide 22	<b>0:55</b>	0:27	<b>0:54</b>
s20	Oerzen, Westerheide 28	<b>1:08</b>	0:30	<b>1:00</b>
s21	Oerzen, Zum Hasel 5	0:24	0:00	0:24
s22	Oerzen, Zum Hasel 10	0:30	0:25	0:28
s23	Oerzen, Mühlenweg 10	<b>0:32</b>	0:00	<b>0:32</b>
s24	Oerzen, Mühlenweg 18	<b>0:43</b>	0:22	<b>0:38</b>
s25	Südergellersen, Auf dem Brink 6	0:00	0:00	0:00
s26	Südergellersen, Auf dem Brink 7	0:00	0:00	0:00
s27	Südergellersen, Birkenweg 7	0:00	0:00	0:00
s28	Südergellersen, Forstweg 4	0:17	0:00	0:17
s29	Südergellersen, Forstweg 8	<b>0:32</b>	0:12	0:20
s30	Südergellersen, Forstweg 11	<b>0:51</b>	0:26	0:25
s31	Südergellersen, Forstweg 16	<b>0:43</b>	0:21	0:23
s32	Südergellersen, Forstweg 17	<b>0:52</b>	0:28	0:25
s33	Südergellersen, Gewerbege- biet 729	<b>3:06</b>	<b>1:43</b>	<b>2:14</b>
s34	Südergellersen, Heidberg 2	0:19	0:00	0:19
s35	Südergellersen, Heidberg 3	0:17	0:00	0:17

s36	Südergellersen, Heiligenthaler Weg 2	<b>0:46</b>	0:24	0:27
s37	Südergellersen, Heiligenthaler Weg 3	0:27	0:00	0:27
s38	Südergellersen, Heiligenthaler Weg 3c	0:26	0:00	0:26
s39	Südergellersen, Heiligenthaler Weg 11	0:25	0:00	0:25
s40	Südergellersen, Im Alten Dorfe 2	0:14	0:00	0:14
s41	Südergellersen, Im Alten Dorfe 3	0:00	0:00	0:00
s42	Südergellersen, Im Alten Dorfe 4	<b>1:06</b>	0:20	<b>0:46</b>
s43	Südergellersen, Im Alten Dorfe 5	0:16	0:00	0:16
s44	Südergellersen, Im Alten Dorfe 7	0:16	0:00	0:16
s45	Südergellersen, Im Alten Dorfe 8	0:29	0:00	0:29
s46	Südergellersen, Im Alten Dorfe 10A	0:29	0:00	0:29
s47	Südergellersen, Kirchgellerser Straße 2	0:00	0:00	0:00
s48	Südergellersen, Kirchgellerser Straße 3	0:00	0:00	0:00
s49	Südergellersen, Kirchgellerser Straße 6	0:00	0:00	0:00
s50	Südergellersen, Kirchgellerser Straße 9	0:00	0:00	0:00
s51	Südergellersen, Kirchgellerser Straße 10	0:00	0:00	0:00
s52	Südergellersen, Kirchgellerser Straße 13	0:00	0:00	0:00
s53	Südergellersen, Kirchgellerser Straße 15	0:26	0:00	0:26
s54	Südergellersen, Kirchgellerser Straße 16	0:29	0:00	0:29
s55	Südergellersen, Oerzer Str. 13A	<b>1:34</b>	<b>1:34</b>	0:28
s56	Südergellersen, Oerzer Str. 15	<b>1:38</b>	<b>1:38</b>	0:27
s57	Südergellersen, Oerzer Str. 18	<b>1:15</b>	<b>0:50</b>	0:29
s58	Südergellersen, Oerzer Str. 19	<b>2:06</b>	<b>1:51</b>	0:30
s59	Südergellersen, Poggenpohl 7	<b>1:51</b>	<b>1:38</b>	<b>0:32</b>
s60	Südergellersen, Poggenpohl 8	<b>1:21</b>	<b>0:49</b>	<b>0:33</b>
s61	Südergellersen, Schwarzer Weg 2	0:00	0:00	0:00
s62	Südergellersen, Schwarzer Weg 9	0:00	0:00	0:00
s63	Südergellersen, Westergellerser Weg 1	0:00	0:00	0:00
s64	Südergellersen, Westergellerser Weg 4	0:00	0:00	0:00
s65	Südergellersen, Wetzter Weg 3	<b>0:52</b>	0:27	0:25
s66	Südergellersen, Wetzter Weg 6	<b>2:17</b>	<b>1:04</b>	<b>1:14</b>



s67	Südergellersen, In de Masch 8	0:20	0:00	0:20
s68	Wetzen, Zum Lerchenberg 5	0:19	0:00	0:19
s69	Wetzen, Zum Lerchenberg 10	0:18	0:00	0:18
s70	Wetzen, Zum Lerchenberg 37	<b>0:40</b>	0:00	<b>0:40</b>

Die Verteilung der Schattenwurfdauer auf der gesamten betrachteten Fläche kann der Karte im Anhang anhand der Iso-Schattenlinien für den jährlichen Schattenwurf entnommen werden.

An den umliegenden Dörfern und Häusern kommt es durch die geplanten Anlagen zum Teil zu großen Überschreitungen der Grenzwerte (max. 30 Stunden im Jahr und max. 30 Minuten täglich). Durch den großen Rotordurchmesser ist der Beschattungsbereich mit 1893 m sehr weit. Die Anlagen haben dagegen teilweise nur ca. 350 bis 900 m Abstand zu den Immissionsorten.

Benachbarte Häuser können ähnliche Beschattungswerte haben, wie die hier beispielhaft untersuchten Immissionsorte.

Für die Einhaltung der Grenzwerte muss eine spezielle Steuerung die Schattenwurf verursachenden Windenergieanlagen abschalten. Das Abschaltmodul besteht aus einem Sonnenscheindetektor und einer Steuereinheit, die bei einem möglichen Schattenwurf (in Abhängigkeit des Azimutwinkels der Windanlage und des Sonnenstands) die entsprechenden Windkraftanlagen abschaltet. Durch dieses Modul wird sichergestellt, dass die Windenergieanlagen, in dem kritischen Zeitraum mit Schattenwurf auf die betroffenen Immissionsorte, abgeschaltet werden und so die Richtwerte nicht überschritten werden.

## **7 Zusammenfassung**

Durch Errichtung und Betrieb der beantragten neuen Windenergieanlagen ist Schattenwurf an einigen der umliegenden Häuser zu erwarten.

Dabei kommt es zu Schattenwurf, der über den Grenzwerten (max. 30 Stunden im Jahr und max. 30 Minuten täglich) liegt.

Um die Überschreitungen zu verhindern und für die Einhaltung der Grenzwerte müssen die geplanten Anlagen mit einem Schattenabschaltmodul ausgestattet werden.

Bei der Bewertung der berechneten Zahlen ist zu berücksichtigen, dass sie jeweils unter „Worst Case“-Annahmen zustande gekommen sind und in der Realität wesentlich geringere Schattendauern festzustellen sein werden. Insbesondere ist zu bemerken, dass bereits vorhandene lichtundurchlässige Hindernisse vor den betrachteten Objekten nicht berücksichtigt wurden.

Für die Untersuchung wurden die durch den Auftraggeber dieses Gutachtens beantragten 5 Windenergieanlagen des Typs NORDEX N175/6.X-6.800 mit einer Nabenhöhe von 179 m und einem Rotordurchmesser von 175 m neben 18 bestehenden, genehmigten Windenergieanlagen an den vom Auftraggeber vorgegebenen Positionen angesetzt.

## **8** **Literaturverzeichnis**

- [1] J. Pohl, F. Faul und R. Mausfeld, *Belästigung durch periodischen Schattenwurf von Windenergieanlagen*, Institut für Psychologie der Christian-Albrechts-Universität zu Kiel, 1999.
- [2] Bund/Länder-Arbeitsgemeinschaft für Immissionsschutz (LAI), *Hinweise zur Ermittlung und Beurteilung der optischen Immissionen von Windkraftanlagen Aktualisierung 2019 (WKA-Schattenwurfhinweise)*.

Karte Titel: Map data: © OpenStreetMap contributors, SRTM | map graphic: © OpenTopoMap (CC-BY-SA)  
WEA Titel, Nordex N175/6X, © Nordex Energy SE & Co. KG

Die vorstehenden Angaben sind unparteiisch und nach bestem Wissen und Gewissen ermittelt worden. Schadensersatzansprüche sind ausgeschlossen. Abschriften und Auszüge dürfen ohne Genehmigung des Verfassers nur vom Auftraggeber erstellt werden, um am beschriebenen Standort das Projekt zu realisieren.

SOWIWAS - Energie GmbH

Energie aus Sonne, Wind, Wasser und mehr

Watenstedter Straße 11

3 8 3 8 4 G e v e n s l e b e n

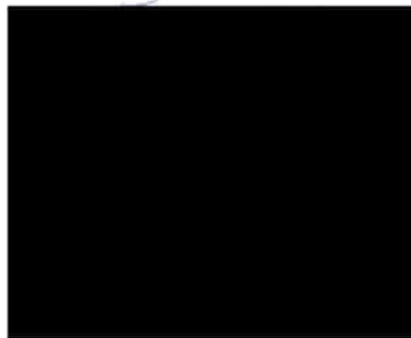
Telefon: 05354 - 99 06.235

Telefax: 05354 - 99 06.109

Internet: [www.sowiwas.de](http://www.sowiwas.de)

E-Mail: [gutachten@sowiwas.de](mailto:gutachten@sowiwas.de)

Gevensleben, den 22. Juli 2025



## Anhang

### Ergebnisse der WindPRO Berechnung Shadow:

#### Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand

Hauptergebnis	4 Seiten
Kalender	100 Seiten
Grafischer Kalender	12 Seiten
Karte	1 Seite

#### Berechnung: Zusatzbelastung Repowering 5x N175

Hauptergebnis	4 Seiten
Grafischer Kalender	12 Seiten
Karte	1 Seite

#### Berechnung: Vorbelastung Repowering 18 Bestand

Hauptergebnis	4 Seiten
Grafischer Kalender	12 Seiten
Karte	1 Seite



## SHADOW - Hauptergebnis

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand

### 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 Sonneneinstrahlungsrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

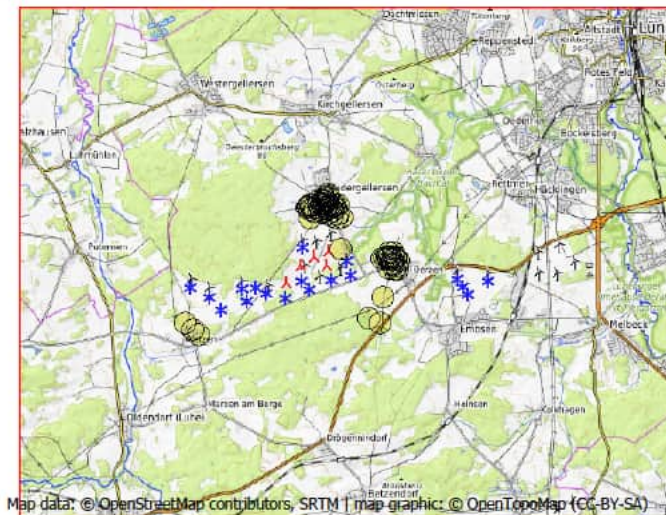
Eine WEA wird nicht berücksichtigt, wenn sie von keinem Teil der Rezeptorfläche aus sichtbar ist. Die Sichtbarkeitsberechnung basiert auf den folgenden Annahmen:

DHM: Höhenlinien: CONTOURLINE\_ONLINEDATA\_0.wpo (1)

Rasterauflösung: 1,0 m

Alle Koordinatenangaben in:

UTM (north)-ETRS89 Zone: 32



Maßstab 1:200.000  
▲ Neue WEA    \* Existierende WEA    ● Schattenrezeptor

### WEA

	Ost	Nord	Z	Beschreibung	WEA-Typ	Hersteller	Typ	Nennleistung	Rotor-durchmesser	NH	Schattendaten	
											Beschatt.-Bereich	U/min
			[m]		Aktuell			[kW]	[m]	[m]	[m]	[U/min]
B 01	585.971,6	5.895.090,6	50,0	NORDEX N1...	Ja	NORDEX	N149/4.0-4.5-4.500	4.500	149,0	125,0	1.822	10,7
B 02	585.959,5	5.894.188,5	45,0	NORDEX N1...	Ja	NORDEX	N131/3300 DE-3.300	3.300	131,0	134,0	1.722	10,9
B 03	585.020,8	5.893.835,6	50,0	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 04	584.733,6	5.893.984,8	50,0	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 05	584.375,7	5.893.950,2	55,0	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 06	584.497,2	5.893.629,8	56,7	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 07	583.821,9	5.893.385,7	64,4	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 08	583.491,9	5.893.713,6	60,0	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 09	582.991,2	5.893.966,5	55,0	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 10	590.139,5	5.894.321,8	37,1	ENERCON E...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
B 11	590.290,9	5.894.120,4	40,0	ENERCON E...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
B 12	590.431,2	5.893.915,7	42,1	ENERCON E...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
B 13	590.960,7	5.894.291,0	45,6	ENERCON E...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
Oerzen 1	587.151,9	5.894.746,2	45,6	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Oerzen 2	587.284,9	5.894.361,9	40,0	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Oerzen 3	586.751,2	5.894.214,7	49,2	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Oerzen 4	586.171,4	5.893.951,1	50,0	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Oerzen 5	585.523,5	5.893.709,1	56,0	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Rep 10	586.619,0	5.894.596,4	42,4	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Rep 11	586.661,3	5.895.000,3	44,3	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Rep 5	585.563,4	5.894.124,0	45,0	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Rep 8	585.927,2	5.894.596,0	48,8	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Rep 9	586.287,4	5.894.833,5	45,0	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8

### 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]
s01	Neu Oerzen, Soltauer Straße 1	588.101,7	5.893.084,2	46,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s02	Oerzen, Am Ohfeld 1	588.404,8	5.894.762,2	45,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s03	Oerzen, Am Ohfeld 4	588.478,4	5.894.877,5	40,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s04	Oerzen, Am Ohfeld 9	588.431,5	5.894.865,5	40,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s05	Oerzen, Am Ohfeld 15	588.429,4	5.894.972,8	43,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s06	Oerzen, Im Dorfe 14	588.496,1	5.894.607,3	48,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s07	Oerzen, Im Dorfe 16	588.303,1	5.894.557,6	47,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0

(Fortsetzung nächste Seite)...



**SHADOW - Hauptergebnis****Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand**

... (Fortsetzung von vorheriger Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
				[m]	[m]	[m]	[m]	[°]		[m]
s08	Oerzen, Im Dorfe 19	588.526,8	5.894.534,4	50,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s09	Oerzen, Im Dorfe 25	588.443,9	5.894.543,8	50,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s10	Oerzen, Westerheide 1	588.389,1	5.894.636,1	49,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s11	Oerzen, Westerheide 3	588.370,1	5.894.675,9	47,7	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s12	Oerzen, Westerheide 4	588.427,4	5.894.685,8	48,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s13	Oerzen, Westerheide 5	588.381,0	5.894.813,7	42,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s14	Oerzen, Westerheide 12A	588.325,0	5.894.865,9	42,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s15	Oerzen, Westerheide 12C	588.306,5	5.894.823,7	44,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s16	Oerzen, Westerheide 18	588.256,0	5.894.856,0	45,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s17	Oerzen, Westerheide 19	588.291,4	5.894.974,5	48,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s18	Oerzen, Westerheide 20	588.229,9	5.894.881,8	47,7	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s19	Oerzen, Westerheide 22	588.185,2	5.894.847,2	46,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s20	Oerzen, Westerheide 28	588.102,7	5.894.825,3	47,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s21	Oerzen, Zum Hasel 5	587.786,3	5.893.215,0	57,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s22	Oerzen, Zum Hasel 10	588.158,0	5.893.781,7	45,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s23	Oerzen, Mühlenweg 10	588.545,4	5.894.776,2	44,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s24	Oerzen, Mühlenweg 18	588.468,7	5.894.823,3	42,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s25	Südergellersen, Auf dem Brink 6	586.477,5	5.896.246,7	67,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s26	Südergellersen, Auf dem Brink 7	586.498,2	5.896.189,4	65,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s27	Südergellersen, Birkenweg 7	586.547,8	5.896.410,5	65,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s28	Südergellersen, Forstweg 4	586.302,3	5.896.127,2	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s29	Südergellersen, Forstweg 8	586.230,1	5.896.140,7	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s30	Südergellersen, Forstweg 11	586.166,4	5.896.101,6	63,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s31	Südergellersen, Forstweg 16	586.112,1	5.896.167,0	64,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s32	Südergellersen, Forstweg 17	586.094,1	5.896.128,7	62,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s33	Südergellersen, Gewerbegebiet	587.007,3	5.895.062,8	43,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s34	Südergellersen, Heidberg 2	586.177,4	5.896.183,9	66,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s35	Südergellersen, Heidberg 3	586.154,2	5.896.223,0	66,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s36	Südergellersen, Heiligenthaler Weg 2	586.863,9	5.896.155,5	55,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s37	Südergellersen, Heiligenthaler Weg 3	586.792,8	5.896.190,0	58,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s38	Südergellersen, Heiligenthaler Weg 3c	586.833,1	5.896.217,7	58,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s39	Südergellersen, Heiligenthaler Weg 11	586.911,1	5.896.239,1	52,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s40	Südergellersen, Im Alten Dorfe 2	586.402,6	5.896.082,0	64,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s41	Südergellersen, Im Alten Dorfe 3	586.453,7	5.896.115,5	65,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s42	Südergellersen, Im Alten Dorfe 4	586.480,0	5.896.021,4	61,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s43	Südergellersen, Im Alten Dorfe 5	586.561,2	5.896.156,3	63,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s44	Südergellersen, Im Alten Dorfe 7	586.616,6	5.896.197,1	62,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s45	Südergellersen, Im Alten Dorfe 8	586.561,9	5.896.067,6	60,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s46	Südergellersen, Im Alten Dorfe 10A	586.625,5	5.896.101,5	60,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s47	Südergellersen, Kirchgellerser Straße 2	586.638,0	5.896.277,9	62,7	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s48	Südergellersen, Kirchgellerser Straße 3	586.594,8	5.896.327,3	63,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s49	Südergellersen, Kirchgellerser Straße 6	586.637,2	5.896.375,2	63,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s50	Südergellersen, Kirchgellerser Straße 9	586.617,5	5.896.432,1	64,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s51	Südergellersen, Kirchgellerser Straße 10	586.660,0	5.896.465,5	63,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s52	Südergellersen, Kirchgellerser Straße 13	586.632,2	5.896.499,1	64,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s53	Südergellersen, Kirchgellerser Straße 15	586.747,3	5.896.191,6	60,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s54	Südergellersen, Kirchgellerser Straße 16	586.731,0	5.896.121,0	59,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s55	Südergellersen, Oerzer Str. 13A	586.909,5	5.895.981,7	53,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s56	Südergellersen, Oerzer Str. 15	587.010,6	5.895.899,8	50,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s57	Südergellersen, Oerzer Str. 18	586.781,3	5.896.062,2	56,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s58	Südergellersen, Oerzer Str. 19	586.879,7	5.895.864,2	49,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s59	Südergellersen, Poggenpohl 7	586.751,1	5.895.922,0	55,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s60	Südergellersen, Poggenpohl 8	586.640,6	5.895.995,8	58,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s61	Südergellersen, Schwarzer Weg 2	586.403,0	5.896.246,5	71,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s62	Südergellersen, Schwarzer Weg 9	586.404,8	5.896.338,8	69,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s63	Südergellersen, Westergellerser Weg 1	586.545,3	5.896.256,4	63,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s64	Südergellersen, Westergellerser Weg 4	586.498,9	5.896.338,8	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s65	Südergellersen, Wetzter Weg 3	586.268,4	5.896.052,0	63,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s66	Südergellersen, Wetzter Weg 6	586.172,4	5.895.854,5	57,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s67	Südergellersen, In de Masch 8	586.717,4	5.896.250,8	61,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s68	Wetzen, Zum Lerchenberg 5	583.085,3	5.892.839,1	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s69	Wetzen, Zum Lerchenberg 10	583.242,4	5.892.711,0	60,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s70	Wetzen, Zum Lerchenberg 37	582.866,7	5.892.994,9	69,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0



**SHADOW - Hauptergebnis****Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand**Berechnungsergebnisse**

Schattenrezeptor

Nr.	Name	astron. max. mögl. Beschattungsdauer		
		Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag
		[h/a]	[d/a]	[h/d]
s01	Neu Oerzen, Soltau Straße 1	0:00	0	0:00
s02	Oerzen, Am Ohfeld 1	54:40	112	0:48
s03	Oerzen, Am Ohfeld 4	47:02	107	0:41
s04	Oerzen, Am Ohfeld 9	50:47	112	0:43
s05	Oerzen, Am Ohfeld 15	49:31	110	0:44
s06	Oerzen, Im Dorfe 14	51:18	108	0:48
s07	Oerzen, Im Dorfe 16	71:46	123	0:55
s08	Oerzen, Im Dorfe 19	35:44	92	0:32
s09	Oerzen, Im Dorfe 25	57:14	113	0:49
s10	Oerzen, Westerheide 1	59:19	115	0:53
s11	Oerzen, Westerheide 3	59:58	116	0:53
s12	Oerzen, Westerheide 4	54:14	111	0:50
s13	Oerzen, Westerheide 5	55:53	116	0:48
s14	Oerzen, Westerheide 12A	60:09	120	0:47
s15	Oerzen, Westerheide 12C	62:51	122	0:49
s16	Oerzen, Westerheide 18	67:54	126	0:50
s17	Oerzen, Westerheide 19	61:44	122	0:51
s18	Oerzen, Westerheide 20	70:26	128	0:52
s19	Oerzen, Westerheide 22	77:16	134	0:55
s20	Oerzen, Westerheide 28	98:48	144	1:08
s21	Oerzen, Zum Hasel 5	16:16	55	0:24
s22	Oerzen, Zum Hasel 10	47:29	116	0:30
s23	Oerzen, Mühlenweg 10	30:40	77	0:32
s24	Oerzen, Mühlenweg 18	48:19	109	0:43
s25	Südergellersen, Auf dem Brink 6	0:00	0	0:00
s26	Südergellersen, Auf dem Brink 7	0:00	0	0:00
s27	Südergellersen, Birkenweg 7	0:00	0	0:00
s28	Südergellersen, Forstweg 4	5:50	26	0:17
s29	Südergellersen, Forstweg 8	11:10	32	0:32
s30	Südergellersen, Forstweg 11	28:05	46	0:51
s31	Südergellersen, Forstweg 16	20:52	42	0:43
s32	Südergellersen, Forstweg 17	31:03	48	0:52
s33	Südergellersen, Gewerbegebiet	729:45	365	3:06
s34	Südergellersen, Heidberg 2	7:45	31	0:19
s35	Südergellersen, Heidberg 3	5:56	27	0:17
s36	Südergellersen, Heiligenthaler Weg 2	31:23	64	0:46
s37	Südergellersen, Heiligenthaler Weg 3	19:41	52	0:27
s38	Südergellersen, Heiligenthaler Weg 3c	19:25	52	0:26
s39	Südergellersen, Heiligenthaler Weg 11	21:43	60	0:25
s40	Südergellersen, Im Alten Dorfe 2	3:43	20	0:14
s41	Südergellersen, Im Alten Dorfe 3	0:00	0	0:00
s42	Südergellersen, Im Alten Dorfe 4	28:18	42	1:06
s43	Südergellersen, Im Alten Dorfe 5	4:40	22	0:16
s44	Südergellersen, Im Alten Dorfe 7	5:15	24	0:16
s45	Südergellersen, Im Alten Dorfe 8	17:07	44	0:29
s46	Südergellersen, Im Alten Dorfe 10A	18:07	46	0:29
s47	Südergellersen, Kirchgellerser Straße 2	0:00	0	0:00
s48	Südergellersen, Kirchgellerser Straße 3	0:00	0	0:00
s49	Südergellersen, Kirchgellerser Straße 6	0:00	0	0:00
s50	Südergellersen, Kirchgellerser Straße 9	0:00	0	0:00
s51	Südergellersen, Kirchgellerser Straße 10	0:00	0	0:00
s52	Südergellersen, Kirchgellerser Straße 13	0:00	0	0:00
s53	Südergellersen, Kirchgellerser Straße 15	16:39	46	0:26
s54	Südergellersen, Kirchgellerser Straße 16	22:55	56	0:29
s55	Südergellersen, Oerzer Str. 13A	84:16	90	1:34
s56	Südergellersen, Oerzer Str. 15	116:41	108	1:38
s57	Südergellersen, Oerzer Str. 18	45:20	70	1:15
s58	Südergellersen, Oerzer Str. 19	130:08	106	2:06
s59	Südergellersen, Poggenpohl 7	94:05	88	1:51
s60	Südergellersen, Poggenpohl 8	46:42	66	1:21
s61	Südergellersen, Schwarzer Weg 2	0:00	0	0:00
s62	Südergellersen, Schwarzer Weg 9	0:00	0	0:00

(Fortsetzung nächste Seite)...



**SHADOW - Hauptergebnis****Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand**

...(Fortsetzung von vorheriger Seite)

Nr.	Name	astron. max. mögl. Beschattungsdauer		
		Stunden/Jahr [h/a]	Schattentage/Jahr [d/a]	Max.Schattendauer/Tag [h/d]
s63	Südergellersen, Westergellenser Weg 1	0:00	0	0:00
s64	Südergellersen, Westergellenser Weg 4	0:00	0	0:00
s65	Südergellersen, Wetzer Weg 3	27:07	44	0:52
s66	Südergellersen, Wetzer Weg 6	114:34	78	2:17
s67	Südergellersen, In de Masch 8	8:07	31	0:20
s68	Wetzen, Zum Lerchenberg 5	20:25	89	0:19
s69	Wetzen, Zum Lerchenberg 10	13:47	66	0:18
s70	Wetzen, Zum Lerchenberg 37	35:54	103	0:40

## Gesamtdauer Beschattung an Rezeptoren pro WEA

Nr.	Name	Maximal [h/a]
B 01	NORDEX N149/4.0-4.5 4500 149.0 !O! NH: 125,0 m (Ges:199,5 m) (101)	142:41
B 02	NORDEX N131/3300 DE 3300 131.0 !-! NH: 134,0 m (Ges:199,5 m) (120)	11:43
B 03	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (94)	11:18
B 04	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (95)	12:12
B 05	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (96)	10:15
B 06	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (97)	23:02
B 07	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (98)	20:35
B 08	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (99)	0:00
B 09	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (100)	0:00
B 10	ENERCON E-66/18.70 1800 70.0 !O! NH: 65,0 m (Ges:100,0 m) (103)	0:00
B 11	ENERCON E-66/18.70 1800 70.0 !O! NH: 65,0 m (Ges:100,0 m) (104)	0:00
B 12	ENERCON E-66/18.70 1800 70.0 !O! NH: 65,0 m (Ges:100,0 m) (105)	0:00
B 13	ENERCON E-66/18.70 1800 70.0 !O! NH: 65,0 m (Ges:100,0 m) (106)	0:00
Oerzen 1	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (79)	331:00
Oerzen 2	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (80)	194:07
Oerzen 3	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (81)	115:16
Oerzen 4	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (82)	50:45
Oerzen 5	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (83)	0:00
Rep 10	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (332)	142:32
Rep 11	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)	462:12
Rep 5	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (329)	10:50
Rep 8	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (330)	76:51
Rep 9	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (331)	134:59

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s01 - Neu Oerzen, Soltauer Straße 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	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11	08:05 17:01	07:09 17:56	06:55 19:53	05:48 20:47	05:00 21:35	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	07:16 16:49	08:09 16:06
2	08:34 16:13	08:03 17:03	07:06 17:58	06:53 19:54	05:46 20:48	04:59 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	07:18 16:47	08:11 16:06
3	08:34 16:14	08:01 17:05	07:04 18:00	06:50 19:56	05:44 20:50	04:58 21:37	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	07:20 16:45	08:12 16:05
4	08:33 16:15	08:00 17:07	07:02 18:01	06:48 19:58	05:42 20:52	04:57 21:38	04:58 21:48	05:39 21:10	06:32 20:04	07:24 18:51	07:21 16:44	08:14 16:04
5	08:33 16:16	07:58 17:09	07:00 18:03	06:46 20:00	05:40 20:54	04:56 21:39	04:59 21:48	05:41 21:08	06:34 20:01	07:26 18:49	07:23 16:42	08:15 16:04
6	08:33 16:17	07:56 17:11	06:57 18:05	06:43 20:02	05:38 20:55	04:56 21:41	05:00 21:47	05:43 21:06	06:36 19:59	07:28 18:46	07:25 16:40	08:16 16:03
7	08:32 16:19	07:54 17:13	06:55 18:07	06:41 20:04	05:36 20:57	04:55 21:41	05:01 21:47	05:44 21:05	06:38 19:56	07:30 18:44	07:27 16:38	08:18 16:03
8	08:32 16:20	07:53 17:15	06:53 18:09	06:39 20:05	05:34 20:59	04:54 21:42	05:02 21:46	05:46 21:03	06:39 19:54	07:31 18:42	07:29 16:36	08:19 16:02
9	08:31 16:22	07:51 17:17	06:50 18:11	06:36 20:07	05:32 21:00	04:54 21:43	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	07:31 16:35	08:20 16:02
10	08:31 16:23	07:49 17:19	06:48 18:13	06:34 20:09	05:30 21:02	04:53 21:44	05:04 21:44	05:50 20:59	06:43 19:49	07:35 18:37	07:33 16:33	08:21 16:02
11	08:30 16:24	07:47 17:21	06:46 18:15	06:32 20:11	05:29 21:04	04:53 21:45	05:05 21:44	05:51 20:57	06:44 19:47	07:37 18:35	07:35 16:31	08:23 16:02
12	08:29 16:26	07:45 17:23	06:43 18:16	06:29 20:12	05:27 21:06	04:53 21:46	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	07:36 16:30	08:24 16:01
13	08:28 16:28	07:43 17:25	06:41 18:18	06:27 20:14	05:25 21:07	04:52 21:46	05:07 21:42	05:55 20:53	06:48 19:42	07:40 18:30	07:38 16:28	08:25 16:01
14	08:28 16:29	07:41 17:27	06:38 18:20	06:25 20:16	05:23 21:09	04:52 21:47	05:09 21:41	05:56 20:51	06:50 19:40	07:42 18:28	07:40 16:26	08:26 16:01
15	08:27 16:31	07:39 17:29	06:36 18:22	06:22 20:18	05:22 21:11	04:52 21:48	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:25	07:42 16:25	08:27 16:01
16	08:26 16:32	07:37 17:31	06:34 18:24	06:20 20:20	05:20 21:12	04:52 21:48	05:11 21:39	06:00 20:46	06:53 19:35	07:46 18:23	07:44 16:23	08:27 16:01
17	08:25 16:34	07:35 17:33	06:31 18:26	06:18 20:21	05:19 21:14	04:51 21:49	05:12 21:37	06:01 20:44	06:55 19:32	07:48 18:21	07:46 16:22	08:28 16:02
18	08:24 16:36	07:33 17:35	06:29 18:27	06:16 20:23	05:17 21:15	04:51 21:49	05:14 21:36	06:03 20:42	06:56 19:30	07:50 18:19	07:47 16:21	08:29 16:02
19	08:23 16:37	07:31 17:37	06:26 18:29	06:13 20:25	05:15 21:17	04:51 21:49	05:15 21:35	06:05 20:40	06:58 19:27	07:51 18:17	07:49 16:19	08:30 16:02
20	08:22 16:39	07:29 17:39	06:24 18:31	06:11 20:27	05:14 21:18	04:52 21:50	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	07:51 16:18	08:30 16:02
21	08:20 16:41	07:26 17:40	06:22 18:33	06:09 20:29	05:13 21:20	04:52 21:50	05:18 21:32	06:08 20:36	07:02 19:23	07:55 18:12	07:53 16:17	08:31 16:03
22	08:19 16:43	07:24 17:42	06:19 18:35	06:07 20:30	05:11 21:21	04:52 21:50	05:19 21:31	06:10 20:33	07:03 19:20	07:57 18:10	07:55 16:15	08:32 16:03
23	08:18 16:45	07:22 17:44	06:17 18:36	06:04 20:32	05:10 21:23	04:52 21:50	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	07:56 16:14	08:32 16:04
24	08:17 16:46	07:20 17:46	06:14 18:38	06:02 20:34	05:08 21:24	04:52 21:50	05:22 21:28	06:13 20:29	07:07 19:15	08:01 18:06	07:58 16:13	08:33 16:04
25	08:15 16:48	07:18 17:48	06:12 18:40	06:00 20:36	05:07 21:26	04:53 21:50	05:24 21:27	06:15 20:27	07:09 19:13	07:03 17:04	08:00 16:12	08:33 16:05
26	08:14 16:50	07:15 17:50	06:10 18:42	05:58 20:38	05:06 21:27	04:53 21:50	05:25 21:25	06:17 20:24	07:10 19:10	07:04 17:01	08:01 16:11	08:33 16:06
27	08:13 16:52	07:13 17:52	06:07 18:44	05:56 20:39	05:05 21:29	04:54 21:50	05:27 21:24	06:19 20:22	07:12 19:08	07:06 16:59	08:03 16:10	08:33 16:07
28	08:11 16:54	07:11 17:54	06:05 18:45	05:54 20:41	05:04 21:30	04:54 21:50	05:28 21:22	06:20 20:20	07:14 19:06	07:08 16:57	08:05 16:09	08:34 16:07
29	08:10 16:56		07:02 19:47	05:52 20:43	05:03 21:31	04:55 21:50	05:30 21:21	06:22 20:18	07:16 19:03	07:10 16:55	08:06 16:08	08:34 16:08
30	08:08 16:58		07:00 19:49	05:50 20:45	05:02 21:33	04:55 21:50	05:31 21:19	06:24 20:15	07:17 19:01	07:12 16:53	08:08 16:07	08:34 16:09
31	08:06 17:00		06:58 19:51		05:01 21:34		05:33 21:17	06:26 20:13		07:14 16:51		08:34 16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	262	237
astr.max.mögl.Beschattung												

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

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



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s02 - Oerzen, Am Ohfeld 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	08:34	08:05		07:09	17:02 (Oerzen 2)	06:55	18:50 (Oerzen 1)	05:48	04:59		
	16:11	17:01		17:56	27 17:29 (Oerzen 3)	19:53	27 19:17 (Oerzen 1)	20:47	21:35		
2	08:34	08:03		07:06	17:00 (Oerzen 2)	06:53	18:50 (Oerzen 1)	05:45	04:59		
	16:12	17:03		17:58	31 17:31 (Oerzen 3)	19:54	28 19:18 (Oerzen 1)	20:48	21:36		
3	08:34	08:01		07:04	16:58 (Oerzen 2)	06:50	18:49 (Oerzen 1)	05:44	04:58		
	16:14	17:05		18:00	33 17:31 (Oerzen 3)	19:56	30 19:19 (Oerzen 1)	20:50	21:37		
4	08:33	08:00		07:02	16:57 (Oerzen 2)	06:48	18:48 (Oerzen 1)	05:42	04:57		
	16:15	17:07		18:01	35 17:32 (Oerzen 3)	19:58	30 19:18 (Oerzen 1)	20:52	21:39		
5	08:33	07:58		07:00	16:56 (Oerzen 2)	06:46	18:47 (Oerzen 1)	05:40	04:56		
	16:16	17:09		18:03	36 17:32 (Oerzen 3)	20:00	32 19:19 (Oerzen 1)	20:54	21:40		
6	08:33	07:56		06:57	16:55 (Oerzen 2)	06:43	18:47 (Oerzen 1)	05:38	04:55		
	16:17	17:11		18:05	37 17:32 (Oerzen 3)	20:02	32 19:19 (Oerzen 1)	20:55	21:41		
7	08:32	07:54		06:55	16:55 (Oerzen 2)	06:41	18:46 (Oerzen 1)	05:36	04:55		
	16:19	17:13		18:07	37 17:32 (Oerzen 3)	20:04	32 19:18 (Oerzen 1)	20:57	21:42		
8	08:32	07:53		06:53	16:53 (Oerzen 2)	06:39	18:46 (Oerzen 1)	05:34	04:54		
	16:20	17:15		18:09	38 17:31 (Oerzen 3)	20:05	39 19:38 (Rep 11)	20:59	21:42		
9	08:31	07:51		06:50	16:53 (Oerzen 2)	06:36	18:47 (Oerzen 1)	05:32	04:54		
	16:21	17:17		18:11	38 17:31 (Oerzen 3)	20:07	44 19:41 (Rep 11)	21:01	21:43		
10	08:31	07:49		06:48	16:54 (Oerzen 2)	06:34	18:46 (Oerzen 1)	05:30	04:53		
	16:23	17:19		18:13	36 17:30 (Oerzen 3)	20:09	46 19:42 (Rep 11)	21:02	21:44		
11	08:30	07:47		06:46	16:53 (Oerzen 2)	06:32	18:47 (Oerzen 1)	05:28	04:53		
	16:24	17:21		18:14	35 17:28 (Oerzen 3)	20:11	48 19:44 (Rep 11)	21:04	21:45		
12	08:29	07:45		06:43	16:53 (Oerzen 2)	06:29	18:48 (Oerzen 1)	05:27	04:52		
	16:26	17:23		18:16	34 17:27 (Oerzen 3)	20:13	48 19:45 (Rep 11)	21:06	21:46		
13	08:28	07:43		06:41	16:53 (Oerzen 2)	06:27	18:48 (Oerzen 1)	05:25	04:52		
	16:27	17:25		18:18	32 17:25 (Oerzen 2)	20:14	47 19:44 (Rep 11)	21:07	21:46		
14	08:28	07:41		06:38	16:54 (Oerzen 2)	06:25	18:49 (Oerzen 1)	05:23	04:52		
	16:29	17:27		18:20	30 17:24 (Oerzen 2)	20:16	45 19:44 (Rep 11)	21:09	21:47		
15	08:27	07:39		06:36	16:54 (Oerzen 2)	06:22	18:51 (Oerzen 1)	05:22	04:52		
	16:31	17:29		18:22	28 17:22 (Oerzen 2)	20:18	42 19:45 (Rep 11)	21:11	21:48		
16	08:26	07:37		06:34	16:55 (Oerzen 2)	06:20	18:53 (Oerzen 1)	05:20	04:51		
	16:32	17:31		18:24	26 17:21 (Oerzen 2)	20:20	37 19:44 (Rep 11)	21:12	21:48		
17	08:25	07:35		06:31	16:57 (Oerzen 2)	06:18	18:57 (Oerzen 1)	05:18	04:51		
	16:34	17:33		18:26	23 17:20 (Oerzen 2)	20:21	29 19:44 (Rep 11)	21:14	21:49		
18	08:24	07:33		06:29	16:58 (Oerzen 2)	06:15	19:21 (Rep 11)	05:17	04:51		
	16:36	17:35		18:27	19 17:17 (Oerzen 2)	20:23	22 19:43 (Rep 11)	21:15	21:49		
19	08:23	07:31		06:26	17:01 (Oerzen 2)	06:13	19:22 (Rep 11)	05:15	04:51		
	16:37	17:37		18:29	22 18:03 (Rep 10)	20:25	20 19:42 (Rep 11)	21:17	21:49		
20	08:22	07:29		06:24	17:06 (Oerzen 2)	06:11	19:23 (Rep 11)	05:14	04:51		
	16:39	17:38		18:31	15 18:05 (Rep 10)	20:27	18 19:41 (Rep 11)	21:18	21:50		
21	08:20	07:26		06:22	17:50 (Rep 10)	06:09	19:24 (Rep 11)	05:12	04:52		
	16:41	17:40		18:33	17 18:07 (Rep 10)	20:29	16 19:40 (Rep 11)	21:20	21:50		
22	08:19	07:24		06:19	17:50 (Rep 10)	06:07	19:25 (Rep 11)	05:11	04:52		
	16:43	17:42		18:35	19 18:09 (Rep 10)	20:30	13 19:38 (Rep 11)	21:22	21:50		
23	08:18	07:22		06:17	17:48 (Rep 10)	06:04	19:28 (Rep 11)	05:10	04:52		
	16:44	17:44		18:36	21 18:09 (Rep 10)	20:32	7 19:35 (Rep 11)	21:23	21:50		
24	08:17	07:20		06:14	17:48 (Rep 10)	06:02		05:08	04:52		
	16:46	17:46		18:38	22 18:10 (Rep 10)	20:34		21:24	21:51		
25	08:15	07:18		06:12	17:47 (Rep 10)	06:00		05:07	04:53		
	16:48	17:48		18:40	22 18:09 (Rep 10)	20:36		21:26	21:51		
26	08:14	07:16		06:10	17:47 (Rep 10)	05:58		05:06	04:53		
	16:50	17:50		18:42	22 18:09 (Rep 10)	20:38		21:27	21:51		
27	08:13	07:13	17:09 (Oerzen 2)	06:07	17:46 (Rep 10)	05:56		05:05	04:53		
	16:52	17:52	7 17:16 (Oerzen 2)	18:44	22 18:08 (Rep 10)	20:39		21:29	21:50		
28	08:11	07:11	17:04 (Oerzen 2)	06:05	17:47 (Rep 10)	05:54		05:04	04:54		
	16:54	17:54	22 17:26 (Oerzen 3)	18:45	25 18:12 (Oerzen 1)	20:41		21:30	21:50		
29	08:10			07:02	18:48 (Rep 10)	05:52		05:02	04:55		
	16:56			19:47	27 19:15 (Oerzen 1)	20:43		21:31	21:50		
30	08:08			07:00	18:48 (Rep 10)	05:50		05:01	04:55		
	16:58			19:49	28 19:16 (Oerzen 1)	20:45		21:33	21:50		
31	08:06			06:58	18:50 (Rep 10)			05:00			
	16:59			19:51	27 19:17 (Oerzen 1)			21:34			
Sonnenscheinstunden		253		367		419		491	506		
astr.max.mögl.Beschattung			29		864		732				

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

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



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s02 - Oerzen, Am Ohfeld 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	04:56	05:34			06:27	18:46 (Oerzen 1)	07:19	17:33 (Oerzen 2)	07:16	08:09		
	21:50	21:16			20:11	19:42 (Rep 11)	18:58	18:05 (Oerzen 3)	16:49	16:06		
2	04:57	05:36			06:29	18:45 (Oerzen 1)	07:21	17:32 (Oerzen 2)	07:18	08:11		
	21:49	21:14			20:08	19:41 (Rep 11)	18:56	18:07 (Oerzen 3)	16:47	16:06		
3	04:57	05:38			06:31	18:44 (Oerzen 1)	07:23	17:32 (Oerzen 2)	07:20	08:12		
	21:49	21:12			20:06	19:38 (Rep 11)	18:54	18:08 (Oerzen 3)	16:45	16:05		
4	04:58	05:39			06:32	18:43 (Oerzen 1)	07:24	17:30 (Oerzen 2)	07:21	08:14		
	21:48	21:10			20:04	19:36 (Rep 11)	18:51	18:07 (Oerzen 3)	16:43	16:04		
5	04:59	05:41			06:34	18:43 (Oerzen 1)	07:26	17:30 (Oerzen 2)	07:23	08:15		
	21:48	21:08			20:01	19:15 (Oerzen 1)	18:49	18:08 (Oerzen 3)	16:42	16:04		
6	05:00	05:43			06:36	18:42 (Oerzen 1)	07:28	17:30 (Oerzen 2)	07:25	08:16		
	21:47	21:07			19:59	19:14 (Oerzen 1)	18:46	18:08 (Oerzen 3)	16:40	16:03		
7	05:01	05:44			06:38	18:42 (Oerzen 1)	07:30	17:31 (Oerzen 2)	07:27	08:18		
	21:47	21:05			19:56	19:14 (Oerzen 1)	18:44	18:08 (Oerzen 3)	16:38	16:03		
8	05:02	05:46			06:39	18:43 (Oerzen 1)	07:31	17:31 (Oerzen 2)	07:29	08:19		
	21:46	21:03			19:54	19:14 (Oerzen 1)	18:42	18:08 (Oerzen 3)	16:36	16:02		
9	05:03	05:48			06:41	18:42 (Oerzen 1)	07:33	17:32 (Oerzen 2)	07:31	08:20		
	21:45	21:01			19:52	19:12 (Oerzen 1)	18:39	18:07 (Oerzen 3)	16:34	16:02		
10	05:04	05:49			06:43	18:43 (Oerzen 1)	07:35	17:31 (Oerzen 2)	07:33	08:21		
	21:44	20:59			19:49	19:11 (Oerzen 1)	18:37	18:05 (Oerzen 3)	16:33	16:02		
11	05:05	05:51			06:44	18:43 (Oerzen 1)	07:37	17:32 (Oerzen 2)	07:35	08:23		
	21:44	20:57			19:47	19:11 (Oerzen 1)	18:35	18:04 (Oerzen 3)	16:31	16:01		
12	05:06	05:53			06:46	18:41 (Rep 10)	07:39	17:34 (Oerzen 2)	07:36	08:24		
	21:43	20:55			19:44	19:09 (Oerzen 1)	18:32	18:03 (Oerzen 3)	16:29	16:01		
13	05:07	05:55			06:48	18:40 (Rep 10)	07:40	17:36 (Oerzen 2)	07:38	08:25		
	21:42	20:53			19:42	19:07 (Oerzen 1)	18:30	18:01 (Oerzen 3)	16:28	16:01		
14	05:08	05:56			06:50	18:38 (Rep 10)	07:42	17:38 (Oerzen 2)	07:40	08:26		
	21:41	20:51			19:39	19:05 (Oerzen 1)	18:28	17:58 (Oerzen 3)	16:26	16:01		
15	05:10	05:58			06:51	18:36 (Rep 10)	07:44		07:42	08:27		
	21:40	20:49			19:37	19:02 (Oerzen 1)	18:25		16:25	16:01		
16	05:11	06:00			06:53	18:36 (Rep 10)	07:46		07:44	08:28		
	21:39	20:46			19:35	18:57 (Rep 10)	18:23		16:23	16:01		
17	05:12	06:01			06:55	18:35 (Rep 10)	07:48		07:46	08:28		
	21:38	20:44			19:32	18:57 (Rep 10)	18:21		16:22	16:02		
18	05:14	06:03			06:56	18:34 (Rep 10)	07:50		07:48	08:29		
	21:36	20:42			19:30	18:56 (Rep 10)	18:19		16:20	16:02		
19	05:15	06:05			06:58	18:34 (Rep 10)	07:51		07:49	08:30		
	21:35	20:40			19:27	18:56 (Rep 10)	18:16		16:19	16:02		
20	05:16	06:07		19:33 (Rep 11)	07:00	18:34 (Rep 10)	07:53		07:51	08:30		
	21:34	20:38	9	19:42 (Rep 11)	19:25	18:56 (Rep 10)	18:14		16:18	16:02		
21	05:18	06:08		19:30 (Rep 11)	07:02	18:35 (Rep 10)	07:55		07:53	08:31		
	21:33	20:36	13	19:43 (Rep 11)	19:22	18:55 (Rep 10)	18:12		16:16	16:03		
22	05:19	06:10		19:28 (Rep 11)	07:03	18:35 (Rep 10)	07:57		07:55	08:32		
	21:31	20:33	17	19:45 (Rep 11)	19:20	18:52 (Rep 10)	18:10		16:15	16:03		
23	05:21	06:12		19:26 (Rep 11)	07:05	18:36 (Rep 10)	07:59		07:56	08:32		
	21:30	20:31	19	19:45 (Rep 11)	19:18	18:50 (Rep 10)	18:08		16:14	16:04		
24	05:22	06:13		19:25 (Rep 11)	07:07	17:46 (Oerzen 2)	08:01		07:58	08:33		
	21:28	20:29	21	19:46 (Rep 11)	19:15	18:48 (Rep 10)	18:06		16:13	16:04		
25	05:24	06:15		19:25 (Rep 11)	07:09	17:41 (Oerzen 2)	07:03		08:00	08:33		
	21:27	20:27	22	19:47 (Rep 11)	19:13	18:44 (Rep 10)	17:03		16:12	16:05		
26	05:25	06:17		18:58 (Oerzen 1)	07:10	17:39 (Oerzen 2)	07:04		08:01	08:33		
	21:25	20:24	30	19:46 (Rep 11)	19:10	18:01 (Oerzen 2)	17:01		16:11	16:06		
27	05:27	06:19		18:55 (Oerzen 1)	07:12	17:37 (Oerzen 2)	07:06		08:03	08:34		
	21:24	20:22	38	19:46 (Rep 11)	19:08	18:03 (Oerzen 2)	16:59		16:10	16:06		
28	05:28	06:20		18:52 (Oerzen 1)	07:14	17:36 (Oerzen 2)	07:08		08:05	08:34		
	21:22	20:20	43	19:46 (Rep 11)	19:06	18:04 (Oerzen 2)	16:57		16:09	16:07		
29	05:30	06:22		18:50 (Oerzen 1)	07:16	17:34 (Oerzen 2)	07:10		08:06	08:34		
	21:21	20:18	45	19:45 (Rep 11)	19:03	18:04 (Oerzen 2)	16:55		16:08	16:08		
30	05:31	06:24		18:49 (Oerzen 1)	07:17	17:33 (Oerzen 2)	07:12		08:08	08:34		
	21:19	20:15	47	19:45 (Rep 11)	19:01	18:04 (Oerzen 2)	16:53		16:07	16:09		
31	05:33	06:25		18:48 (Oerzen 1)			07:14			08:34		
	21:17	20:13	47	19:44 (Rep 11)			16:51			16:10		
Sonnenscheinstunden	509	458			382		329		261	237		
astr.max.mögl.Beschattung			351		839		465					

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

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



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s03 - Oerzen, Am Ohfeld 4

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni
1	08:34 16:11	08:05 17:01	07:09 17:56	16:46 (Oerzen 2) 17:24 (Oerzen 3)	06:55 19:03 (Oerzen 1)	05:48 20:47
2	08:34 16:12	08:03 17:03	07:06 17:58	16:46 (Oerzen 2) 17:24 (Oerzen 3)	06:53 19:28 (Rep 11)	05:45 20:48
3	08:34 16:14	08:01 17:05	07:04 18:00	16:45 (Oerzen 2) 17:23 (Oerzen 3)	06:50 19:30 (Rep 11)	05:43 20:50
4	08:33 16:15	08:00 17:07	07:02 18:01	16:45 (Oerzen 2) 17:23 (Oerzen 3)	06:48 19:31 (Rep 11)	05:42 20:52
5	08:33 16:16	07:58 17:09	07:00 18:03	16:45 (Oerzen 2) 17:23 (Oerzen 3)	06:46 19:33 (Rep 11)	05:40 20:54
6	08:33 16:17	07:56 17:11	06:57 18:05	16:45 (Oerzen 2) 17:21 (Oerzen 3)	06:43 20:02	05:38 20:55
7	08:32 16:19	07:54 17:13	06:55 18:07	16:46 (Oerzen 2) 17:20 (Oerzen 3)	06:41 20:03	05:36 20:57
8	08:32 16:20	07:53 17:15	06:53 18:09	16:46 (Oerzen 2) 17:18 (Oerzen 3)	06:39 20:05	05:34 20:59
9	08:31 16:21	07:51 17:17	06:50 18:11	16:47 (Oerzen 2) 17:15 (Oerzen 3)	06:36 20:07	05:32 21:01
10	08:31 16:23	07:49 17:19	06:48 18:13	16:48 (Oerzen 2) 17:10 (Oerzen 2)	06:34 20:09	05:30 21:02
11	08:30 16:24	07:47 17:21	06:46 18:14	16:49 (Oerzen 2) 17:08 (Oerzen 2)	06:32 20:11	05:28 21:04
12	08:29 16:26	07:45 17:23	06:43 18:16	16:52 (Oerzen 2) 17:05 (Oerzen 2)	06:29 20:13	05:27 21:06
13	08:28 16:27	07:43 17:25	06:41 18:18	06:27 20:14	19:12 (Rep 11)	05:25 21:07
14	08:28 16:29	07:41 17:27	06:38 18:20	17:47 (Rep 10) 17:54 (Rep 10)	06:25 20:16	05:23 21:09
15	08:27 16:31	07:39 17:29	06:36 18:22	17:43 (Rep 10) 17:55 (Rep 10)	06:22 20:18	05:22 21:11
16	08:26 16:32	07:37 17:31	06:34 18:24	17:42 (Rep 10) 17:58 (Rep 10)	06:20 20:20	05:20 21:12
17	08:25 16:34	07:35 17:33	06:31 18:26	17:41 (Rep 10) 18:00 (Rep 10)	06:18 20:21	05:18 21:14
18	08:24 16:36	07:33 17:35	06:29 18:27	17:40 (Rep 10) 18:00 (Rep 10)	06:15 20:23	05:17 21:15
19	08:23 16:37	07:31 17:37	06:26 18:29	17:39 (Rep 10) 18:00 (Rep 10)	06:13 20:25	05:15 21:17
20	08:22 16:39	07:29 17:38	06:24 18:31	17:38 (Rep 10) 17:59 (Rep 10)	06:11 20:27	05:14 21:18
21	08:20 16:41	07:26 17:40	06:22 18:33	17:38 (Rep 10) 18:00 (Rep 10)	06:09 20:29	05:12 21:20
22	08:19 16:43	07:24 17:42	06:19 18:35	17:39 (Rep 10) 18:02 (Oerzen 1)	06:07 20:30	05:11 21:22
23	08:18 16:44	07:22 17:44	06:17 18:36	17:39 (Rep 10) 18:03 (Oerzen 1)	06:04 20:32	05:10 21:23
24	08:17 16:46	07:20 17:46	06:14 18:38	17:40 (Rep 10) 18:04 (Oerzen 1)	06:02 20:34	05:08 21:24
25	08:15 16:48	07:18 17:48	06:12 18:40	17:38 (Oerzen 1) 18:04 (Oerzen 1)	06:00 20:36	05:07 21:26
26	08:14 16:50	07:16 17:50	06:10 18:42	17:37 (Oerzen 1) 18:05 (Oerzen 1)	05:58 20:38	05:06 21:27
27	08:13 16:52	07:13 17:52	06:07 18:44	17:36 (Oerzen 1) 18:05 (Oerzen 1)	05:56 20:39	05:05 21:29
28	08:11 16:54	07:11 17:54	06:05 18:45	17:36 (Oerzen 1) 18:05 (Oerzen 1)	05:54 20:41	05:04 21:30
29	08:10 16:56		07:02 19:47	18:36 (Oerzen 1) 19:05 (Oerzen 1)	05:52 20:43	05:02 21:31
30	08:08 16:58		07:00 19:49	18:35 (Oerzen 1) 19:05 (Oerzen 1)	05:50 20:45	05:01 21:33
31	08:06 16:59		06:58 19:51	18:35 (Oerzen 1) 19:04 (Oerzen 1)		05:00 21:34
Sonnenscheinstunden	253	275	367	419	415	506
astr.max.mögl.Beschattung		198	783			

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

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



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s03 - Oerzen, Am Ohfeld 4

### Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlungsrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember	
1	04:56 21:50	05:34 21:16		06:27 20:11	21	19:10 (Rep 11) 19:31 (Rep 11)	07:19 18:58	10	17:33 (Oerzen 2) 17:43 (Oerzen 2)	07:16 16:49	08:09 16:06
2	04:57 21:49	05:36 21:14		06:29 20:08	22	19:10 (Rep 11) 19:32 (Rep 11)	07:21 18:56	17	17:29 (Oerzen 2) 17:46 (Oerzen 2)	07:18 16:47	08:11 16:06
3	04:57 21:49	05:38 21:12		06:31 20:06	22	19:09 (Rep 11) 19:31 (Rep 11)	07:23 18:54	21	17:27 (Oerzen 2) 17:48 (Oerzen 2)	07:20 16:45	08:12 16:05
4	04:58 21:48	05:39 21:10		06:32 20:04	22	19:09 (Rep 11) 19:31 (Rep 11)	07:24 18:51	24	17:24 (Oerzen 2) 17:48 (Oerzen 2)	07:21 16:43	08:14 16:04
5	04:59 21:48	05:41 21:08		06:34 20:01	34	18:38 (Oerzen 1) 19:30 (Rep 11)	07:26 18:49	31	17:23 (Oerzen 2) 17:54 (Oerzen 3)	07:23 16:42	08:15 16:04
6	05:00 21:47	05:43 21:07		06:36 19:59	39	18:34 (Oerzen 1) 19:29 (Rep 11)	07:28 18:46	34	17:22 (Oerzen 2) 17:56 (Oerzen 3)	07:25 16:40	08:16 16:03
7	05:01 21:47	05:44 21:05		06:38 19:56	40	18:33 (Oerzen 1) 19:28 (Rep 11)	07:30 18:44	36	17:21 (Oerzen 2) 17:57 (Oerzen 3)	07:27 16:38	08:18 16:03
8	05:02 21:46	05:46 21:03		06:39 19:54	41	18:31 (Oerzen 1) 19:27 (Rep 11)	07:31 18:42	37	17:21 (Oerzen 2) 17:58 (Oerzen 3)	07:29 16:36	08:19 16:02
9	05:03 21:45	05:48 21:01		06:41 19:52	38	18:29 (Oerzen 1) 19:23 (Rep 11)	07:33 18:39	38	17:20 (Oerzen 2) 17:58 (Oerzen 3)	07:31 16:34	08:20 16:02
10	05:04 21:44	05:49 20:59		06:43 19:49	35	18:29 (Oerzen 1) 19:21 (Rep 11)	07:35 18:37	38	17:19 (Oerzen 2) 17:57 (Oerzen 3)	07:33 16:33	08:21 16:02
11	05:05 21:44	05:51 20:57		06:44 19:47	28	18:28 (Oerzen 1) 18:56 (Oerzen 1)	07:37 18:35	38	17:19 (Oerzen 2) 17:57 (Oerzen 3)	07:35 16:31	08:23 16:01
12	05:06 21:43	05:53 20:55		06:46 19:44	30	18:26 (Oerzen 1) 18:56 (Oerzen 1)	07:39 18:32	38	17:19 (Oerzen 2) 17:57 (Oerzen 3)	07:36 16:29	08:24 16:01
13	05:07 21:42	05:55 20:53		06:48 19:42	30	18:26 (Oerzen 1) 18:56 (Oerzen 1)	07:40 18:30	38	17:19 (Oerzen 2) 17:57 (Oerzen 3)	07:38 16:28	08:25 16:01
14	05:08 21:41	05:56 20:51		06:50 19:39	30	18:26 (Oerzen 1) 18:56 (Oerzen 1)	07:42 18:28	37	17:19 (Oerzen 2) 17:56 (Oerzen 3)	07:40 16:26	08:26 16:01
15	05:10 21:40	05:58 20:49		06:51 19:37	30	18:25 (Oerzen 1) 18:55 (Oerzen 1)	07:44 18:25	35	17:20 (Oerzen 2) 17:55 (Oerzen 3)	07:42 16:25	08:27 16:01
16	05:11 21:39	06:00 20:46		06:53 19:35	29	18:25 (Oerzen 1) 18:54 (Oerzen 1)	07:46 18:23	33	17:21 (Oerzen 2) 17:54 (Oerzen 3)	07:44 16:23	08:28 16:01
17	05:12 21:38	06:01 20:44		06:55 19:32	28	18:26 (Oerzen 1) 18:54 (Oerzen 1)	07:48 18:21	30	17:22 (Oerzen 2) 17:52 (Oerzen 3)	07:46 16:22	08:28 16:01
18	05:14 21:36	06:03 20:42		06:56 19:30	27	18:25 (Oerzen 1) 18:52 (Oerzen 1)	07:50 18:19	26	17:23 (Oerzen 2) 17:49 (Oerzen 3)	07:48 16:20	08:29 16:02
19	05:15 21:35	06:05 20:40		06:58 19:27	25	18:26 (Oerzen 1) 18:51 (Oerzen 1)	07:51 18:16	16	17:25 (Oerzen 2) 17:41 (Oerzen 2)	07:49 16:19	08:30 16:02
20	05:16 21:34	06:07 20:38		07:00 19:25	25	18:25 (Rep 10) 18:50 (Oerzen 1)	07:53 18:14	10	17:27 (Oerzen 2) 17:37 (Oerzen 2)	07:51 16:18	08:30 16:02
21	05:18 21:33	06:08 20:36		07:02 19:22	23	18:25 (Rep 10) 18:48 (Oerzen 1)	07:55 18:12			07:53 16:16	08:31 16:03
22	05:19 21:31	06:10 20:33		07:03 19:20	22	18:23 (Rep 10) 18:45 (Oerzen 1)	07:57 18:10			07:55 16:15	08:32 16:03
23	05:21 21:30	06:12 20:31		07:05 19:18	21	18:23 (Rep 10) 18:44 (Rep 10)	07:59 18:08			07:56 16:14	08:32 16:04
24	05:22 21:28	06:13 20:29		07:07 19:15	21	18:23 (Rep 10) 18:44 (Rep 10)	08:01 18:06			07:58 16:13	08:33 16:04
25	05:24 21:27	06:15 20:27		07:09 19:13	21	18:22 (Rep 10) 18:43 (Rep 10)	07:03 17:03			08:00 16:12	08:33 16:05
26	05:25 21:25	06:17 20:24		07:10 19:10	19	18:23 (Rep 10) 18:42 (Rep 10)	07:04 17:01			08:01 16:11	08:33 16:06
27	05:27 21:24	06:19 20:22	7	07:12 19:08	17	18:23 (Rep 10) 18:40 (Rep 10)	07:06 16:59			08:03 16:10	08:34 16:06
28	05:28 21:22	06:20 20:20	13	07:14 19:06	14	18:24 (Rep 10) 18:38 (Rep 10)	07:08 16:57			08:05 16:09	08:34 16:07
29	05:30 21:21	06:22 20:18	16	07:16 19:03	10	18:25 (Rep 10) 18:35 (Rep 10)	07:10 16:55			08:06 16:08	08:34 16:08
30	05:31 21:19	06:24 20:15	19	07:17 19:01			07:12 16:53			08:08 16:07	08:34 16:09
31	05:33 21:17	06:25 20:13	20	07:18 19:00			07:14 16:51			08:09 16:10	08:34 16:10
Sonnenscheinstunden		509	458	382	764	329	587	261	237		
astr.max.mögl.Beschattung			75								

**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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s04 - Oerzen, Am Ohfeld 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	08:34 16:11	08:05 17:01		07:09 17:56	40	16:43 (Oerzen 2) 17:23 (Oerzen 3)	06:55 19:53	18:34 (Oerzen 1) 19:04 (Oerzen 1)	05:48 20:47	04:59 21:35	
2	08:34 16:12	08:03 17:03		07:06 17:58	40	16:43 (Oerzen 2) 17:23 (Oerzen 3)	06:53 19:54	18:34 (Oerzen 1) 19:04 (Oerzen 1)	05:45 20:48	04:59 21:36	
3	08:34 16:14	08:01 17:05		07:04 18:00	41	16:42 (Oerzen 2) 17:23 (Oerzen 3)	06:50 19:56	18:35 (Oerzen 1) 19:30 (Rep 11)	05:43 20:50	04:58 21:37	
4	08:33 16:15	08:00 17:07		07:02 18:01	40	16:43 (Oerzen 2) 17:23 (Oerzen 3)	06:48 19:58	18:35 (Oerzen 1) 19:31 (Rep 11)	05:42 20:52	04:57 21:39	
5	08:33 16:16	07:58 17:09		07:00 18:03	39	16:43 (Oerzen 2) 17:22 (Oerzen 3)	06:46 20:00	18:36 (Oerzen 1) 19:33 (Rep 11)	05:40 20:54	04:56 21:40	
6	08:33 16:17	07:56 17:11		06:57 18:05	39	16:42 (Oerzen 2) 17:21 (Oerzen 3)	06:43 20:02	18:37 (Oerzen 1) 19:34 (Rep 11)	05:38 20:55	04:55 21:41	
7	08:32 16:19	07:54 17:13		06:55 18:07	37	16:43 (Oerzen 2) 17:20 (Oerzen 3)	06:41 20:04	18:38 (Oerzen 1) 19:34 (Rep 11)	05:36 20:57	04:55 21:42	
8	08:32 16:20	07:53 17:15		06:53 18:09	34	16:43 (Oerzen 2) 17:17 (Oerzen 3)	06:39 20:05	18:40 (Oerzen 1) 19:35 (Rep 11)	05:34 20:59	04:54 21:42	
9	08:31 16:21	07:51 17:17		06:50 18:11	31	16:44 (Oerzen 2) 17:15 (Oerzen 3)	06:36 20:07	18:43 (Oerzen 1) 19:35 (Rep 11)	05:32 21:01	04:54 21:43	
10	08:31 16:23	07:49 17:19		06:48 18:13	24	16:46 (Oerzen 2) 17:10 (Oerzen 2)	06:34 20:09	19:12 (Rep 11) 19:34 (Rep 11)	05:30 21:02	04:53 21:44	
11	08:30 16:24	07:47 17:21		06:46 18:14	21	16:46 (Oerzen 2) 17:07 (Oerzen 2)	06:32 20:11	19:12 (Rep 11) 19:34 (Rep 11)	05:28 21:04	04:53 21:45	
12	08:29 16:26	07:45 17:23		06:43 18:16	16	16:49 (Oerzen 2) 17:05 (Oerzen 2)	06:29 20:13	19:12 (Rep 11) 19:34 (Rep 11)	05:27 21:06	04:52 21:46	
13	08:28 16:27	07:43 17:25		06:41 18:18	9	16:52 (Oerzen 2) 17:01 (Oerzen 2)	06:27 20:14	19:12 (Rep 11) 19:32 (Rep 11)	05:25 21:07	04:52 21:46	
14	08:28 16:29	07:41 17:27		06:38 18:20	6	17:48 (Rep 10) 17:54 (Rep 10)	06:25 20:16	19:12 (Rep 11) 19:31 (Rep 11)	05:23 21:09	04:52 21:47	
15	08:27 16:31	07:39 17:29		06:36 18:22	11	17:44 (Rep 10) 17:55 (Rep 10)	06:22 20:18	19:13 (Rep 11) 19:30 (Rep 11)	05:22 21:11	04:52 21:48	
16	08:26 16:32	07:37 17:31		06:34 18:24	16	17:42 (Rep 10) 17:58 (Rep 10)	06:20 20:20	19:15 (Rep 11) 19:29 (Rep 11)	05:20 21:12	04:51 21:48	
17	08:25 16:34	07:35 17:33		06:31 18:26	19	17:41 (Rep 10) 18:00 (Rep 10)	06:18 20:21	19:17 (Rep 11) 19:26 (Rep 11)	05:18 21:14	04:51 21:49	
18	08:24 16:36	07:33 17:35		06:29 18:27	20	17:40 (Rep 10) 18:00 (Rep 10)	06:15 20:23		05:17 21:15	04:51 21:49	
19	08:23 16:37	07:31 17:37		06:26 18:29	21	17:39 (Rep 10) 18:00 (Rep 10)	06:13 20:25		05:15 21:17	04:51 21:49	
20	08:22 16:39	07:29 17:38		06:24 18:31	22	17:38 (Rep 10) 18:00 (Rep 10)	06:11 20:27		05:14 21:18	04:51 21:50	
21	08:20 16:41	07:26 17:40	7	06:22 17:03 (Oerzen 2)	22	17:38 (Rep 10) 18:00 (Rep 10)	06:09 20:29		05:12 21:20	04:52 21:50	
22	08:19 16:43	07:24 17:42	15	06:19 17:07 (Oerzen 2)	22	17:39 (Rep 10) 18:01 (Oerzen 1)	06:07 20:30		05:11 21:22	04:52 21:50	
23	08:18 16:44	07:22 17:44	20	06:17 17:10 (Oerzen 2)	24	17:38 (Rep 10) 18:02 (Oerzen 1)	06:04 20:32		05:10 21:23	04:52 21:50	
24	08:17 16:46	07:20 17:46	30	06:14 17:18 (Oerzen 3)	25	17:39 (Rep 10) 18:04 (Oerzen 1)	06:02 20:34		05:08 21:24	04:52 21:51	
25	08:15 16:48	07:18 17:48	33	06:12 17:20 (Oerzen 3)	25	17:39 (Rep 10) 18:04 (Oerzen 1)	06:00 20:36		05:07 21:26	04:53 21:51	
26	08:14 16:50	07:16 17:50	36	06:10 17:22 (Oerzen 3)	27	17:38 (Oerzen 1) 18:05 (Oerzen 1)	05:58 20:38		05:06 21:27	04:53 21:51	
27	08:13 16:52	07:13 17:52	38	06:07 17:23 (Oerzen 3)	29	17:36 (Oerzen 1) 18:05 (Oerzen 1)	05:56 20:39		05:05 21:29	04:53 21:50	
28	08:11 16:54	07:11 17:54	39	06:05 17:23 (Oerzen 3)	30	17:36 (Oerzen 1) 18:06 (Oerzen 1)	05:54 20:41		05:04 21:30	04:54 21:50	
29	08:10 16:56			07:02 19:47	30	18:36 (Oerzen 1) 19:06 (Oerzen 1)	05:52 20:43		05:02 21:31	04:55 21:50	
30	08:08 16:58			07:00 19:49	30	18:35 (Oerzen 1) 19:05 (Oerzen 1)	05:50 20:45		05:01 21:33	04:55 21:50	
31	08:06 16:59			06:58 19:51	31	18:35 (Oerzen 1) 19:06 (Oerzen 1)			05:00 21:34		
Sonnenscheinstunden		253	275	367	821	419	478	491	506		
astr.max.mögl.Beschattung			218								

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

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



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s04 - Oerzen, Am Ohfeld 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

Juli		August		September		Oktober		November		Dezember	
1	04:56	05:34		06:27		19:11 (Rep 11)	07:19	17:29 (Oerzen 2)	07:16	08:09	
	21:50	21:16		20:11	22	19:33 (Rep 11)	18:58	14	17:43 (Oerzen 2)	16:49	16:06
2	04:57	05:36		06:29		19:10 (Rep 11)	07:21		17:26 (Oerzen 2)	07:18	08:11
	21:49	21:14		20:08	23	19:33 (Rep 11)	18:56	19	17:45 (Oerzen 2)	16:47	16:06
3	04:57	05:38		06:31		18:40 (Oerzen 1)	07:23		17:24 (Oerzen 2)	07:20	08:12
	21:49	21:12		20:06	31	19:32 (Rep 11)	18:54	23	17:47 (Oerzen 2)	16:45	16:05
4	04:58	05:39		06:32		18:37 (Oerzen 1)	07:24		17:22 (Oerzen 2)	07:21	08:14
	21:48	21:10		20:04	38	19:32 (Rep 11)	18:51	27	17:49 (Oerzen 3)	16:43	16:04
5	04:59	05:41		06:34		18:35 (Oerzen 1)	07:26		17:21 (Oerzen 2)	07:23	08:15
	21:48	21:08		20:01	41	19:31 (Rep 11)	18:49	32	17:53 (Oerzen 3)	16:42	16:04
6	05:00	05:43		06:36		18:32 (Oerzen 1)	07:28		17:20 (Oerzen 2)	07:25	08:16
	21:47	21:07		19:59	43	19:30 (Rep 11)	18:46	35	17:55 (Oerzen 3)	16:40	16:03
7	05:01	05:44		06:38		18:31 (Oerzen 1)	07:30		17:19 (Oerzen 2)	07:27	08:18
	21:47	21:05		19:56	42	19:28 (Rep 11)	18:44	37	17:56 (Oerzen 3)	16:38	16:03
8	05:02	05:46		06:39		18:30 (Oerzen 1)	07:31		17:18 (Oerzen 2)	07:29	08:19
	21:46	21:03		19:54	41	19:27 (Rep 11)	18:42	39	17:57 (Oerzen 3)	16:36	16:02
9	05:03	05:48		06:41		18:28 (Oerzen 1)	07:33		17:18 (Oerzen 2)	07:31	08:20
	21:45	21:01		19:52	38	19:23 (Rep 11)	18:39	39	17:57 (Oerzen 3)	16:34	16:02
10	05:04	05:49		06:43		18:28 (Oerzen 1)	07:35		17:17 (Oerzen 2)	07:33	08:21
	21:44	20:59		19:49	29	18:57 (Oerzen 1)	18:37	40	17:57 (Oerzen 3)	16:33	16:02
11	05:05	05:51		06:44		18:27 (Oerzen 1)	07:37		17:16 (Oerzen 2)	07:35	08:23
	21:44	20:57		19:47	31	18:58 (Oerzen 1)	18:35	41	17:57 (Oerzen 3)	16:31	16:01
12	05:06	05:53		06:46		18:26 (Oerzen 1)	07:39		17:16 (Oerzen 2)	07:36	08:24
	21:43	20:55		19:44	31	18:57 (Oerzen 1)	18:32	40	17:56 (Oerzen 3)	16:29	16:01
13	05:07	05:55		06:48		18:26 (Oerzen 1)	07:40		17:17 (Oerzen 2)	07:38	08:25
	21:42	20:53		19:42	31	18:57 (Oerzen 1)	18:30	39	17:56 (Oerzen 3)	16:28	16:01
14	05:08	05:56		06:50		18:26 (Oerzen 1)	07:42		17:17 (Oerzen 2)	07:40	08:26
	21:41	20:51		19:39	31	18:57 (Oerzen 1)	18:28	38	17:55 (Oerzen 3)	16:26	16:01
15	05:10	05:58		06:51		18:25 (Oerzen 1)	07:44		17:18 (Oerzen 2)	07:42	08:27
	21:40	20:49		19:37	30	18:55 (Oerzen 1)	18:25	36	17:54 (Oerzen 3)	16:25	16:01
16	05:11	06:00		06:53		18:26 (Oerzen 1)	07:46		17:18 (Oerzen 2)	07:44	08:28
	21:39	20:46		19:35	29	18:55 (Oerzen 1)	18:23	35	17:53 (Oerzen 3)	16:23	16:01
17	05:12	06:01		06:55		18:26 (Oerzen 1)	07:48		17:19 (Oerzen 2)	07:46	08:28
	21:38	20:44		19:32	28	18:54 (Oerzen 1)	18:21	33	17:52 (Oerzen 3)	16:22	16:01
18	05:14	06:03		06:56		18:26 (Oerzen 1)	07:50		17:20 (Oerzen 2)	07:48	08:29
	21:36	20:42		19:30	26	18:52 (Oerzen 1)	18:19	29	17:49 (Oerzen 3)	16:20	16:02
19	05:15	06:05		06:58		18:26 (Rep 10)	07:51		17:22 (Oerzen 2)	07:49	08:30
	21:35	20:40		19:27	25	18:51 (Oerzen 1)	18:16	18	17:40 (Oerzen 2)	16:19	16:02
20	05:16	06:07		07:00		18:25 (Rep 10)	07:53		17:24 (Oerzen 2)	07:51	08:31
	21:34	20:38		19:25	24	18:49 (Oerzen 1)	18:14	12	17:36 (Oerzen 2)	16:18	16:02
21	05:18	06:08		07:02		18:24 (Rep 10)	07:55			07:53	08:31
	21:33	20:36		19:22	23	18:47 (Oerzen 1)	18:12			16:16	16:03
22	05:19	06:10		07:03		18:23 (Rep 10)	07:57			07:55	08:32
	21:31	20:33		19:20	22	18:45 (Rep 10)	18:10			16:15	16:03
23	05:21	06:12		07:05		18:23 (Rep 10)	07:59			07:56	08:32
	21:30	20:31		19:18	22	18:45 (Rep 10)	18:08			16:14	16:04
24	05:22	06:13		07:07		18:23 (Rep 10)	08:01			07:58	08:33
	21:28	20:29		19:15	21	18:44 (Rep 10)	18:06			16:13	16:04
25	05:24	06:15		07:09		18:22 (Rep 10)	07:03			08:00	08:33
	21:27	20:27		19:13	21	18:43 (Rep 10)	17:03			16:12	16:05
26	05:25	06:17	19:19 (Rep 11)	07:10		18:23 (Rep 10)	07:04			08:01	08:33
	21:25	20:24	9	19:28 (Rep 11)	19:10	18:42 (Rep 10)	17:01			16:11	16:06
27	05:27	06:19	19:17 (Rep 11)	07:12		18:24 (Rep 10)	07:06			08:03	08:34
	21:24	20:22	14	19:31 (Rep 11)	19:08	18:40 (Rep 10)	16:59			16:10	16:06
28	05:28	06:20	19:15 (Rep 11)	07:14		18:25 (Rep 10)	07:08			08:05	08:34
	21:22	20:20	17	19:32 (Rep 11)	19:06	18:38 (Rep 10)	16:57			16:09	16:07
29	05:30	06:22	19:13 (Rep 11)	07:16		18:26 (Rep 10)	07:10			08:06	08:34
	21:21	20:18	19	19:32 (Rep 11)	19:03	9	18:35 (Rep 10)	16:55		16:08	16:08
30	05:31	06:24	19:12 (Rep 11)	07:17		17:35 (Oerzen 2)	07:12			08:08	08:34
	21:19	20:15	21	19:33 (Rep 11)	19:01	2	17:37 (Oerzen 2)	16:53		16:07	16:09
31	05:33	06:25	19:12 (Rep 11)				07:14				08:34
	21:17	20:13	22	19:34 (Rep 11)			16:51				16:10
Sonnenscheinstunden		509		382			329			261	237
astr.max.mögl.Beschattung			102		802		626				

**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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s05 - Oerzen, Am Ohfeld 15**Annahmen für Schattenwurfberechnung**

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:34 16:11	08:05 17:01	07:09 17:56	16:32 (Oerzen 2) 17:12 (Oerzen 3)	18:30 (Oerzen 1) 19:25 (Rep 11)	04:59 21:35
2	08:34 16:12	08:03 17:03	07:06 17:58	16:33 (Oerzen 2) 17:11 (Oerzen 3)	19:04 (Rep 11) 19:25 (Rep 11)	04:59 21:36
3	08:34 16:14	08:02 17:05	07:04 18:00	16:34 (Oerzen 2) 17:08 (Oerzen 3)	19:04 (Rep 11) 19:26 (Rep 11)	04:58 21:37
4	08:33 16:15	08:00 17:07	07:02 18:01	16:35 (Oerzen 2) 17:05 (Oerzen 3)	19:02 (Rep 11) 19:25 (Rep 11)	04:57 21:39
5	08:33 16:16	07:58 17:09	07:00 18:03	16:38 (Oerzen 2) 16:52 (Oerzen 2)	19:03 (Rep 11) 19:25 (Rep 11)	04:56 21:40
6	08:33 16:17	07:56 17:11	06:57 18:05	16:42 (Oerzen 2) 16:46 (Oerzen 2)	19:03 (Rep 11) 19:25 (Rep 11)	04:55 21:41
7	08:32 16:19	07:54 17:13	06:55 18:07	16:41 17:44 (Rep 10)	19:02 (Rep 11) 19:23 (Rep 11)	04:55 21:42
8	08:32 16:20	07:53 17:15	06:53 18:09	16:39 17:38 (Rep 10)	19:03 (Rep 11) 19:04 (Rep 11)	04:54 21:43
9	08:31 16:21	07:51 17:17	06:50 18:11	16:36 17:44 (Rep 10)	19:05 (Rep 11) 19:22 (Rep 11)	04:54 21:43
10	08:31 16:23	07:49 17:19	06:48 18:13	16:34 17:47 (Rep 10)	19:05 (Rep 11) 19:19 (Rep 11)	04:53 21:44
11	08:30 16:24	07:47 17:21	06:46 18:14	16:32 17:48 (Rep 10)	19:07 (Rep 11) 19:17 (Rep 11)	04:53 21:45
12	08:29 16:26	07:45 17:23	06:43 18:16	16:29 17:32 (Rep 10)	19:07 (Rep 11) 19:17 (Rep 11)	04:52 21:46
13	08:28 16:27	07:43 17:25	06:41 18:18	16:27 17:31 (Rep 10)	19:07 (Rep 11) 19:17 (Rep 11)	04:52 21:46
14	08:28 16:29	07:41 17:27	16:42 (Oerzen 2) 16:52 (Oerzen 2)	16:38 17:30 (Rep 10)	19:07 (Rep 11) 19:17 (Rep 11)	04:52 21:47
15	08:27 16:31	07:39 17:29	16:38 (Oerzen 2) 16:54 (Oerzen 2)	16:36 17:29 (Rep 10)	19:07 (Rep 11) 19:17 (Rep 11)	04:52 21:48
16	08:26 16:32	07:37 17:31	16:36 (Oerzen 2) 16:56 (Oerzen 2)	16:34 17:29 (Rep 10)	19:07 (Rep 11) 19:17 (Rep 11)	04:51 21:48
17	08:25 16:34	07:35 17:33	16:35 (Oerzen 2) 16:58 (Oerzen 2)	16:31 17:28 (Oerzen 1)	19:07 (Rep 11) 19:17 (Rep 11)	04:51 21:49
18	08:24 16:36	07:33 17:35	16:34 (Oerzen 2) 17:06 (Oerzen 3)	16:29 17:26 (Oerzen 1)	19:07 (Rep 11) 19:17 (Rep 11)	04:51 21:49
19	08:23 16:37	07:31 17:37	16:33 (Oerzen 2) 17:09 (Oerzen 3)	16:26 17:25 (Oerzen 1)	19:07 (Rep 11) 19:17 (Rep 11)	04:51 21:49
20	08:22 16:39	07:29 17:38	16:31 (Oerzen 2) 17:10 (Oerzen 3)	16:24 17:24 (Oerzen 1)	19:07 (Rep 11) 19:17 (Rep 11)	04:51 21:50
21	08:20 16:41	07:26 17:40	16:31 (Oerzen 2) 17:12 (Oerzen 3)	16:22 17:24 (Oerzen 1)	19:07 (Rep 11) 19:17 (Rep 11)	04:52 21:50
22	08:19 16:43	07:24 17:42	16:31 (Oerzen 2) 17:13 (Oerzen 3)	16:20 17:23 (Oerzen 1)	19:07 (Rep 11) 19:17 (Rep 11)	04:52 21:50
23	08:18 16:44	07:22 17:44	16:31 (Oerzen 2) 17:14 (Oerzen 3)	16:18 17:23 (Oerzen 1)	19:07 (Rep 11) 19:17 (Rep 11)	04:52 21:50
24	08:17 16:46	07:20 17:46	16:30 (Oerzen 2) 17:13 (Oerzen 3)	16:16 17:23 (Oerzen 1)	19:07 (Rep 11) 19:17 (Rep 11)	04:52 21:51
25	08:15 16:48	07:18 17:48	16:30 (Oerzen 2) 17:14 (Oerzen 3)	16:12 17:22 (Oerzen 1)	19:07 (Rep 11) 19:17 (Rep 11)	04:53 21:51
26	08:14 16:50	07:16 17:50	16:31 (Oerzen 2) 17:14 (Oerzen 3)	16:10 17:23 (Oerzen 1)	19:07 (Rep 11) 19:17 (Rep 11)	04:53 21:51
27	08:13 16:52	07:13 17:52	16:31 (Oerzen 2) 17:14 (Oerzen 3)	16:07 17:23 (Oerzen 1)	19:07 (Rep 11) 19:17 (Rep 11)	04:53 21:50
28	08:11 16:54	07:11 17:54	16:31 (Oerzen 2) 17:12 (Oerzen 3)	16:05 17:24 (Oerzen 1)	19:07 (Rep 11) 19:17 (Rep 11)	04:54 21:50
29	08:10 16:56		17:02 19:47	18:25 (Oerzen 1) 19:21 (Rep 11)	19:07 (Rep 11) 19:17 (Rep 11)	04:55 21:50
30	08:08 16:58		17:00 19:49	18:25 (Oerzen 1) 19:23 (Rep 11)	19:07 (Rep 11) 19:17 (Rep 11)	04:55 21:50
31	08:06 16:59		16:58 19:51	18:28 (Oerzen 1) 19:25 (Rep 11)	19:07 (Rep 11) 19:17 (Rep 11)	04:55 21:50
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung		514	741	224		

**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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s05 - Oerzen, Am Ohfeld 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 Sonneneinstrichtungsrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

	[Juli	[August	[September		[Oktober		[November	[Dezember	
1	04:56	05:34	06:27		19:06 (Rep 11)	07:19	18:11 (Rep 10)	07:16	08:09
	21:50	21:16	20:11	10	19:16 (Rep 11)	18:58	18:30 (Rep 10)	16:49	16:06
2	04:57	05:36	06:29		19:04 (Rep 11)	07:21	18:12 (Rep 10)	07:18	08:11
	21:49	21:14	20:08	14	19:18 (Rep 11)	18:56	18:28 (Rep 10)	16:47	16:06
3	04:57	05:38	06:31		19:01 (Rep 11)	07:23	18:13 (Rep 10)	07:20	08:12
	21:49	21:12	20:06	18	19:19 (Rep 11)	18:54	18:26 (Rep 10)	16:45	16:05
4	04:58	05:39	06:32		19:00 (Rep 11)	07:24	18:14 (Rep 10)	07:21	08:14
	21:48	21:10	20:04	20	19:20 (Rep 11)	18:51	18:22 (Rep 10)	16:43	16:04
5	04:59	05:41	06:34		19:00 (Rep 11)	07:26		07:23	08:15
	21:48	21:08	20:01	20	19:20 (Rep 11)	18:49		16:42	16:04
6	05:00	05:43	06:36		18:58 (Rep 11)	07:28		07:25	08:16
	21:47	21:07	19:59	22	19:20 (Rep 11)	18:46		16:40	16:03
7	05:01	05:44	06:38		18:58 (Rep 11)	07:30		07:27	08:18
	21:47	21:05	19:56	22	19:20 (Rep 11)	18:44		16:38	16:03
8	05:02	05:46	06:39		18:58 (Rep 11)	07:31	17:15 (Oerzen 2)	07:29	08:19
	21:46	21:03	19:54	22	19:20 (Rep 11)	18:42	17:25 (Oerzen 2)	16:36	16:02
9	05:03	05:48	06:41		18:57 (Rep 11)	07:33	17:12 (Oerzen 2)	07:31	08:20
	21:45	21:01	19:52	22	19:19 (Rep 11)	18:39	17:28 (Oerzen 2)	16:34	16:02
10	05:04	05:49	06:43		18:57 (Rep 11)	07:35	17:09 (Oerzen 2)	07:33	08:21
	21:44	20:59	19:49	22	19:19 (Rep 11)	18:37	17:41 (Oerzen 3)	16:33	16:02
11	05:05	05:51	06:44		18:24 (Oerzen 1)	07:37	17:07 (Oerzen 2)	07:35	08:23
	21:44	20:57	19:47	29	19:18 (Rep 11)	18:35	17:43 (Oerzen 3)	16:31	16:01
12	05:06	05:53	06:46		18:19 (Oerzen 1)	07:39	17:06 (Oerzen 2)	07:36	08:24
	21:43	20:55	19:44	35	19:16 (Rep 11)	18:32	17:44 (Oerzen 3)	16:29	16:01
13	05:07	05:55	06:48		18:17 (Oerzen 1)	07:40	17:05 (Oerzen 2)	07:38	08:25
	21:42	20:53	19:42	35	19:14 (Rep 11)	18:30	17:45 (Oerzen 3)	16:28	16:01
14	05:08	05:56	06:50		18:15 (Oerzen 1)	07:42	17:04 (Oerzen 2)	07:40	08:26
	21:41	20:51	19:39	35	19:12 (Rep 11)	18:28	17:46 (Oerzen 3)	16:26	16:01
15	05:10	05:58	06:51		18:13 (Oerzen 1)	07:44	17:03 (Oerzen 2)	07:42	08:27
	21:40	20:49	19:37	32	19:09 (Rep 11)	18:25	17:46 (Oerzen 3)	16:25	16:01
16	05:11	06:00	06:53		18:12 (Oerzen 1)	07:46	17:03 (Oerzen 2)	07:44	08:28
	21:39	20:46	19:35	27	18:39 (Oerzen 1)	18:23	17:46 (Oerzen 3)	16:23	16:01
17	05:12	06:01	06:55		18:11 (Oerzen 1)	07:48	17:02 (Oerzen 2)	07:46	08:28
	21:38	20:44	19:32	29	18:40 (Oerzen 1)	18:21	17:46 (Oerzen 3)	16:22	16:01
18	05:14	06:03	06:56		18:10 (Oerzen 1)	07:50	17:02 (Oerzen 2)	07:48	08:29
	21:36	20:42	19:30	29	18:39 (Oerzen 1)	18:19	17:45 (Oerzen 3)	16:20	16:02
19	05:15	06:05	06:58		18:09 (Oerzen 1)	07:51	17:02 (Oerzen 2)	07:49	08:30
	21:35	20:40	19:27	31	18:40 (Oerzen 1)	18:16	17:45 (Oerzen 3)	16:19	16:02
20	05:16	06:07	07:00		18:09 (Oerzen 1)	07:53	17:02 (Oerzen 2)	07:51	08:31
	21:34	20:38	19:25	31	18:40 (Oerzen 1)	18:14	17:44 (Oerzen 3)	16:18	16:02
21	05:18	06:08	07:02		18:09 (Oerzen 1)	07:55	17:02 (Oerzen 2)	07:53	08:31
	21:33	20:36	19:22	31	18:40 (Oerzen 1)	18:12	17:42 (Oerzen 3)	16:16	16:03
22	05:19	06:10	07:03		18:08 (Oerzen 1)	07:57	17:02 (Oerzen 2)	07:55	08:32
	21:31	20:33	19:20	30	18:38 (Oerzen 1)	18:10	17:40 (Oerzen 3)	16:15	16:03
23	05:21	06:12	07:05		18:08 (Oerzen 1)	07:59	17:03 (Oerzen 2)	07:56	08:32
	21:30	20:31	19:18	30	18:38 (Oerzen 1)	18:08	17:38 (Oerzen 3)	16:14	16:04
24	05:22	06:13	07:07		18:09 (Oerzen 1)	08:01	17:03 (Oerzen 2)	07:58	08:33
	21:28	20:29	19:15	28	18:37 (Oerzen 1)	18:06	17:28 (Oerzen 2)	16:13	16:04
25	05:24	06:15	07:09		18:08 (Oerzen 1)	07:03	16:05 (Oerzen 2)	08:00	08:33
	21:27	20:27	19:13	27	18:35 (Oerzen 1)	17:03	16:27 (Oerzen 2)	16:12	16:05
26	05:25	06:17	07:10		18:09 (Oerzen 1)	07:04	16:06 (Oerzen 2)	08:01	08:33
	21:25	20:24	19:10	25	18:34 (Oerzen 1)	17:01	16:25 (Oerzen 2)	16:11	16:06
27	05:27	06:19	07:12		18:10 (Oerzen 1)	07:06	16:08 (Oerzen 2)	08:03	08:34
	21:24	20:22	19:08	23	18:33 (Rep 10)	16:59	16:23 (Oerzen 2)	16:10	16:06
28	05:28	06:20	07:14		18:11 (Rep 10)	07:08	16:11 (Oerzen 2)	08:05	08:34
	21:22	20:20	19:06	22	18:33 (Rep 10)	16:57	16:20 (Oerzen 2)	16:09	16:07
29	05:30	06:22	07:16		18:10 (Rep 10)	07:10		08:06	08:34
	21:21	20:18	19:03	21	18:31 (Rep 10)	16:55		16:08	16:08
30	05:31	06:24	07:17		18:10 (Rep 10)	07:12		08:08	08:34
	21:19	20:15	19:01	21	18:31 (Rep 10)	16:53		16:07	16:09
31	05:33	06:25				07:14			08:34
	21:17	20:13				16:51			16:10
Sonnenscheinstunden	509	458	382			329		261	237
astr.max.mögl.Beschattung				763		729			

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s06 - Oerzen, Im Dorfe 14

## 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	08:34 16:11	08:05 17:01	07:09 17:56		06:55 19:53	22	19:01 (Rep 10) 19:23 (Rep 10)	04:58 20:47
2	08:34 16:12	08:03 17:03	07:06 17:58		06:53 19:54	22	19:01 (Rep 10) 19:23 (Rep 10)	04:59 20:48
3	08:34 16:14	08:01 17:05	07:04 18:00		06:50 19:56	20	19:02 (Rep 10) 19:22 (Rep 10)	04:58 20:50
4	08:33 16:15	08:00 17:07	07:02 18:01		06:48 19:58	20	19:01 (Rep 10) 19:21 (Rep 10)	04:57 20:52
5	08:33 16:16	07:58 17:09	07:00 18:03		06:46 20:00	18	19:02 (Rep 10) 19:20 (Rep 10)	04:56 20:54
6	08:33 16:17	07:56 17:11	06:57 18:05		06:43 20:02	21	19:04 (Rep 10) 19:29 (Oerzen 1)	04:55 20:55
7	08:32 16:19	07:54 17:13	06:55 18:07		06:41 20:03	26	19:04 (Rep 10) 19:32 (Oerzen 1)	04:55 20:57
8	08:32 16:20	07:53 17:15	06:53 18:09	8	17:34 (Oerzen 3) 17:42 (Oerzen 3)	23	19:08 (Rep 10) 19:34 (Oerzen 1)	04:54 20:59
9	08:31 16:21	07:51 17:17	06:50 18:11	12	17:32 (Oerzen 3) 17:44 (Oerzen 3)	22	19:14 (Oerzen 1) 19:36 (Oerzen 1)	04:54 21:00
10	08:31 16:23	07:49 17:19	06:48 18:13	17	17:30 (Oerzen 3) 17:47 (Oerzen 3)	24	19:12 (Oerzen 1) 19:36 (Oerzen 1)	04:53 21:02
11	08:30 16:24	07:47 17:21	06:46 18:14	20	17:28 (Oerzen 3) 17:48 (Oerzen 3)	26	19:11 (Oerzen 1) 19:37 (Oerzen 1)	04:53 21:04
12	08:29 16:26	07:45 17:23	06:43 18:16	21	17:28 (Oerzen 3) 17:49 (Oerzen 3)	28	19:10 (Oerzen 1) 19:38 (Oerzen 1)	04:52 21:06
13	08:28 16:27	07:43 17:25	06:41 18:18	22	17:26 (Oerzen 3) 17:48 (Oerzen 3)	28	19:09 (Oerzen 1) 19:37 (Oerzen 1)	04:52 21:07
14	08:28 16:29	07:41 17:27	06:38 18:20	25	17:24 (Oerzen 2) 17:49 (Oerzen 3)	30	19:08 (Oerzen 1) 19:38 (Oerzen 1)	04:52 21:09
15	08:27 16:31	07:39 17:29	06:36 18:22	27	17:22 (Oerzen 2) 17:49 (Oerzen 2)	37	19:08 (Oerzen 1) 19:50 (Rep 11)	04:52 21:11
16	08:26 16:32	07:37 17:31	06:34 18:24	29	17:21 (Oerzen 2) 17:50 (Oerzen 2)	41	19:08 (Oerzen 1) 19:52 (Rep 11)	04:51 21:12
17	08:25 16:34	07:35 17:33	06:31 18:26	30	17:21 (Oerzen 2) 17:51 (Oerzen 2)	45	19:08 (Oerzen 1) 19:54 (Rep 11)	04:51 21:14
18	08:24 16:36	07:33 17:35	06:29 18:27	31	17:19 (Oerzen 2) 17:50 (Oerzen 2)	47	19:07 (Oerzen 1) 19:55 (Rep 11)	04:51 21:15
19	08:23 16:37	07:31 17:37	06:26 18:29	32	17:19 (Oerzen 2) 17:51 (Oerzen 2)	48	19:08 (Oerzen 1) 19:57 (Rep 11)	04:51 21:17
20	08:22 16:39	07:29 17:38	06:24 18:31	32	17:18 (Oerzen 2) 17:50 (Oerzen 2)	48	19:08 (Oerzen 1) 19:57 (Rep 11)	04:51 21:18
21	08:20 16:41	07:26 17:40	06:22 18:33	32	17:18 (Oerzen 2) 17:50 (Oerzen 2)	48	19:09 (Oerzen 1) 19:58 (Rep 11)	04:52 21:20
22	08:19 16:43	07:24 17:42	06:19 18:35	31	17:19 (Oerzen 2) 17:50 (Oerzen 2)	46	19:10 (Oerzen 1) 19:58 (Rep 11)	04:52 21:22
23	08:18 16:44	07:22 17:44	06:17 18:36	31	17:18 (Oerzen 2) 17:49 (Oerzen 2)	43	19:11 (Oerzen 1) 19:57 (Rep 11)	04:52 21:23
24	08:17 16:46	07:20 17:46	06:14 18:38	30	17:19 (Oerzen 2) 17:49 (Oerzen 2)	40	19:12 (Oerzen 1) 19:57 (Rep 11)	04:52 21:24
25	08:15 16:48	07:18 17:48	06:12 18:40	29	17:18 (Oerzen 2) 17:47 (Oerzen 2)	35	19:14 (Oerzen 1) 19:56 (Rep 11)	04:53 21:26
26	08:14 16:50	07:15 17:50	06:10 18:42	34	17:19 (Oerzen 2) 18:16 (Rep 10)	28	19:16 (Oerzen 1) 19:55 (Rep 11)	04:53 21:27
27	08:13 16:52	07:13 17:52	06:07 18:44	35	17:20 (Oerzen 2) 18:17 (Rep 10)	16	19:38 (Rep 11) 19:54 (Rep 11)	04:53 21:29
28	08:11 16:54	07:11 17:54	06:05 18:45	36	17:21 (Oerzen 2) 18:19 (Rep 10)	14	19:39 (Rep 11) 19:53 (Rep 11)	04:54 21:30
29	08:10 16:56		07:02 19:47	35	18:23 (Oerzen 2) 19:21 (Rep 10)	10	19:41 (Rep 11) 19:51 (Rep 11)	04:55 21:31
30	08:08 16:58		07:00 19:49	33	18:25 (Oerzen 2) 19:23 (Rep 10)			04:55 21:33
31	08:06 16:59		06:58 19:51	21	19:02 (Rep 10) 19:23 (Rep 10)			
Sonnenscheinstunden	253	275	367		419		491	506
astr.max.mögl.Beschattung			653		876			

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

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



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s06 - Oerzen, Im Dorfe 14

### 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	04:56	05:34			06:27	19:10 (Oerzen 1)	07:19	18:06 (Oerzen 3)	07:16	08:09		
	21:50	21:16			20:11	26 19:36 (Oerzen 1)	18:58	22 18:28 (Oerzen 3)	16:49	16:06		
2	04:57	05:36			06:29	19:11 (Oerzen 1)	07:21	18:07 (Oerzen 3)	07:18	08:11		
	21:49	21:14			20:08	24 19:35 (Oerzen 1)	18:56	20 18:27 (Oerzen 3)	16:47	16:06		
3	04:57	05:38			06:31	19:11 (Oerzen 1)	07:23	18:08 (Oerzen 3)	07:20	08:12		
	21:49	21:12			20:06	22 19:33 (Oerzen 1)	18:54	18 18:26 (Oerzen 3)	16:45	16:05		
4	04:58	05:39			06:32	19:05 (Rep 10)	07:24	18:08 (Oerzen 3)	07:21	08:14		
	21:48	21:10			20:03	23 19:31 (Oerzen 1)	18:51	14 18:22 (Oerzen 3)	16:43	16:04		
5	04:59	05:41			06:34	19:02 (Rep 10)	07:26	18:10 (Oerzen 3)	07:23	08:15		
	21:48	21:08			20:01	25 19:29 (Oerzen 1)	18:49	10 18:20 (Oerzen 3)	16:42	16:04		
6	05:00	05:43			06:36	18:59 (Rep 10)	07:28	18:14 (Oerzen 3)	07:25	08:16		
	21:47	21:07			19:59	21 19:24 (Oerzen 1)	18:46	3 18:17 (Oerzen 3)	16:40	16:03		
7	05:01	05:44			06:38	18:58 (Rep 10)	07:30		07:27	08:18		
	21:47	21:05			19:56	17 19:15 (Rep 10)	18:44		16:38	16:03		
8	05:02	05:46			06:39	18:57 (Rep 10)	07:31		07:29	08:19		
	21:46	21:03			19:54	19 19:16 (Rep 10)	18:42		16:36	16:02		
9	05:03	05:48			06:41	18:55 (Rep 10)	07:33		07:31	08:20		
	21:45	21:01			19:52	21 19:16 (Rep 10)	18:39		16:34	16:02		
10	05:04	05:49			06:43	18:55 (Rep 10)	07:35		07:33	08:21		
	21:44	20:59			19:49	21 19:16 (Rep 10)	18:37		16:33	16:02		
11	05:05	05:51			06:44	18:55 (Rep 10)	07:37		07:35	08:23		
	21:44	20:57			19:47	21 19:16 (Rep 10)	18:35		16:31	16:01		
12	05:06	05:53			06:46	18:54 (Rep 10)	07:39		07:36	08:24		
	21:43	20:55			19:44	21 19:15 (Rep 10)	18:32		16:29	16:01		
13	05:07	05:55		19:51 (Rep 11)	06:48	18:17 (Oerzen 2)	07:40		07:38	08:25		
	21:42	20:53	4	19:55 (Rep 11)	19:42	31 19:14 (Rep 10)	18:30		16:28	16:01		
14	05:08	05:56		19:48 (Rep 11)	06:50	18:14 (Oerzen 2)	07:42		07:40	08:26		
	21:41	20:51	11	19:59 (Rep 11)	19:39	34 19:12 (Rep 10)	18:28		16:26	16:01		
15	05:10	05:58		19:45 (Rep 11)	06:51	18:11 (Oerzen 2)	07:44		07:42	08:27		
	21:40	20:49	15	20:00 (Rep 11)	19:37	36 19:09 (Rep 10)	18:25		16:25	16:01		
16	05:11	06:00		19:44 (Rep 11)	06:53	18:09 (Oerzen 2)	07:46		07:44	08:27		
	21:39	20:46	17	20:01 (Rep 11)	19:35	36 19:07 (Rep 10)	18:23		16:23	16:01		
17	05:12	06:01		19:22 (Oerzen 1)	06:55	18:08 (Oerzen 2)	07:48		07:46	08:28		
	21:38	20:44	30	20:02 (Rep 11)	19:32	34 19:05 (Rep 10)	18:21		16:22	16:02		
18	05:14	06:03		19:19 (Oerzen 1)	06:56	18:06 (Oerzen 2)	07:50		07:47	08:29		
	21:36	20:42	36	20:02 (Rep 11)	19:30	29 18:35 (Oerzen 2)	18:19		16:20	16:02		
19	05:15	06:05		19:17 (Oerzen 1)	06:58	18:05 (Oerzen 2)	07:51		07:49	08:30		
	21:35	20:40	41	20:03 (Rep 11)	19:27	30 18:35 (Oerzen 2)	18:16		16:19	16:02		
20	05:16	06:07		19:16 (Oerzen 1)	07:00	18:05 (Oerzen 2)	07:53		07:51	08:30		
	21:34	20:38	44	20:03 (Rep 11)	19:25	31 18:36 (Oerzen 2)	18:14		16:18	16:02		
21	05:18	06:08		19:14 (Oerzen 1)	07:02	18:04 (Oerzen 2)	07:55		07:53	08:31		
	21:33	20:36	47	20:02 (Rep 11)	19:22	32 18:36 (Oerzen 2)	18:12		16:16	16:03		
22	05:19	06:10		19:13 (Oerzen 1)	07:03	18:03 (Oerzen 2)	07:57		07:55	08:32		
	21:31	20:33	48	20:02 (Rep 11)	19:20	32 18:35 (Oerzen 2)	18:10		16:15	16:03		
23	05:21	06:12		19:12 (Oerzen 1)	07:05	18:03 (Oerzen 2)	07:59		07:56	08:32		
	21:30	20:31	48	20:01 (Rep 11)	19:18	32 18:35 (Oerzen 2)	18:08		16:14	16:04		
24	05:22	06:13		19:11 (Oerzen 1)	07:07	18:03 (Oerzen 2)	08:01		07:58	08:33		
	21:28	20:29	48	20:00 (Rep 11)	19:15	32 18:35 (Oerzen 2)	18:06		16:13	16:04		
25	05:24	06:15		19:11 (Oerzen 1)	07:09	18:02 (Oerzen 2)	07:03		08:00	08:33		
	21:27	20:27	47	19:59 (Rep 11)	19:13	31 18:33 (Oerzen 2)	17:03		16:12	16:05		
26	05:25	06:17		19:10 (Oerzen 1)	07:10	18:02 (Oerzen 2)	07:04		08:01	08:33		
	21:25	20:24	45	19:56 (Rep 11)	19:10	31 18:33 (Oerzen 2)	17:01		16:11	16:06		
27	05:27	06:19		19:10 (Oerzen 1)	07:12	18:03 (Oerzen 2)	07:06		08:03	08:34		
	21:24	20:22	41	19:54 (Rep 11)	19:08	29 18:32 (Oerzen 2)	16:59		16:10	16:06		
28	05:28	06:20		19:10 (Oerzen 1)	07:14	18:04 (Oerzen 2)	07:08		08:05	08:34		
	21:22	20:20	37	19:52 (Rep 11)	19:06	27 18:31 (Oerzen 2)	16:57		16:09	16:07		
29	05:30	06:22		19:09 (Oerzen 1)	07:16	18:03 (Oerzen 2)	07:10		08:06	08:34		
	21:21	20:18	30	19:39 (Oerzen 1)	19:03	26 18:29 (Oerzen 2)	16:55		16:08	16:08		
30	05:31	06:24		19:10 (Oerzen 1)	07:17	18:05 (Oerzen 2)	07:12		08:08	08:34		
	21:19	20:15	28	19:38 (Oerzen 1)	19:01	23 18:28 (Oerzen 3)	16:53		16:07	16:09		
31	05:33	06:25		19:10 (Oerzen 1)			07:14			08:34		
	21:17	20:13	28	19:38 (Oerzen 1)			16:51			16:10		
Sonnenscheinstunden	509	458			382		329		261	237		
astr.max.mögl.Beschattung			645			817		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) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------







## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s07 - Oerzen, Im Dorfe 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 Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli		August		September		Oktober		November		Dezember	
1	04:56	05:35			06:27	19:04 (Rep 10)	07:19	18:05 (Oerzen 3)	07:16	08:09		
	21:50	21:16			20:11	19:20 (Rep 10)	18:58	18:27 (Oerzen 3)	16:49	16:06		
2	04:57	05:36			06:29	19:03 (Rep 10)	07:21	18:06 (Oerzen 3)	07:18	08:11		
	21:49	21:14			20:08	19:21 (Rep 10)	18:56	18:26 (Oerzen 3)	16:47	16:06		
3	04:57	05:38			06:31	19:01 (Rep 10)	07:23	18:07 (Oerzen 3)	07:20	08:12		
	21:49	21:12			20:06	19:21 (Rep 10)	18:54	18:24 (Oerzen 3)	16:45	16:05		
4	04:58	05:39			06:32	19:00 (Rep 10)	07:24	18:08 (Oerzen 3)	07:21	08:14		
	21:48	21:10			20:04	19:22 (Rep 10)	18:51	18:21 (Oerzen 3)	16:44	16:04		
5	04:59	05:41	19:32 (Oerzen 1)		06:34	19:00 (Rep 10)	07:26	18:12 (Oerzen 3)	07:23	08:15		
	21:48	21:08	22	20:08 (Rep 11)	20:01	19:23 (Rep 10)	18:49	18:17 (Oerzen 3)	16:42	16:04		
6	05:00	05:43		19:29 (Oerzen 1)	06:36	18:58 (Rep 10)	07:28		07:25	08:16		
	21:47	21:07	29	20:09 (Rep 11)	19:59	19:22 (Rep 10)	18:46		16:40	16:03		
7	05:01	05:44		19:27 (Oerzen 1)	06:38	18:18 (Oerzen 2)	07:30		07:27	08:18		
	21:47	21:05	37	20:11 (Rep 11)	19:56	19:22 (Rep 10)	18:44		16:38	16:03		
8	05:02	05:46		19:25 (Oerzen 1)	06:39	18:14 (Oerzen 2)	07:31		07:29	08:19		
	21:46	21:03	42	20:12 (Rep 11)	19:54	19:22 (Rep 10)	18:42		16:36	16:02		
9	05:03	05:48		19:24 (Oerzen 1)	06:41	18:11 (Oerzen 2)	07:33		07:31	08:20		
	21:45	21:01	47	20:13 (Rep 11)	19:52	19:21 (Rep 10)	18:39		16:35	16:02		
10	05:04	05:49		19:23 (Oerzen 1)	06:43	18:09 (Oerzen 2)	07:35		07:33	08:21		
	21:44	20:59	49	20:13 (Rep 11)	19:49	19:20 (Rep 10)	18:37		16:33	16:02		
11	05:05	05:51		19:22 (Oerzen 1)	06:44	18:08 (Oerzen 2)	07:37		07:35	08:23		
	21:44	20:57	51	20:13 (Rep 11)	19:47	19:19 (Rep 10)	18:35		16:31	16:02		
12	05:06	05:53		19:21 (Oerzen 1)	06:46	18:05 (Oerzen 2)	07:39		07:36	08:24		
	21:43	20:55	53	20:14 (Rep 11)	19:44	19:16 (Rep 10)	18:32		16:29	16:01		
13	05:07	05:55		19:20 (Oerzen 1)	06:48	18:04 (Oerzen 2)	07:40		07:38	08:25		
	21:42	20:53	53	20:13 (Rep 11)	19:42	19:14 (Rep 10)	18:30		16:28	16:01		
14	05:08	05:56		19:20 (Oerzen 1)	06:50	18:03 (Oerzen 2)	07:42		07:40	08:26		
	21:41	20:51	54	20:14 (Rep 11)	19:40	19:12 (Rep 10)	18:28		16:26	16:01		
15	05:10	05:58		19:19 (Oerzen 1)	06:51	18:02 (Oerzen 2)	07:44		07:42	08:27		
	21:40	20:49	54	20:13 (Rep 11)	19:37	18:38 (Oerzen 2)	18:25		16:25	16:01		
16	05:11	06:00		19:18 (Oerzen 1)	06:53	18:01 (Oerzen 2)	07:46		07:44	08:28		
	21:39	20:46	55	20:13 (Rep 11)	19:35	18:38 (Oerzen 2)	18:23		16:23	16:01		
17	05:12	06:01		19:18 (Oerzen 1)	06:55	18:01 (Oerzen 2)	07:48		07:46	08:28		
	21:38	20:44	55	20:13 (Rep 11)	19:32	18:39 (Oerzen 2)	18:21		16:22	16:02		
18	05:14	06:03		19:17 (Oerzen 1)	06:56	18:00 (Oerzen 2)	07:50		07:48	08:29		
	21:36	20:42	54	20:11 (Rep 11)	19:30	18:38 (Oerzen 2)	18:19		16:20	16:02		
19	05:15	06:05		19:18 (Oerzen 1)	06:58	17:59 (Oerzen 2)	07:51		07:49	08:30		
	21:35	20:40	53	20:11 (Rep 11)	19:27	18:38 (Oerzen 2)	18:16		16:19	16:02		
20	05:16	06:07		19:18 (Oerzen 1)	07:00	17:59 (Oerzen 2)	07:53		07:51	08:30		
	21:34	20:38	52	20:10 (Rep 11)	19:25	18:37 (Oerzen 2)	18:14		16:18	16:02		
21	05:18	06:08		19:17 (Oerzen 1)	07:02	18:00 (Oerzen 2)	07:55		07:53	08:31		
	21:33	20:36	49	20:07 (Rep 11)	19:22	18:37 (Oerzen 2)	18:12		16:16	16:03		
22	05:19	06:10		19:18 (Oerzen 1)	07:03	17:59 (Oerzen 2)	07:57		07:55	08:32		
	21:31	20:33	44	20:05 (Rep 11)	19:20	18:36 (Oerzen 2)	18:10		16:15	16:03		
23	05:21	06:12		19:17 (Oerzen 1)	07:05	17:59 (Oerzen 2)	07:59		07:56	08:32		
	21:30	20:31	39	20:02 (Rep 11)	19:18	18:35 (Oerzen 2)	18:08		16:14	16:04		
24	05:22	06:13		19:18 (Oerzen 1)	07:07	18:00 (Oerzen 2)	08:01		07:58	08:33		
	21:28	20:29	31	19:49 (Oerzen 1)	19:15	18:34 (Oerzen 2)	18:06		16:13	16:04		
25	05:24	06:15		19:19 (Oerzen 1)	07:09	18:00 (Oerzen 2)	07:03		08:00	08:33		
	21:27	20:27	29	19:48 (Oerzen 1)	19:13	18:32 (Oerzen 2)	17:03		16:12	16:05		
26	05:25	06:17		19:19 (Oerzen 1)	07:10	18:00 (Oerzen 2)	07:04		08:01	08:33		
	21:25	20:24	28	19:47 (Oerzen 1)	19:10	18:31 (Oerzen 2)	17:01		16:11	16:06		
27	05:27	06:19		19:20 (Oerzen 1)	07:12	18:02 (Oerzen 2)	07:06		08:03	08:34		
	21:24	20:22	25	19:45 (Oerzen 1)	19:08	18:30 (Oerzen 3)	16:59		16:10	16:06		
28	05:28	06:20		19:22 (Oerzen 1)	07:14	18:03 (Oerzen 2)	07:08		08:05	08:34		
	21:22	20:20	22	19:44 (Oerzen 1)	19:06	18:30 (Oerzen 3)	16:57		16:09	16:07		
29	05:30	06:22		19:23 (Oerzen 1)	07:16	18:04 (Oerzen 3)	07:10		08:06	08:34		
	21:21	20:18	18	19:41 (Oerzen 1)	19:03	18:28 (Oerzen 3)	16:55		16:08	16:08		
30	05:31	06:24		19:13 (Rep 10)	07:17	18:04 (Oerzen 3)	07:12		08:08	08:34		
	21:19	20:15	13	19:38 (Oerzen 1)	19:01	18:28 (Oerzen 3)	16:53		16:07	16:09		
31	05:33	06:25		19:07 (Rep 10)			07:14			08:34		
	21:17	20:13	12	19:19 (Rep 10)			16:51			16:10		
Sonnenscheinstunden	509	458			382		329		261	237		
astr.max.mögl.Beschattung		1070			1022		77					

**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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s08 - Oerzen, Im Dorfe 19

## 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	08:34	08:05	07:09		06:55		18:30 (Oerzen 2)	05:48	19:29 (Oerzen 1)	04:59
	16:11	17:01	17:56		19:53	24	18:54 (Oerzen 2)	20:47	2 19:31 (Oerzen 1)	21:35
2	08:34	08:03	07:06		06:53		18:32 (Oerzen 2)	05:45		04:59
	16:12	17:03	17:58		19:54	21	18:53 (Oerzen 2)	20:48		21:36
3	08:34	08:01	07:04		06:50		18:34 (Oerzen 2)	05:44		04:58
	16:14	17:05	18:00		19:56	17	18:51 (Oerzen 2)	20:50		21:37
4	08:33	08:00	07:02		06:48		18:36 (Oerzen 2)	05:42		04:57
	16:15	17:07	18:01		19:58	11	18:47 (Oerzen 2)	20:52		21:38
5	08:33	07:58	07:00		06:46			05:40		04:56
	16:16	17:09	18:03		20:00			20:54		21:40
6	08:33	07:56	06:57		06:43			05:38		04:55
	16:17	17:11	18:05		20:02			20:55		21:41
7	08:32	07:54	06:55		06:41			05:36		04:55
	16:19	17:13	18:07		20:03			20:57		21:42
8	08:32	07:53	06:53		06:39			05:34		04:54
	16:20	17:15	18:09		20:05			20:59		21:42
9	08:31	07:51	06:50		06:36			05:32		04:54
	16:21	17:17	18:11		20:07			21:00		21:43
10	08:31	07:49	06:48		06:34			05:30		04:53
	16:23	17:19	18:13		20:09			21:02		21:44
11	08:30	07:47	06:46		17:45 (Oerzen 3)	06:32	19:28 (Oerzen 1)	05:28		04:53
	16:24	17:21	18:14	2	17:47 (Oerzen 3)	20:11	12 19:40 (Oerzen 1)	21:04		21:45
12	08:29	07:45	06:43		17:41 (Oerzen 3)	06:29	19:25 (Oerzen 1)	05:27		04:52
	16:26	17:23	18:16	9	17:50 (Oerzen 3)	20:12	18 19:43 (Oerzen 1)	21:06		21:46
13	08:28	07:43	06:41		17:38 (Oerzen 3)	06:27	19:23 (Oerzen 1)	05:25		04:52
	16:27	17:25	18:18	14	17:52 (Oerzen 3)	20:14	20 19:43 (Oerzen 1)	21:07		21:46
14	08:28	07:41	06:38		17:36 (Oerzen 3)	06:25	19:21 (Oerzen 1)	05:23		04:52
	16:29	17:27	18:20	18	17:54 (Oerzen 3)	20:16	24 19:45 (Oerzen 1)	21:09		21:47
15	08:27	07:39	06:36		17:35 (Oerzen 3)	06:22	19:20 (Oerzen 1)	05:22		04:52
	16:31	17:29	18:22	20	17:55 (Oerzen 3)	20:18	26 19:46 (Oerzen 1)	21:11		21:48
16	08:26	07:37	06:34		17:34 (Oerzen 3)	06:20	19:19 (Oerzen 1)	05:20		04:51
	16:32	17:31	18:24	21	17:55 (Oerzen 3)	20:20	27 19:46 (Oerzen 1)	21:12		21:48
17	08:25	07:35	06:31		17:34 (Oerzen 3)	06:18	19:19 (Oerzen 1)	05:18		04:51
	16:34	17:33	18:26	22	17:56 (Oerzen 3)	20:21	28 19:47 (Oerzen 1)	21:14		21:49
18	08:24	07:33	06:29		17:33 (Oerzen 3)	06:15	19:17 (Oerzen 1)	05:17		04:51
	16:36	17:35	18:27	24	17:57 (Oerzen 2)	20:23	29 19:46 (Oerzen 1)	21:15		21:49
19	08:23	07:31	06:26		17:33 (Oerzen 3)	06:13	19:17 (Oerzen 1)	05:15		04:51
	16:37	17:37	18:29	26	17:59 (Oerzen 2)	20:25	29 19:46 (Oerzen 1)	21:17		21:49
20	08:22	07:29	06:24		17:33 (Oerzen 3)	06:11	19:17 (Oerzen 1)	05:14		04:51
	16:39	17:38	18:31	26	17:59 (Oerzen 2)	20:27	29 19:46 (Oerzen 1)	21:18		21:50
21	08:20	07:26	06:22		17:32 (Oerzen 2)	06:09	19:17 (Oerzen 1)	05:12		04:52
	16:41	17:40	18:33	28	18:00 (Oerzen 2)	20:29	29 19:46 (Oerzen 1)	21:20		21:50
22	08:19	07:24	06:19		17:31 (Oerzen 2)	06:07	19:17 (Oerzen 1)	05:11		04:52
	16:43	17:42	18:35	30	18:01 (Oerzen 2)	20:30	29 19:46 (Oerzen 1)	21:22		21:50
23	08:18	07:22	06:17		17:30 (Oerzen 2)	06:04	19:17 (Oerzen 1)	05:10		04:52
	16:44	17:44	18:36	31	18:01 (Oerzen 2)	20:32	28 19:45 (Oerzen 1)	21:23		21:50
24	08:17	07:20	06:14		17:30 (Oerzen 2)	06:02	19:18 (Oerzen 1)	05:08		04:52
	16:46	17:46	18:38	31	18:01 (Oerzen 2)	20:34	27 19:45 (Oerzen 1)	21:24		21:51
25	08:15	07:18	06:12		17:29 (Oerzen 2)	06:00	19:18 (Oerzen 1)	05:07		04:53
	16:48	17:48	18:40	31	18:00 (Oerzen 2)	20:36	26 19:44 (Oerzen 1)	21:26		21:51
26	08:14	07:15	06:10		17:29 (Oerzen 2)	05:58	19:19 (Oerzen 1)	05:06		04:53
	16:50	17:50	18:42	31	18:00 (Oerzen 2)	20:38	24 19:43 (Oerzen 1)	21:27		21:51
27	08:13	07:13	06:07		17:28 (Oerzen 2)	05:56	19:20 (Oerzen 1)	05:05		04:53
	16:52	17:52	18:44	31	17:59 (Oerzen 2)	20:39	22 19:42 (Oerzen 1)	21:29		21:50
28	08:11	07:11	06:05		17:29 (Oerzen 2)	05:54	19:21 (Oerzen 1)	05:04		04:54
	16:54	17:54	18:45	30	17:59 (Oerzen 2)	20:41	20 19:41 (Oerzen 1)	21:30		21:50
29	08:10		07:02		18:29 (Oerzen 2)	05:52	19:22 (Oerzen 1)	05:02		04:55
	16:56		19:47	30	18:59 (Oerzen 2)	20:43	17 19:39 (Oerzen 1)	21:31		21:50
30	08:08		07:00		18:29 (Oerzen 2)	05:50	19:24 (Oerzen 1)	05:01		04:55
	16:58		19:49	28	18:57 (Oerzen 2)	20:45	12 19:36 (Oerzen 1)	21:33		21:50
31	08:06		06:58		18:30 (Oerzen 2)			05:00		
	16:59		19:51	26	18:56 (Oerzen 2)			21:34		
Sonnenscheinstunden	253	275	367		419		491			506
astr.max.mögl.Beschattung			509		549		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) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s08 - Oerzen, Im Dorfe 19

## 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	04:56 21:50	05:34 21:16		06:27 20:11	12	19:27 (Oerzen 1) 19:39 (Oerzen 1)	07:19 18:58	18:18 (Oerzen 3) 18:30 (Oerzen 3)	07:16 16:49	08:09 16:06	
2	04:57 21:49	05:36 21:14		06:29 20:08			07:21 18:56	18:21 (Oerzen 3) 18:28 (Oerzen 3)	07:18 16:47	08:11 16:06	
3	04:57 21:49	05:38 21:12		06:31 20:06			07:23 18:53		07:20 16:45	08:12 16:05	
4	04:58 21:48	05:39 21:10		06:32 20:03			07:24 18:51		07:21 16:43	08:14 16:04	
5	04:59 21:48	05:41 21:08		06:34 20:01			07:26 18:49		07:23 16:42	08:15 16:04	
6	05:00 21:47	05:43 21:07		06:36 19:59			07:28 18:46		07:25 16:40	08:16 16:03	
7	05:01 21:47	05:44 21:05		06:38 19:56			07:30 18:44		07:27 16:38	08:18 16:03	
8	05:02 21:46	05:46 21:03		06:39 19:54	10	18:32 (Oerzen 2) 18:42 (Oerzen 2)	07:31 18:42		07:29 16:36	08:19 16:02	
9	05:03 21:45	05:48 21:01		06:41 19:52	17	18:27 (Oerzen 2) 18:44 (Oerzen 2)	07:33 18:39		07:31 16:34	08:20 16:02	
10	05:04 21:44	05:49 20:59		06:43 19:49	21	18:25 (Oerzen 2) 18:46 (Oerzen 2)	07:35 18:37		07:33 16:33	08:21 16:02	
11	05:05 21:44	05:51 20:57		06:44 19:47	23	18:24 (Oerzen 2) 18:47 (Oerzen 2)	07:37 18:35		07:35 16:31	08:23 16:01	
12	05:06 21:43	05:53 20:55	7	19:35 (Oerzen 1) 19:42 (Oerzen 1)	06:46 19:44	18:21 (Oerzen 2) 18:48 (Oerzen 2)	07:39 18:32		07:36 16:29	08:24 16:01	
13	05:07 21:42	05:55 20:53	14	19:31 (Oerzen 1) 19:45 (Oerzen 1)	06:48 19:42	18:20 (Oerzen 2) 18:48 (Oerzen 2)	07:40 18:30		07:38 16:28	08:25 16:01	
14	05:08 21:41	05:56 20:51	18	19:29 (Oerzen 1) 19:47 (Oerzen 1)	06:50 19:39	18:20 (Oerzen 2) 18:49 (Oerzen 2)	07:42 18:28		07:40 16:26	08:26 16:01	
15	05:10 21:40	05:58 20:49	20	19:27 (Oerzen 1) 19:47 (Oerzen 1)	06:51 19:37	18:18 (Oerzen 2) 18:49 (Oerzen 2)	07:44 18:25		07:42 16:25	08:27 16:01	
16	05:11 21:39	06:00 20:46	23	19:26 (Oerzen 1) 19:49 (Oerzen 1)	06:53 19:35	18:18 (Oerzen 2) 18:49 (Oerzen 2)	07:46 18:23		07:44 16:23	08:27 16:01	
17	05:12 21:38	06:01 20:44	25	19:25 (Oerzen 1) 19:50 (Oerzen 1)	06:55 19:32	18:17 (Oerzen 2) 18:49 (Oerzen 2)	07:48 18:21		07:46 16:22	08:28 16:02	
18	05:14 21:36	06:03 20:42	26	19:24 (Oerzen 1) 19:50 (Oerzen 1)	06:56 19:30	18:16 (Oerzen 2) 18:48 (Oerzen 2)	07:50 18:19		07:47 16:20	08:29 16:02	
19	05:15 21:35	06:05 20:40	28	19:23 (Oerzen 1) 19:51 (Oerzen 1)	06:58 19:27	18:16 (Oerzen 2) 18:48 (Oerzen 2)	07:51 18:16		07:49 16:19	08:30 16:02	
20	05:16 21:34	06:07 20:38	28	19:23 (Oerzen 1) 19:51 (Oerzen 1)	07:00 19:25	18:16 (Oerzen 2) 18:47 (Oerzen 2)	07:53 18:14		07:51 16:18	08:30 16:02	
21	05:18 21:33	06:08 20:36	29	19:22 (Oerzen 1) 19:51 (Oerzen 1)	07:02 19:22	18:17 (Oerzen 2) 18:47 (Oerzen 2)	07:55 18:12		07:53 16:16	08:31 16:03	
22	05:19 21:31	06:10 20:33	29	19:22 (Oerzen 1) 19:51 (Oerzen 1)	07:03 19:20	18:16 (Oerzen 2) 18:45 (Oerzen 2)	07:57 18:10		07:55 16:15	08:32 16:03	
23	05:21 21:30	06:12 20:31	29	19:21 (Oerzen 1) 19:50 (Oerzen 1)	07:05 19:18	18:17 (Oerzen 2) 18:44 (Oerzen 2)	07:59 18:08		07:56 16:14	08:32 16:04	
24	05:22 21:28	06:13 20:29	29	19:21 (Oerzen 1) 19:50 (Oerzen 1)	07:07 19:15	18:17 (Oerzen 3) 18:43 (Oerzen 2)	08:01 18:06		07:58 16:13	08:33 16:04	
25	05:24 21:27	06:15 20:27	29	19:21 (Oerzen 1) 19:50 (Oerzen 1)	07:09 19:13	18:16 (Oerzen 3) 18:40 (Oerzen 2)	07:03 17:03		08:00 16:12	08:33 16:05	
26	05:25 21:25	06:17 20:24	27	19:21 (Oerzen 1) 19:48 (Oerzen 1)	07:10 19:10	18:16 (Oerzen 3) 18:39 (Oerzen 2)	07:04 17:01		08:01 16:11	08:33 16:06	
27	05:27 21:24	06:19 20:22	27	19:21 (Oerzen 1) 19:48 (Oerzen 1)	07:12 19:08	18:16 (Oerzen 3) 18:37 (Oerzen 3)	07:06 16:59		08:03 16:10	08:33 16:06	
28	05:28 21:22	06:20 20:20	25	19:22 (Oerzen 1) 19:47 (Oerzen 1)	07:14 19:06	18:16 (Oerzen 3) 18:37 (Oerzen 3)	07:08 16:57		08:05 16:09	08:34 16:07	
29	05:30 21:21	06:22 20:18	23	19:22 (Oerzen 1) 19:45 (Oerzen 1)	07:15 19:03	18:16 (Oerzen 3) 18:35 (Oerzen 3)	07:10 16:55		08:06 16:08	08:34 16:08	
30	05:31 21:19	06:24 20:15	21	19:23 (Oerzen 1) 19:44 (Oerzen 1)	07:17 19:01	18:17 (Oerzen 3) 18:32 (Oerzen 3)	07:12 16:53		08:08 16:07	08:34 16:09	
31	05:33 21:17	06:25 20:13	17	19:25 (Oerzen 1) 19:42 (Oerzen 1)			07:14 16:51			08:34 16:10	
Sonnenscheinstunden		509	458	382	591	329	19	261	237		
astr.max.mögl.Beschattung			474								

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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s09 - Oerzen, Im Dorfe 25

## 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	08:34	08:05	07:09	06:55	18:25 (Oerzen 2)	05:48	19:21 (Oerzen 1)	04:59			
	16:11	17:01	17:56	19:53	43	19:26 (Rep 10)	20:47	35	20:02 (Rep 11)	21:35	
2	08:34	08:03	07:06	06:53	18:27 (Oerzen 2)	05:45	19:23 (Oerzen 1)	04:59			
	16:12	17:03	17:58	19:54	42	19:28 (Rep 10)	20:48	29	20:00 (Rep 11)	21:36	
3	08:34	08:01	07:04	06:50	18:29 (Oerzen 2)	05:44	19:26 (Oerzen 1)	04:58			
	16:14	17:05	18:00	19:56	40	19:29 (Rep 10)	20:50	19	19:59 (Rep 11)	21:37	
4	08:33	08:00	07:02	06:48	18:31 (Oerzen 2)	05:42	19:48 (Rep 11)	04:57			
	16:15	17:07	18:01	19:58	35	19:28 (Rep 10)	20:52	8	19:56 (Rep 11)	21:38	
5	08:33	07:58	07:00	06:46	19:06 (Rep 10)	05:40		04:56			
	16:16	17:09	18:03	20:00	22	19:28 (Rep 10)	20:54		21:40		
6	08:33	07:56	06:57	06:43	19:07 (Rep 10)	05:38		04:55			
	16:17	17:11	18:05	20:02	21	19:28 (Rep 10)	20:55		21:41		
7	08:32	07:54	06:55	06:41	19:06 (Rep 10)	05:36		04:55			
	16:19	17:13	18:07	20:03	21	19:27 (Rep 10)	20:57		21:42		
8	08:32	07:53	06:53	06:39	19:07 (Rep 10)	05:34		04:54			
	16:20	17:15	18:09	20:05	19	19:26 (Rep 10)	20:59		21:42		
9	08:31	07:51	06:50	06:36	19:08 (Rep 10)	05:32		04:54			
	16:21	17:17	18:11	20:07	17	19:25 (Rep 10)	21:00		21:43		
10	08:31	07:49	06:48	17:43 (Oerzen 3)	06:34	19:08 (Rep 10)	05:30		04:53		
	16:23	17:19	18:13	2	17:45 (Oerzen 3)	20:09	19:23 (Rep 10)	21:02		21:44	
11	08:30	07:47	06:46	17:37 (Oerzen 3)	06:32	19:11 (Rep 10)	05:28		04:53		
	16:24	17:21	18:14	11	17:48 (Oerzen 3)	20:11	19:37 (Oerzen 1)	21:04		21:45	
12	08:29	07:45	06:43	17:35 (Oerzen 3)	06:29	19:26 (Oerzen 1)	05:27		04:52		
	16:26	17:23	18:16	15	17:50 (Oerzen 3)	20:12	19:41 (Oerzen 1)	21:06		21:46	
13	08:28	07:43	06:41	17:33 (Oerzen 3)	06:27	19:22 (Oerzen 1)	05:25		04:52		
	16:27	17:25	18:18	19	17:52 (Oerzen 3)	20:14	19:42 (Oerzen 1)	21:07		21:46	
14	08:28	07:41	06:38	17:32 (Oerzen 3)	06:25	19:21 (Oerzen 1)	05:23		04:52		
	16:29	17:27	18:20	21	17:53 (Oerzen 3)	20:16	19:44 (Oerzen 1)	21:09		21:47	
15	08:27	07:39	06:36	17:31 (Oerzen 3)	06:22	19:20 (Oerzen 1)	05:22		04:52		
	16:31	17:29	18:22	22	17:53 (Oerzen 3)	20:18	19:45 (Oerzen 1)	21:11		21:48	
16	08:26	07:37	06:34	17:30 (Oerzen 3)	06:20	19:19 (Oerzen 1)	05:20		04:51		
	16:32	17:31	18:24	23	17:53 (Oerzen 3)	20:20	19:46 (Oerzen 1)	21:12		21:48	
17	08:25	07:35	06:31	17:30 (Oerzen 3)	06:18	19:18 (Oerzen 1)	05:18		04:51		
	16:34	17:33	18:26	24	17:54 (Oerzen 2)	20:21	19:46 (Oerzen 1)	21:14		21:49	
18	08:24	07:33	06:29	17:29 (Oerzen 3)	06:15	19:16 (Oerzen 1)	05:17		04:51		
	16:36	17:35	18:27	26	17:55 (Oerzen 2)	20:23	19:55 (Rep 11)	21:15		21:49	
19	08:23	07:31	06:26	17:28 (Oerzen 2)	06:13	19:16 (Oerzen 1)	05:15		04:51		
	16:37	17:37	18:29	28	17:56 (Oerzen 2)	20:25	19:57 (Rep 11)	21:17		21:49	
20	08:22	07:29	06:24	17:27 (Oerzen 2)	06:11	19:16 (Oerzen 1)	05:14		04:51		
	16:39	17:38	18:31	29	17:56 (Oerzen 2)	20:27	19:59 (Rep 11)	21:18		21:50	
21	08:20	07:26	06:22	17:26 (Oerzen 2)	06:09	19:15 (Oerzen 1)	05:12		04:52		
	16:41	17:40	18:33	31	17:57 (Oerzen 2)	20:29	20:01 (Rep 11)	21:20		21:50	
22	08:19	07:24	06:19	17:26 (Oerzen 2)	06:07	19:15 (Oerzen 1)	05:11		04:52		
	16:43	17:42	18:35	32	17:58 (Oerzen 2)	20:30	20:02 (Rep 11)	21:22		21:50	
23	08:18	07:22	06:17	17:24 (Oerzen 2)	06:04	19:15 (Oerzen 1)	05:10		04:52		
	16:44	17:44	18:36	33	17:57 (Oerzen 2)	20:32	20:04 (Rep 11)	21:23		21:50	
24	08:17	07:20	06:14	17:24 (Oerzen 2)	06:02	19:16 (Oerzen 1)	05:08		04:52		
	16:46	17:46	18:38	34	17:58 (Oerzen 2)	20:34	20:05 (Rep 11)	21:24		21:51	
25	08:15	07:18	06:12	17:23 (Oerzen 2)	06:00	19:16 (Oerzen 1)	05:07		04:53		
	16:48	17:48	18:40	34	17:57 (Oerzen 2)	20:36	20:05 (Rep 11)	21:26		21:51	
26	08:14	07:15	06:10	17:23 (Oerzen 2)	05:58	19:16 (Oerzen 1)	05:06		04:53		
	16:50	17:50	18:42	34	17:57 (Oerzen 2)	20:38	20:05 (Rep 11)	21:27		21:51	
27	08:13	07:13	06:07	17:23 (Oerzen 2)	05:56	19:17 (Oerzen 1)	05:05		04:53		
	16:52	17:52	18:44	33	17:56 (Oerzen 2)	20:39	20:04 (Rep 11)	21:29		21:50	
28	08:11	07:11	06:05	17:23 (Oerzen 2)	05:54	19:17 (Oerzen 1)	05:04		04:54		
	16:54	17:54	18:45	33	17:56 (Oerzen 2)	20:41	20:04 (Rep 11)	21:30		21:50	
29	08:10		07:02	18:24 (Oerzen 2)	05:52	19:18 (Oerzen 1)	05:02		04:55		
	16:56		19:47	37	19:21 (Rep 10)	20:43	20:03 (Rep 11)	21:31		21:50	
30	08:08		07:00	18:24 (Oerzen 2)	05:50	19:19 (Oerzen 1)	05:01		04:55		
	16:58		19:49	41	19:23 (Rep 10)	20:45	20:03 (Rep 11)	21:33		21:50	
31	08:06		06:58	18:25 (Oerzen 2)			05:00				
	16:59		19:51	43	19:25 (Rep 10)		21:34				
Sonnenscheinstunden			253	275	367	419	491	506			
astr.max.mögl.Beschattung				605	1013	91					

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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s09 - Oerzen, Im Dorfe 25

### Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

		Juli		August		September		Oktober		November		Dezember	
1	04:56 21:50	05:34 21:16			06:27 20:11	17	19:10 (Rep 10) 19:36 (Oerzen 1)	07:19 18:58	17	18:13 (Oerzen 3) 18:30 (Oerzen 3)	07:16 16:49	08:09 16:06	
2	04:57 21:49	05:36 21:14			06:29 20:08	15	19:07 (Rep 10) 19:22 (Rep 10)	07:21 18:56	13	18:15 (Oerzen 3) 18:28 (Oerzen 3)	07:18 16:47	08:11 16:06	
3	04:57 21:49	05:38 21:12			06:31 20:06	17	19:05 (Rep 10) 19:22 (Rep 10)	07:23 18:54	8	18:18 (Oerzen 3) 18:26 (Oerzen 3)	07:20 16:45	08:12 16:05	
4	04:58 21:48	05:39 21:10			06:32 20:04	19	19:04 (Rep 10) 19:23 (Rep 10)	07:24 18:51			07:21 16:43	08:14 16:04	
5	04:59 21:48	05:41 21:08			06:34 20:01	21	19:03 (Rep 10) 19:24 (Rep 10)	07:26 18:49			07:23 16:42	08:15 16:04	
6	05:00 21:47	05:43 21:07			06:36 19:59	21	19:02 (Rep 10) 19:23 (Rep 10)	07:28 18:46			07:25 16:40	08:16 16:03	
7	05:01 21:47	05:44 21:05			06:38 19:56	21	19:02 (Rep 10) 19:23 (Rep 10)	07:30 18:44			07:27 16:38	08:18 16:03	
8	05:02 21:46	05:46 21:03	2	20:00 (Rep 11) 20:02 (Rep 11)	06:39 19:54	35	18:26 (Oerzen 2) 19:23 (Rep 10)	07:31 18:42			07:29 16:36	08:19 16:02	
9	05:03 21:45	05:48 21:01	10	19:56 (Rep 11) 20:06 (Rep 11)	06:41 19:52	39	18:22 (Oerzen 2) 19:22 (Rep 10)	07:33 18:39			07:31 16:34	08:20 16:02	
10	05:04 21:44	05:49 20:59	23	19:33 (Oerzen 1) 20:08 (Rep 11)	06:43 19:49	42	18:20 (Oerzen 2) 19:21 (Rep 10)	07:35 18:37			07:33 16:33	08:21 16:02	
11	05:05 21:44	05:51 20:57	31	19:30 (Oerzen 1) 20:09 (Rep 11)	06:44 19:47	42	18:19 (Oerzen 2) 19:19 (Rep 10)	07:37 18:35			07:35 16:31	08:23 16:01	
12	05:06 21:43	05:53 20:55	36	19:29 (Oerzen 1) 20:10 (Rep 11)	06:46 19:44	42	18:16 (Oerzen 2) 19:16 (Rep 10)	07:39 18:32			07:36 16:29	08:24 16:01	
13	05:07 21:42	05:55 20:53	42	19:26 (Oerzen 1) 20:10 (Rep 11)	06:48 19:42	41	18:15 (Oerzen 2) 19:14 (Rep 10)	07:40 18:30			07:38 16:28	08:25 16:01	
14	05:08 21:41	05:56 20:51	44	19:26 (Oerzen 1) 20:11 (Rep 11)	06:50 19:39	38	18:14 (Oerzen 2) 19:12 (Rep 10)	07:42 18:28			07:40 16:26	08:26 16:01	
15	05:10 21:40	05:58 20:49	47	19:24 (Oerzen 1) 20:11 (Rep 11)	06:51 19:37	32	18:13 (Oerzen 2) 18:45 (Oerzen 2)	07:44 18:25			07:42 16:25	08:27 16:01	
16	05:11 21:39	06:00 20:46	48	19:23 (Oerzen 1) 20:11 (Rep 11)	06:53 19:35	33	18:12 (Oerzen 2) 18:45 (Oerzen 2)	07:46 18:23			07:44 16:23	08:27 16:01	
17	05:12 21:38	06:01 20:44	48	19:23 (Oerzen 1) 20:11 (Rep 11)	06:55 19:32	33	18:12 (Oerzen 2) 18:45 (Oerzen 2)	07:48 18:21			07:46 16:22	08:28 16:02	
18	05:14 21:36	06:03 20:42	49	19:21 (Oerzen 1) 20:10 (Rep 11)	06:56 19:30	33	18:11 (Oerzen 2) 18:44 (Oerzen 2)	07:50 18:19			07:47 16:20	08:29 16:02	
19	05:15 21:35	06:05 20:40	49	19:21 (Oerzen 1) 20:10 (Rep 11)	06:58 19:27	33	18:11 (Oerzen 2) 18:44 (Oerzen 2)	07:51 18:16			07:49 16:19	08:30 16:02	
20	05:16 21:34	06:07 20:38	49	19:21 (Oerzen 1) 20:10 (Rep 11)	07:00 19:25	33	18:11 (Oerzen 2) 18:44 (Oerzen 2)	07:53 18:14			07:51 16:18	08:30 16:02	
21	05:18 21:33	06:08 20:36	47	19:20 (Oerzen 1) 20:07 (Rep 11)	07:02 19:22	33	18:11 (Oerzen 2) 18:44 (Oerzen 2)	07:55 18:12			07:53 16:16	08:31 16:03	
22	05:19 21:31	06:10 20:33	45	19:20 (Oerzen 1) 20:05 (Rep 11)	07:03 19:20	32	18:10 (Oerzen 2) 18:42 (Oerzen 2)	07:57 18:10			07:55 16:15	08:32 16:03	
23	05:21 21:30	06:12 20:31	43	19:19 (Oerzen 1) 20:02 (Rep 11)	07:05 19:18	30	18:11 (Oerzen 2) 18:41 (Oerzen 2)	07:59 18:08			07:56 16:14	08:32 16:04	
24	05:22 21:28	06:13 20:29	38	19:20 (Oerzen 1) 20:00 (Rep 11)	07:07 19:15	28	18:12 (Oerzen 2) 18:40 (Oerzen 2)	08:01 18:06			07:58 16:13	08:33 16:04	
25	05:24 21:27	06:15 20:27	32	19:20 (Oerzen 1) 19:59 (Rep 11)	07:09 19:13	26	18:12 (Oerzen 3) 18:38 (Oerzen 2)	07:03 17:03			08:00 16:12	08:33 16:05	
26	05:25 21:25	06:17 20:24	28	19:20 (Oerzen 1) 19:48 (Oerzen 1)	07:10 19:10	25	18:12 (Oerzen 3) 18:37 (Oerzen 2)	07:04 17:01			08:01 16:11	08:33 16:06	
27	05:27 21:24	06:19 20:22	26	19:21 (Oerzen 1) 19:47 (Oerzen 1)	07:12 19:08	23	18:12 (Oerzen 3) 18:35 (Oerzen 3)	07:06 16:59			08:03 16:10	08:34 16:06	
28	05:28 21:22	06:20 20:20	25	19:22 (Oerzen 1) 19:47 (Oerzen 1)	07:14 19:06	23	18:12 (Oerzen 3) 18:35 (Oerzen 3)	07:08 16:57			08:05 16:09	08:34 16:07	
29	05:30 21:21	06:22 20:18	22	19:22 (Oerzen 1) 19:44 (Oerzen 1)	07:16 19:03	21	18:12 (Oerzen 3) 18:33 (Oerzen 3)	07:10 16:55			08:06 16:08	08:34 16:08	
30	05:31 21:19	06:24 20:15	20	19:23 (Oerzen 1) 19:43 (Oerzen 1)	07:17 19:01	20	18:12 (Oerzen 3) 18:32 (Oerzen 3)	07:12 16:53			08:08 16:07	08:34 16:09	
31	05:33 21:17	06:25 20:13	15	19:26 (Oerzen 1) 19:41 (Oerzen 1)				07:14 16:51				08:34 16:10	
Sonnenscheinstunden		509	458		382		329		261	237			
astr.max.mögl.Beschattung			819		868		38						

**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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s10 - Oerzen, Westerheide 1

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März		April		Mai	Juni
1	08:34	08:05	07:09		06:55	18:57 (Rep 10)	05:48	04:59
	16:11	17:01	17:56		19:53	23 19:20 (Rep 10)	20:47	21:35
2	08:34	08:03	07:06		06:53	18:57 (Rep 10)	05:45	04:59
	16:12	17:03	17:58		19:54	22 19:19 (Rep 10)	20:48	21:36
3	08:34	08:01	07:04		06:50	18:58 (Rep 10)	05:44	04:58
	16:14	17:05	18:00		19:56	21 19:19 (Rep 10)	20:50	21:37
4	08:33	08:00	07:02		06:48	18:58 (Rep 10)	05:42	04:57
	16:15	17:07	18:01		19:58	19 19:17 (Rep 10)	20:52	21:38
5	08:33	07:58	07:00	17:33 (Oerzen 3)	06:46	18:59 (Rep 10)	05:40	04:56
	16:16	17:09	18:03	2 17:35 (Oerzen 3)	20:00	21 19:24 (Oerzen 1)	20:54	21:40
6	08:33	07:56	06:57	17:27 (Oerzen 3)	06:43	19:01 (Rep 10)	05:38	04:55
	16:17	17:11	18:05	12 17:39 (Oerzen 3)	20:02	28 19:29 (Oerzen 1)	20:55	21:41
7	08:32	07:54	06:55	17:25 (Oerzen 3)	06:41	19:02 (Rep 10)	05:36	04:55
	16:19	17:13	18:07	16 17:41 (Oerzen 3)	20:04	29 19:31 (Oerzen 1)	20:57	21:42
8	08:32	07:53	06:53	17:21 (Oerzen 2)	06:39	19:10 (Oerzen 1)	05:34	04:54
	16:20	17:15	18:09	21 17:42 (Oerzen 3)	20:05	22 19:32 (Oerzen 1)	20:59	21:42
9	08:31	07:51	06:50	17:18 (Oerzen 2)	06:36	19:08 (Oerzen 1)	05:32	04:54
	16:21	17:17	18:11	25 17:43 (Oerzen 3)	20:07	26 19:34 (Oerzen 1)	21:01	21:43
10	08:31	07:49	06:48	17:17 (Oerzen 2)	06:34	19:06 (Oerzen 1)	05:30	04:53
	16:23	17:19	18:13	27 17:44 (Oerzen 3)	20:09	28 19:34 (Oerzen 1)	21:02	21:44
11	08:30	07:47	06:46	17:14 (Oerzen 2)	06:32	19:05 (Oerzen 1)	05:28	04:53
	16:24	17:21	18:15	29 17:43 (Oerzen 3)	20:11	30 19:35 (Oerzen 1)	21:04	21:45
12	08:29	07:45	06:43	17:13 (Oerzen 2)	06:29	19:05 (Oerzen 1)	05:27	04:52
	16:26	17:23	18:16	31 17:44 (Oerzen 3)	20:13	30 19:35 (Oerzen 1)	21:06	21:46
13	08:28	07:43	06:41	17:11 (Oerzen 2)	06:27	19:03 (Oerzen 1)	05:25	04:52
	16:27	17:25	18:18	32 17:43 (Oerzen 3)	20:14	32 19:35 (Oerzen 1)	21:07	21:46
14	08:28	07:41	06:38	17:11 (Oerzen 2)	06:25	19:03 (Oerzen 1)	05:23	04:52
	16:29	17:27	18:20	32 17:43 (Oerzen 3)	20:16	35 19:48 (Rep 11)	21:09	21:47
15	08:27	07:39	06:36	17:09 (Oerzen 2)	06:22	19:03 (Oerzen 1)	05:22	04:52
	16:31	17:29	18:22	34 17:43 (Oerzen 2)	20:18	41 19:50 (Rep 11)	21:11	21:48
16	08:26	07:37	06:34	17:09 (Oerzen 2)	06:20	19:03 (Oerzen 1)	05:20	04:51
	16:32	17:31	18:24	34 17:43 (Oerzen 2)	20:20	45 19:52 (Rep 11)	21:12	21:48
17	08:25	07:35	06:31	17:09 (Oerzen 2)	06:18	19:03 (Oerzen 1)	05:18	04:51
	16:34	17:33	18:26	35 17:44 (Oerzen 2)	20:21	48 19:54 (Rep 11)	21:14	21:49
18	08:24	07:33	06:29	17:08 (Oerzen 2)	06:15	19:02 (Oerzen 1)	05:17	04:51
	16:36	17:35	18:27	35 17:43 (Oerzen 2)	20:23	51 19:55 (Rep 11)	21:15	21:49
19	08:23	07:31	06:26	17:08 (Oerzen 2)	06:13	19:02 (Oerzen 1)	05:15	04:51
	16:37	17:37	18:29	35 17:43 (Oerzen 2)	20:25	52 19:56 (Rep 11)	21:17	21:49
20	08:22	07:29	06:24	17:08 (Oerzen 2)	06:11	19:03 (Oerzen 1)	05:14	04:51
	16:39	17:38	18:31	34 17:42 (Oerzen 2)	20:27	53 19:57 (Rep 11)	21:18	21:50
21	08:20	07:26	06:22	17:08 (Oerzen 2)	06:09	19:03 (Oerzen 1)	05:12	04:52
	16:41	17:40	18:33	34 17:42 (Oerzen 2)	20:29	52 19:57 (Rep 11)	21:20	21:50
22	08:19	07:24	06:19	17:09 (Oerzen 2)	06:07	19:04 (Oerzen 1)	05:11	04:52
	16:43	17:42	18:35	32 17:41 (Oerzen 2)	20:30	50 19:57 (Rep 11)	21:22	21:50
23	08:18	07:22	06:17	17:09 (Oerzen 2)	06:04	19:05 (Oerzen 1)	05:10	04:52
	16:44	17:44	18:36	31 17:40 (Oerzen 2)	20:32	48 19:57 (Rep 11)	21:23	21:50
24	08:17	07:20	06:14	17:10 (Oerzen 2)	06:02	19:06 (Oerzen 1)	05:08	04:52
	16:46	17:46	18:38	29 17:39 (Oerzen 2)	20:34	45 19:56 (Rep 11)	21:24	21:51
25	08:15	07:18	06:12	17:10 (Oerzen 2)	06:00	19:08 (Oerzen 1)	05:07	04:53
	16:48	17:48	18:40	36 18:14 (Rep 10)	20:36	41 19:56 (Rep 11)	21:26	21:51
26	08:14	07:16	06:10	17:12 (Oerzen 2)	05:58	19:10 (Oerzen 1)	05:06	04:53
	16:50	17:50	18:42	37 18:16 (Rep 10)	20:38	35 19:55 (Rep 11)	21:27	21:51
27	08:13	07:13	06:07	17:13 (Oerzen 2)	05:56	19:13 (Oerzen 1)	05:05	04:53
	16:52	17:52	18:44	36 18:17 (Rep 10)	20:39	28 19:54 (Rep 11)	21:29	21:50
28	08:11	07:11	06:05	17:16 (Oerzen 2)	05:54	19:36 (Rep 11)	05:04	04:54
	16:54	17:54	18:45	34 18:19 (Rep 10)	20:41	17 19:53 (Rep 11)	21:30	21:50
29	08:10		07:02	18:21 (Oerzen 2)	05:52	19:38 (Rep 11)	05:02	04:55
	16:56		19:47	27 19:21 (Rep 10)	20:43	13 19:51 (Rep 11)	21:31	21:50
30	08:08		07:00	18:58 (Rep 10)	05:50	19:40 (Rep 11)	05:01	04:55
	16:58		19:49	22 19:20 (Rep 10)	20:45	9 19:49 (Rep 11)	21:33	21:50
31	08:06		06:58	18:58 (Rep 10)			05:00	
	16:59		19:51	23 19:21 (Rep 10)			21:34	
Sonnenscheinstunden	253	275	367		419		491	506
astr.max.mögl.Beschattung			775		994			

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

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



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s10 - Oerzen, Westerheide 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	04:56 21:50	05:34 21:16		06:27 20:11	19:04 (Oerzen 1) 30 19:34 (Oerzen 1)	07:19 18:58	17:52 (Oerzen 2) 30 18:22 (Oerzen 3)	07:16 16:49	08:09 16:06		
2	04:57 21:49	05:36 21:14		06:29 20:08	19:05 (Oerzen 1) 28 19:33 (Oerzen 1)	07:21 18:56	17:53 (Oerzen 2) 29 18:22 (Oerzen 3)	07:18 16:47	08:11 16:06		
3	04:57 21:49	05:38 21:12		06:31 20:06	19:05 (Oerzen 1) 26 19:31 (Oerzen 1)	07:23 18:54	17:54 (Oerzen 2) 28 18:22 (Oerzen 3)	07:20 16:45	08:12 16:05		
4	04:58 21:48	05:39 21:10		06:32 20:04	19:07 (Oerzen 1) 22 19:29 (Oerzen 1)	07:24 18:51	17:54 (Oerzen 2) 26 18:20 (Oerzen 3)	07:21 16:43	08:14 16:04		
5	04:59 21:48	05:41 21:08		06:34 20:01	18:59 (Rep 10) 29 19:28 (Oerzen 1)	07:26 18:49	17:57 (Oerzen 2) 22 18:19 (Oerzen 3)	07:23 16:42	08:15 16:04		
6	05:00 21:47	05:43 21:07		06:36 19:59	18:56 (Rep 10) 28 19:24 (Oerzen 1)	07:28 18:46	18:00 (Oerzen 3) 18 18:18 (Oerzen 3)	07:25 16:40	08:16 16:03		
7	05:01 21:47	05:44 21:05		06:38 19:56	18:54 (Rep 10) 23 19:20 (Oerzen 1)	07:30 18:44	18:02 (Oerzen 3) 14 18:16 (Oerzen 3)	07:27 16:38	08:18 16:03		
8	05:02 21:46	05:46 21:03		06:39 19:54	18:53 (Rep 10) 19 19:12 (Rep 10)	07:31 18:42	18:04 (Oerzen 3) 9 18:13 (Oerzen 3)	07:29 16:36	08:19 16:02		
9	05:03 21:45	05:48 21:01		06:41 19:52	18:51 (Rep 10) 21 19:12 (Rep 10)	07:33 18:39		07:31 16:34	08:20 16:02		
10	05:04 21:44	05:49 20:59		06:43 19:49	18:51 (Rep 10) 22 19:13 (Rep 10)	07:35 18:37		07:33 16:33	08:21 16:02		
11	05:05 21:44	05:51 20:57		06:44 19:47	18:50 (Rep 10) 23 19:13 (Rep 10)	07:37 18:35		07:35 16:31	08:23 16:01		
12	05:06 21:43	05:53 20:55		19:51 (Rep 11) 19:54 (Rep 11)	06:46 23 19:12 (Rep 10)	07:39 18:32		07:36 16:29	08:24 16:01		
13	05:07 21:42	05:55 20:53	3	19:46 (Rep 11) 19:57 (Rep 11)	06:48 23 19:12 (Rep 10)	07:40 18:30		07:38 16:28	08:25 16:01		
14	05:08 21:41	05:56 20:51	11	19:45 (Rep 11) 19:59 (Rep 11)	06:50 21 19:11 (Rep 10)	07:42 18:28		07:40 16:26	08:26 16:01		
15	05:10 21:40	05:58 20:49	14	19:43 (Rep 11) 20:00 (Rep 11)	06:51 33 19:09 (Rep 10)	07:44 18:25		07:42 16:25	08:27 16:01		
16	05:11 21:39	06:00 20:46	17	19:18 (Oerzen 1) 20:01 (Rep 11)	06:53 36 19:07 (Rep 10)	07:46 18:23		07:44 16:23	08:28 16:01		
17	05:12 21:38	06:01 20:44	30	19:16 (Oerzen 1) 20:02 (Rep 11)	06:55 37 19:05 (Rep 10)	07:48 18:21		07:46 16:22	08:28 16:02		
18	05:14 21:36	06:03 20:42	37	19:13 (Oerzen 1) 20:02 (Rep 11)	06:56 36 19:02 (Rep 10)	07:50 18:19		07:48 16:20	08:29 16:02		
19	05:15 21:35	06:05 20:40	42	19:12 (Oerzen 1) 20:02 (Rep 11)	06:58 31 18:59 (Rep 10)	07:51 18:16		07:49 16:19	08:30 16:02		
20	05:16 21:34	06:07 20:38	45	19:11 (Oerzen 1) 20:02 (Rep 11)	07:00 30 18:26 (Oerzen 2)	07:53 18:14		07:51 16:18	08:30 16:02		
21	05:18 21:33	06:08 20:36	48	19:09 (Oerzen 1) 20:02 (Rep 11)	07:02 32 18:27 (Oerzen 2)	07:55 18:12		07:53 16:16	08:31 16:03		
22	05:19 21:31	06:10 20:33	50	19:08 (Oerzen 1) 20:02 (Rep 11)	07:03 33 18:26 (Oerzen 2)	07:57 18:10		07:55 16:15	08:32 16:03		
23	05:21 21:30	06:12 20:31	52	19:06 (Oerzen 1) 20:00 (Rep 11)	07:05 35 18:27 (Oerzen 2)	07:59 18:08		07:56 16:14	08:32 16:04		
24	05:22 21:28	06:13 20:29	53	19:06 (Oerzen 1) 20:00 (Rep 11)	07:07 35 18:27 (Oerzen 2)	08:01 18:06		07:58 16:13	08:33 16:04		
25	05:24 21:27	06:15 20:27	52	19:06 (Oerzen 1) 19:59 (Rep 11)	07:09 35 18:26 (Oerzen 2)	07:03 17:03		08:00 16:12	08:33 16:05		
26	05:25 21:25	06:17 20:24	48	19:05 (Oerzen 1) 19:56 (Rep 11)	07:10 35 18:26 (Oerzen 2)	07:04 17:01		08:01 16:11	08:33 16:06		
27	05:27 21:24	06:19 20:22	45	19:05 (Oerzen 1) 19:54 (Rep 11)	07:12 34 18:25 (Oerzen 2)	07:06 16:59		08:03 16:10	08:34 16:06		
28	05:28 21:22	06:20 20:20	41	19:05 (Oerzen 1) 19:52 (Rep 11)	07:14 34 18:25 (Oerzen 2)	07:08 16:57		08:05 16:09	08:34 16:07		
29	05:30 21:21	06:22 20:18	33	19:04 (Oerzen 1) 19:48 (Rep 11)	07:16 33 18:23 (Oerzen 2)	07:10 16:55		08:06 16:08	08:34 16:08		
30	05:31 21:19	06:24 20:15	32	19:04 (Oerzen 1) 19:36 (Oerzen 1)	07:17 32 18:23 (Oerzen 3)	07:12 16:53		08:08 16:07	08:34 16:09		
31	05:33 21:17	06:25 20:13	30	19:05 (Oerzen 1) 19:35 (Oerzen 1)		07:14 16:51			08:34 16:10		
Sonnenscheinstunden		509	458	382	879	329	176	261	237		
astr.max.mögl.Beschattung			735								

**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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s11 - Oerzen, Westerheide 3**Annahmen für Schattenwurfberechnung**

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März		April		Mai	Juni
1	08:34	08:05	07:09		06:55	18:53 (Rep 10)	05:48	04:59
	16:11	17:01	17:56		19:53	22 19:15 (Rep 10)	20:47	21:35
2	08:34	08:03	07:06		06:53	18:54 (Rep 10)	05:45	04:59
	16:12	17:03	17:58		19:54	20 19:14 (Rep 10)	20:48	21:36
3	08:34	08:01	07:04	17:27 (Oerzen 3)	06:50	18:55 (Rep 10)	05:44	04:58
	16:14	17:05	18:00	3 17:30 (Oerzen 3)	19:56	27 19:22 (Oerzen 1)	20:50	21:37
4	08:33	08:00	07:02	17:22 (Oerzen 3)	06:48	18:56 (Rep 10)	05:42	04:57
	16:15	17:07	18:01	13 17:35 (Oerzen 3)	19:58	28 19:24 (Oerzen 1)	20:52	21:39
5	08:33	07:58	07:00	17:15 (Oerzen 2)	06:46	18:58 (Rep 10)	05:40	04:56
	16:16	17:09	18:03	22 17:37 (Oerzen 3)	20:00	28 19:26 (Oerzen 1)	20:54	21:40
6	08:33	07:56	06:57	17:12 (Oerzen 2)	06:43	19:03 (Oerzen 1)	05:38	04:55
	16:17	17:11	18:05	25 17:37 (Oerzen 3)	20:02	25 19:28 (Oerzen 1)	20:55	21:41
7	08:32	07:54	06:55	17:10 (Oerzen 2)	06:41	19:01 (Oerzen 1)	05:36	04:55
	16:19	17:13	18:07	29 17:39 (Oerzen 3)	20:04	27 19:28 (Oerzen 1)	20:57	21:42
8	08:32	07:53	06:53	17:07 (Oerzen 2)	06:39	19:00 (Oerzen 1)	05:34	04:54
	16:20	17:15	18:09	31 17:38 (Oerzen 3)	20:05	29 19:29 (Oerzen 1)	20:59	21:42
9	08:31	07:51	06:50	17:06 (Oerzen 2)	06:36	19:00 (Oerzen 1)	05:32	04:54
	16:21	17:17	18:11	33 17:39 (Oerzen 3)	20:07	30 19:30 (Oerzen 1)	21:01	21:43
10	08:31	07:49	06:48	17:06 (Oerzen 2)	06:34	18:58 (Oerzen 1)	05:30	04:53
	16:23	17:19	18:13	33 17:39 (Oerzen 3)	20:09	31 19:29 (Oerzen 1)	21:02	21:44
11	08:30	07:47	06:46	17:04 (Oerzen 2)	06:32	18:58 (Oerzen 1)	05:28	04:53
	16:24	17:21	18:15	35 17:39 (Oerzen 3)	20:11	32 19:30 (Oerzen 1)	21:04	21:45
12	08:29	07:45	06:43	17:04 (Oerzen 2)	06:29	18:57 (Oerzen 1)	05:27	04:52
	16:26	17:23	18:16	34 17:38 (Oerzen 3)	20:13	33 19:30 (Oerzen 1)	21:06	21:46
13	08:28	07:43	06:41	17:02 (Oerzen 2)	06:27	18:56 (Oerzen 1)	05:25	04:52
	16:27	17:25	18:18	35 17:37 (Oerzen 3)	20:14	42 19:47 (Rep 11)	21:07	21:46
14	08:28	07:41	06:38	17:02 (Oerzen 2)	06:25	18:56 (Oerzen 1)	05:23	04:52
	16:29	17:27	18:20	35 17:37 (Oerzen 3)	20:16	46 19:48 (Rep 11)	21:09	21:47
15	08:27	07:39	06:36	17:01 (Oerzen 2)	06:22	18:57 (Oerzen 1)	05:22	04:52
	16:31	17:29	18:22	35 17:36 (Oerzen 2)	20:18	48 19:50 (Rep 11)	21:11	21:48
16	08:26	07:37	06:34	17:01 (Oerzen 2)	06:20	18:57 (Oerzen 1)	05:20	04:51
	16:32	17:31	18:24	35 17:36 (Oerzen 2)	20:20	51 19:52 (Rep 11)	21:12	21:48
17	08:25	07:35	06:31	17:02 (Oerzen 2)	06:18	18:57 (Oerzen 1)	05:18	04:51
	16:34	17:33	18:26	34 17:36 (Oerzen 2)	20:21	52 19:53 (Rep 11)	21:14	21:49
18	08:24	07:33	06:29	17:01 (Oerzen 2)	06:15	18:57 (Oerzen 1)	05:17	04:51
	16:36	17:35	18:27	34 17:35 (Oerzen 2)	20:23	53 19:53 (Rep 11)	21:15	21:49
19	08:23	07:31	06:26	17:02 (Oerzen 2)	06:13	18:58 (Oerzen 1)	05:15	04:51
	16:37	17:37	18:29	33 17:35 (Oerzen 2)	20:25	51 19:53 (Rep 11)	21:17	21:49
20	08:22	07:29	06:24	17:02 (Oerzen 2)	06:11	18:58 (Oerzen 1)	05:14	04:51
	16:39	17:38	18:31	31 17:33 (Oerzen 2)	20:27	50 19:53 (Rep 11)	21:18	21:50
21	08:20	07:26	06:22	17:03 (Oerzen 2)	06:09	18:59 (Oerzen 1)	05:12	04:52
	16:41	17:40	18:33	30 17:33 (Oerzen 2)	20:29	48 19:53 (Rep 11)	21:20	21:50
22	08:19	07:24	06:19	17:04 (Oerzen 2)	06:07	19:01 (Oerzen 1)	05:11	04:52
	16:43	17:42	18:35	28 17:32 (Oerzen 2)	20:30	44 19:53 (Rep 11)	21:22	21:50
23	08:18	07:22	06:17	17:05 (Oerzen 2)	06:04	19:03 (Oerzen 1)	05:10	04:52
	16:44	17:44	18:36	32 18:10 (Rep 10)	20:32	39 19:52 (Rep 11)	21:23	21:50
24	08:17	07:20	06:14	17:07 (Oerzen 2)	06:02	19:05 (Oerzen 1)	05:08	04:52
	16:46	17:46	18:38	33 18:12 (Rep 10)	20:34	35 19:52 (Rep 11)	21:24	21:51
25	08:15	07:18	06:12	17:08 (Oerzen 2)	06:00	19:31 (Rep 11)	05:07	04:53
	16:48	17:48	18:40	33 18:14 (Rep 10)	20:36	20 19:51 (Rep 11)	21:26	21:51
26	08:14	07:16	06:10	17:13 (Oerzen 2)	05:58	19:32 (Rep 11)	05:06	04:53
	16:50	17:50	18:42	27 18:16 (Rep 10)	20:38	18 19:50 (Rep 11)	21:27	21:51
27	08:13	07:13	06:07	17:55 (Rep 10)	05:56	19:33 (Rep 11)	05:05	04:53
	16:52	17:52	18:44	21 18:16 (Rep 10)	20:39	15 19:48 (Rep 11)	21:29	21:50
28	08:11	07:11	06:05	17:54 (Rep 10)	05:54	19:35 (Rep 11)	05:04	04:54
	16:54	17:54	18:45	23 18:17 (Rep 10)	20:41	11 19:46 (Rep 11)	21:30	21:50
29	08:10		07:02	18:54 (Rep 10)	05:52	19:39 (Rep 11)	05:02	04:55
	16:56		19:47	23 19:17 (Rep 10)	20:43	3 19:42 (Rep 11)	21:31	21:50
30	08:08		07:00	18:53 (Rep 10)	05:50		05:01	04:55
	16:58		19:49	23 19:16 (Rep 10)	20:45		21:33	21:50
31	08:06		06:58	18:54 (Rep 10)			05:00	
	16:59		19:51	22 19:16 (Rep 10)			21:34	
Sonnenscheinstunden	253	275	367		419		491	506
astr.max.mögl.Beschattung			825		958			

**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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s11 - Oerzen, Westerheide 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

Juli		August		September		Oktober		November		Dezember	
1	04:56 21:50	05:34 21:16		06:27 20:11	18:57 (Oerzen 1) 19:29 (Oerzen 1)	07:19 18:58	35	17:42 (Oerzen 2) 18:17 (Oerzen 3)	07:16 16:49	08:09 16:06	
2	04:57 21:49	05:36 21:14		06:29 20:08	18:57 (Oerzen 1) 19:28 (Oerzen 1)	07:21 18:56	34	17:43 (Oerzen 2) 18:17 (Oerzen 3)	07:18 16:47	08:11 16:06	
3	04:57 21:49	05:38 21:12		06:31 20:06	18:57 (Oerzen 1) 19:27 (Oerzen 1)	07:23 18:54	34	17:43 (Oerzen 2) 18:17 (Oerzen 3)	07:20 16:45	08:12 16:05	
4	04:58 21:48	05:39 21:10		06:32 20:04	18:57 (Oerzen 1) 19:26 (Oerzen 1)	07:24 18:51	33	17:43 (Oerzen 2) 18:16 (Oerzen 3)	07:21 16:43	08:14 16:04	
5	04:59 21:48	05:41 21:08		06:34 20:01	18:58 (Oerzen 1) 19:25 (Oerzen 1)	07:26 18:49	32	17:44 (Oerzen 2) 18:16 (Oerzen 3)	07:23 16:42	08:15 16:04	
6	05:00 21:47	05:43 21:07		06:36 19:59	18:58 (Oerzen 1) 19:23 (Oerzen 1)	07:28 18:46	30	17:45 (Oerzen 2) 18:15 (Oerzen 3)	07:25 16:40	08:16 16:03	
7	05:01 21:47	05:44 21:05		06:38 19:56	18:53 (Rep 10) 19:22 (Oerzen 1)	07:30 18:44	27	17:47 (Oerzen 2) 18:14 (Oerzen 3)	07:27 16:38	08:18 16:03	
8	05:02 21:46	05:46 21:03		06:39 19:54	18:51 (Rep 10) 19:20 (Oerzen 1)	07:31 18:42	24	17:49 (Oerzen 2) 18:13 (Oerzen 3)	07:29 16:36	08:19 16:02	
9	05:03 21:45	05:48 21:01		06:41 19:52	18:48 (Rep 10) 19:16 (Oerzen 1)	07:33 18:39	19	17:52 (Oerzen 2) 18:11 (Oerzen 3)	07:31 16:34	08:20 16:02	
10	05:04 21:44	05:49 20:59		06:43 19:49	18:47 (Rep 10) 19:07 (Rep 10)	07:35 18:37	9	17:58 (Oerzen 3) 18:07 (Oerzen 3)	07:33 16:33	08:21 16:02	
11	05:05 21:44	05:51 20:57		06:44 19:47	18:46 (Rep 10) 19:08 (Rep 10)	07:37 18:35			07:35 16:31	08:23 16:01	
12	05:06 21:43	05:53 20:55		06:46 19:44	18:45 (Rep 10) 19:07 (Rep 10)	07:39 18:32			07:36 16:29	08:24 16:01	
13	05:07 21:42	05:55 20:53		06:48 19:42	18:45 (Rep 10) 19:07 (Rep 10)	07:40 18:30			07:38 16:28	08:25 16:01	
14	05:08 21:41	05:56 20:51		06:50 19:41	18:45 (Rep 10) 19:07 (Rep 10)	07:42 18:28			07:40 16:26	08:26 16:01	
15	05:10 21:40	05:58 20:49	6	19:45 (Rep 11) 19:51 (Rep 11)	18:44 (Rep 10) 19:06 (Rep 10)	07:44 18:25			07:42 16:25	08:27 16:01	
16	05:11 21:39	06:00 20:46	12	19:53 (Rep 11) 19:39 (Rep 11)	18:44 (Rep 10) 19:06 (Rep 10)	07:46 18:23			07:44 16:23	08:28 16:01	
17	05:12 21:38	06:01 20:44	16	19:55 (Rep 11) 19:38 (Rep 11)	18:44 (Rep 10) 19:05 (Rep 10)	07:48 18:21			07:46 16:22	08:28 16:02	
18	05:14 21:36	06:03 20:42	18	19:56 (Rep 11) 19:15 (Oerzen 1)	18:46 (Rep 10) 17:56 (Oerzen 2)	07:50 18:19			07:48 16:20	08:29 16:02	
19	05:15 21:35	06:05 20:40	24	19:57 (Rep 11) 19:10 (Oerzen 1)	19:02 (Rep 10) 17:54 (Oerzen 2)	07:51 18:16			07:49 16:19	08:30 16:02	
20	05:16 21:34	06:07 20:38	35	19:57 (Rep 11) 19:08 (Oerzen 1)	18:59 (Rep 10) 17:52 (Oerzen 2)	07:53 18:14			07:51 16:18	08:30 16:02	
21	05:18 21:33	06:08 20:36	40	19:58 (Rep 11) 19:05 (Oerzen 1)	18:57 (Rep 10) 17:50 (Oerzen 2)	07:55 18:12			07:53 16:16	08:31 16:03	
22	05:19 21:31	06:10 20:33	45	19:57 (Rep 11) 19:04 (Oerzen 1)	18:55 (Rep 10) 17:48 (Oerzen 2)	07:57 18:10			07:55 16:15	08:32 16:03	
23	05:21 21:30	06:12 20:31	49	19:58 (Rep 11) 19:02 (Oerzen 1)	18:17 (Oerzen 2) 17:47 (Oerzen 2)	18:10 07:59			07:56 16:14	08:32 16:04	
24	05:22 21:28	06:13 20:29	51	19:57 (Rep 11) 19:01 (Oerzen 1)	18:18 (Oerzen 2) 17:46 (Oerzen 2)	18:08 08:01			07:58 16:13	08:33 16:04	
25	05:24 21:27	06:15 20:27	52	19:57 (Rep 11) 19:00 (Oerzen 1)	18:18 (Oerzen 2) 17:44 (Oerzen 2)	18:06 07:03			16:13 08:00	16:04 08:33	
26	05:25 21:25	06:17 20:24	53	19:57 (Rep 11) 19:55 (Rep 11)	18:18 (Oerzen 2) 18:18 (Oerzen 2)	17:03 17:01			16:12 16:11	16:05 16:06	
27	05:27 21:24	06:19 20:22	52	18:59 (Oerzen 1) 19:55 (Rep 11)	17:44 (Oerzen 2) 17:43 (Oerzen 2)	07:04 07:06			08:01 16:10	08:33 16:06	
28	05:28 21:22	06:20 20:20	51	18:59 (Oerzen 1) 19:54 (Rep 11)	18:18 (Oerzen 2) 17:43 (Oerzen 2)	07:06 07:08			08:03 16:09	08:34 16:07	
29	05:30 21:21	06:22 20:18	49	18:58 (Oerzen 1) 19:52 (Rep 11)	18:18 (Oerzen 2) 17:42 (Oerzen 2)	16:57 07:10			08:05 16:08	08:34 16:08	
30	05:31 21:19	06:24 20:15	46	18:57 (Oerzen 1) 19:49 (Rep 11)	18:18 (Oerzen 2) 17:42 (Oerzen 2)	16:55 07:12			16:09 16:07	08:34 16:09	
31	05:33 21:17	06:25 20:13	41	18:57 (Oerzen 1) 19:47 (Rep 11)	18:17 (Oerzen 3) 18:17 (Oerzen 3)	16:53 07:14			16:08 16:07	08:34 16:10	
Sonnenscheinstunden		509	458	382	865	329	277	261	237		
astr.max.mögl.Beschattung			673								

**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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s12 - Oerzen, Westerheide 4

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlungsrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

		Januar	Februar	März			April			Mai	Juni
	1	08:34	08:05	07:09			06:55		18:54 (Rep 10)	05:48	04:59
		16:11	17:01	17:56			19:53	19	19:13 (Rep 10)	20:47	21:35
	2	08:34	08:03	07:06			06:53		18:55 (Rep 10)	05:45	04:59
		16:12	17:03	17:58			19:54	27	19:22 (Oerzen 1)	20:48	21:36
	3	08:34	08:01	07:04			06:50		18:56 (Rep 10)	05:44	04:58
		16:14	17:05	18:00			19:56	29	19:25 (Oerzen 1)	20:50	21:37
	4	08:33	08:00	07:02		17:24 (Oerzen 3)	06:48		18:58 (Rep 10)	05:42	04:57
		16:15	17:07	18:01	11	17:35 (Oerzen 3)	19:58	27	19:25 (Oerzen 1)	20:52	21:38
	5	08:33	07:58	07:00		17:18 (Oerzen 2)	06:46		19:02 (Oerzen 1)	05:40	04:56
		16:16	17:09	18:03	19	17:37 (Oerzen 3)	20:00	25	19:27 (Oerzen 1)	20:54	21:40
	6	08:33	07:56	06:57		17:14 (Oerzen 2)	06:43		19:01 (Oerzen 1)	05:38	04:55
		16:17	17:11	18:05	24	17:38 (Oerzen 3)	20:02	27	19:28 (Oerzen 1)	20:55	21:41
	7	08:32	07:54	06:55		17:12 (Oerzen 2)	06:41		19:00 (Oerzen 1)	05:36	04:55
		16:19	17:13	18:07	27	17:39 (Oerzen 3)	20:03	28	19:28 (Oerzen 1)	20:57	21:42
	8	08:32	07:53	06:53		17:10 (Oerzen 2)	06:39		18:59 (Oerzen 1)	05:34	04:54
		16:20	17:15	18:09	29	17:39 (Oerzen 3)	20:05	30	19:29 (Oerzen 1)	20:59	21:42
	9	08:31	07:51	06:50		17:09 (Oerzen 2)	06:36		18:59 (Oerzen 1)	05:32	04:54
		16:21	17:17	18:11	31	17:40 (Oerzen 3)	20:07	30	19:29 (Oerzen 1)	21:01	21:43
	10	08:31	07:49	06:48		17:08 (Oerzen 2)	06:34		18:57 (Oerzen 1)	05:30	04:53
		16:23	17:19	18:13	32	17:40 (Oerzen 3)	20:09	31	19:28 (Oerzen 1)	21:02	21:44
	11	08:30	07:47	06:46		17:07 (Oerzen 2)	06:32		18:57 (Oerzen 1)	05:28	04:53
		16:24	17:21	18:14	32	17:39 (Oerzen 3)	20:11	31	19:28 (Oerzen 1)	21:04	21:45
	12	08:29	07:45	06:43		17:06 (Oerzen 2)	06:29		18:57 (Oerzen 1)	05:27	04:52
		16:26	17:23	18:16	33	17:39 (Oerzen 3)	20:13	40	19:46 (Rep 11)	21:06	21:46
	13	08:28	07:43	06:41		17:05 (Oerzen 2)	06:27		18:56 (Oerzen 1)	05:25	04:52
		16:27	17:25	18:18	33	17:38 (Oerzen 3)	20:14	45	19:47 (Rep 11)	21:07	21:46
	14	08:28	07:41	06:38		17:05 (Oerzen 2)	06:25		18:57 (Oerzen 1)	05:23	04:52
		16:29	17:27	18:20	33	17:38 (Oerzen 2)	20:16	46	19:48 (Rep 11)	21:09	21:47
	15	08:27	07:39	06:36		17:04 (Oerzen 2)	06:22		18:57 (Oerzen 1)	05:22	04:52
		16:31	17:29	18:22	33	17:37 (Oerzen 2)	20:18	49	19:50 (Rep 11)	21:11	21:48
	16	08:26	07:37	06:34		17:04 (Oerzen 2)	06:20		18:58 (Oerzen 1)	05:20	04:51
		16:32	17:31	18:24	33	17:37 (Oerzen 2)	20:20	50	19:52 (Rep 11)	21:12	21:48
	17	08:25	07:35	06:31		17:05 (Oerzen 2)	06:18		18:58 (Oerzen 1)	05:18	04:51
		16:34	17:33	18:26	32	17:37 (Oerzen 2)	20:21	49	19:52 (Rep 11)	21:14	21:49
	18	08:24	07:33	06:29		17:04 (Oerzen 2)	06:15		18:58 (Oerzen 1)	05:17	04:51
		16:36	17:35	18:27	32	17:36 (Oerzen 2)	20:23	47	19:51 (Rep 11)	21:15	21:49
	19	08:23	07:31	06:26		17:05 (Oerzen 2)	06:13		18:59 (Oerzen 1)	05:15	04:51
		16:37	17:37	18:29	31	17:36 (Oerzen 2)	20:25	45	19:51 (Rep 11)	21:17	21:49
	20	08:22	07:29	06:24		17:05 (Oerzen 2)	06:11		19:01 (Oerzen 1)	05:14	04:51
		16:39	17:38	18:31	29	17:34 (Oerzen 2)	20:27	41	19:51 (Rep 11)	21:18	21:50
	21	08:20	07:26	06:22		17:06 (Oerzen 2)	06:09		19:03 (Oerzen 1)	05:12	04:52
		16:41	17:40	18:33	27	17:33 (Oerzen 2)	20:29	37	19:51 (Rep 11)	21:20	21:50
	22	08:19	07:24	06:19		17:08 (Oerzen 2)	06:07		19:06 (Oerzen 1)	05:11	04:52
		16:43	17:42	18:35	28	18:09 (Rep 10)	20:30	30	19:50 (Rep 11)	21:22	21:50
	23	08:18	07:22	06:17		17:09 (Oerzen 2)	06:04		19:30 (Rep 11)	05:10	04:52
		16:44	17:44	18:36	30	18:10 (Rep 10)	20:32	19	19:49 (Rep 11)	21:23	21:50
	24	08:17	07:20	06:14		17:11 (Oerzen 2)	06:02		19:31 (Rep 11)	05:08	04:52
		16:46	17:46	18:38	29	18:12 (Rep 10)	20:34	17	19:48 (Rep 11)	21:24	21:51
	25	08:15	07:18	06:12		17:14 (Oerzen 2)	06:00		19:32 (Rep 11)	05:07	04:53
		16:48	17:48	18:40	25	18:14 (Rep 10)	20:36	15	19:47 (Rep 11)	21:26	21:51
	26	08:14	07:16	06:10		17:56 (Rep 10)	05:58		19:34 (Rep 11)	05:06	04:53
		16:50	17:50	18:42	20	18:16 (Rep 10)	20:38	11	19:45 (Rep 11)	21:27	21:51
	27	08:13	07:13	06:07		17:54 (Rep 10)	05:56		19:37 (Rep 11)	05:05	04:53
		16:52	17:52	18:44	22	18:16 (Rep 10)	20:39	4	19:41 (Rep 11)	21:29	21:50
	28	08:11	07:11	06:05		17:54 (Rep 10)	05:54			05:04	04:54
		16:54	17:54	18:45	22	18:16 (Rep 10)	20:41			21:30	21:50
	29	08:10		07:02		18:54 (Rep 10)	05:52			05:02	04:55
		16:56		19:47	22	19:16 (Rep 10)	20:43			21:31	21:50
	30	08:08		07:00		18:54 (Rep 10)	05:50			05:01	04:55
		16:58		19:49	21	19:15 (Rep 10)	20:45			21:33	21:50
	31	08:06		06:58		18:54 (Rep 10)				05:00	
		16:59		19:51	21	19:15 (Rep 10)				21:34	
Sonnenscheinstunden		253	275	367			419			491	506
astr.max.mögl.Beschattung				761			849				

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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s12 - Oerzen, Westerheide 4

### Annahmen für Schattenwurfberechnung

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

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

Juli		August		September		Oktober		November		Dezember	
1	04:56 21:50	05:34 21:16		06:27 20:11	18:56 (Oerzen 1) 31 19:27 (Oerzen 1)	07:19 18:58	33 18:18 (Oerzen 3)	07:16 16:49	08:09 16:06		
2	04:57 21:49	05:36 21:14		06:29 20:08	18:56 (Oerzen 1) 31 19:27 (Oerzen 1)	07:21 18:56	33 18:18 (Oerzen 3)	07:18 16:47	08:11 16:06		
3	04:57 21:49	05:38 21:12		06:31 20:06	18:56 (Oerzen 1) 30 19:26 (Oerzen 1)	07:23 18:54	32 18:18 (Oerzen 3)	07:20 16:45	08:12 16:05		
4	04:58 21:48	05:39 21:10		06:32 20:04	18:56 (Oerzen 1) 30 19:26 (Oerzen 1)	07:24 18:51	32 18:17 (Oerzen 3)	07:21 16:43	08:14 16:04		
5	04:59 21:48	05:41 21:08		06:34 20:01	18:57 (Oerzen 1) 28 19:25 (Oerzen 1)	07:26 18:49	30 18:16 (Oerzen 3)	07:23 16:42	08:15 16:04		
6	05:00 21:47	05:43 21:07		06:36 19:59	18:56 (Oerzen 1) 27 19:23 (Oerzen 1)	07:28 18:46	29 18:16 (Oerzen 3)	07:25 16:40	08:16 16:03		
7	05:01 21:47	05:44 21:05		06:38 19:56	18:57 (Oerzen 1) 25 19:22 (Oerzen 1)	07:30 18:44	26 18:15 (Oerzen 3)	07:27 16:38	08:18 16:03		
8	05:02 21:46	05:46 21:03		06:39 19:54	18:53 (Rep 10) 28 19:21 (Oerzen 1)	07:31 18:42	22 18:13 (Oerzen 3)	07:29 16:36	08:19 16:02		
9	05:03 21:45	05:48 21:01		06:41 19:52	18:50 (Rep 10) 28 19:18 (Oerzen 1)	07:33 18:39	16 17:55 (Oerzen 2)	07:31 16:34	08:20 16:02		
10	05:04 21:44	05:49 20:59		06:43 19:49	18:48 (Rep 10) 27 19:15 (Oerzen 1)	07:35 18:37	9 18:08 (Oerzen 3)	07:33 16:33	08:21 16:02		
11	05:05 21:44	05:51 20:57		06:44 19:47	18:47 (Rep 10) 20 19:07 (Rep 10)	07:37 18:35		07:35 16:31	08:23 16:01		
12	05:06 21:43	05:53 20:55		06:46 19:44	18:45 (Rep 10) 21 19:06 (Rep 10)	07:39 18:32		07:36 16:29	08:24 16:01		
13	05:07 21:42	05:55 20:53		06:48 19:42	18:45 (Rep 10) 22 19:07 (Rep 10)	07:40 18:30		07:38 16:28	08:25 16:01		
14	05:08 21:41	05:56 20:51		06:50 19:39	18:45 (Rep 10) 22 19:07 (Rep 10)	07:42 18:28		07:40 16:26	08:26 16:01		
15	05:10 21:40	05:58 20:49		06:51 19:37	18:44 (Rep 10) 22 19:06 (Rep 10)	07:44 18:25		07:42 16:25	08:27 16:01		
16	05:11 21:39	06:00 20:46	19:42 (Rep 11)	06:53 19:35	18:44 (Rep 10) 21 19:05 (Rep 10)	07:46 18:23		07:44 16:23	08:28 16:01		
17	05:12 21:38	06:01 20:44	7 19:40 (Rep 11)	06:55 19:32	18:44 (Rep 10) 21 19:05 (Rep 10)	07:48 18:21		07:46 16:22	08:28 16:02		
18	05:14 21:36	06:03 20:42	12 19:52 (Rep 11)	06:56 19:30	18:03 (Oerzen 2) 23 19:02 (Rep 10)	07:50 18:19		07:48 16:20	08:29 16:02		
19	05:15 21:35	06:05 20:40	16 19:53 (Rep 11)	06:58 19:27	17:58 (Oerzen 2) 29 18:59 (Rep 10)	07:51 18:16		07:49 16:19	08:30 16:02		
20	05:16 21:34	06:07 20:38	18 19:54 (Rep 11)	07:00 19:25	17:56 (Oerzen 2) 30 18:57 (Rep 10)	07:53 18:14		07:51 16:18	08:30 16:02		
21	05:18 21:33	06:08 20:36	20 19:55 (Rep 11)	07:02 19:22	17:54 (Oerzen 2) 29 18:55 (Rep 10)	07:55 18:12		07:53 16:16	08:31 16:03		
22	05:19 21:31	06:10 20:33	31 19:55 (Rep 11)	07:03 19:20	17:51 (Oerzen 2) 26 18:17 (Oerzen 2)	07:57 18:10		07:55 16:15	08:32 16:03		
23	05:21 21:30	06:12 20:31	38 19:55 (Rep 11)	07:05 19:18	17:50 (Oerzen 2) 28 18:18 (Oerzen 2)	07:59 18:08		07:56 16:14	08:32 16:04		
24	05:22 21:28	06:13 20:29	43 19:55 (Rep 11)	07:07 19:15	17:49 (Oerzen 2) 30 18:19 (Oerzen 2)	08:01 18:06		07:58 16:13	08:33 16:04		
25	05:24 21:27	06:15 20:27	46 19:55 (Rep 11)	07:09 19:13	17:47 (Oerzen 2) 32 18:19 (Oerzen 2)	07:03 17:03		08:00 16:12	08:33 16:05		
26	05:25 21:25	06:17 20:24	48 19:55 (Rep 11)	07:10 19:10	17:47 (Oerzen 2) 32 18:19 (Oerzen 2)	07:04 17:01		08:01 16:11	08:33 16:06		
27	05:27 21:24	06:19 20:22	49 19:54 (Rep 11)	07:12 19:08	17:46 (Oerzen 2) 33 18:19 (Oerzen 2)	07:06 16:59		08:03 16:10	08:34 16:06		
28	05:28 21:22	06:20 20:20	50 19:53 (Rep 11)	07:14 19:06	17:46 (Oerzen 2) 33 18:19 (Oerzen 2)	07:08 16:57		08:05 16:09	08:34 16:07		
29	05:30 21:21	06:22 20:18	49 19:52 (Rep 11)	07:16 19:03	18:57 (Oerzen 1) 33 18:18 (Oerzen 2)	07:10 16:55		08:06 16:08	08:34 16:08		
30	05:31 21:19	06:24 20:15	47 19:49 (Rep 11)	07:17 19:01	18:57 (Oerzen 1) 33 18:18 (Oerzen 2)	07:12 16:53		08:08 16:07	08:34 16:09		
31	05:33 21:17	06:25 20:13	44 19:47 (Rep 11)		18:57 (Oerzen 1) 39 19:45 (Rep 11)	07:14 16:51			08:34 16:10		
Sonnenscheinstunden		509	458	382	825	329	262	261	237		
astr.max.mögl.Beschattung			557								

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s13 - Oerzen, Westerheide 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	08:34 16:11	08:05 17:01	07:09 17:56	16:47 (Oerzen 2) 17:26 (Oerzen 3)	06:55 19:53	18:40 (Oerzen 1) 19:11 (Oerzen 1)
2	08:34 16:12	08:03 17:03	07:06 17:58	16:47 (Oerzen 2) 17:26 (Oerzen 3)	06:53 19:54	18:40 (Oerzen 1) 19:12 (Oerzen 1)
3	08:34 16:14	08:01 17:05	07:04 18:00	16:46 (Oerzen 2) 17:26 (Oerzen 3)	06:50 19:56	18:40 (Oerzen 1) 19:12 (Oerzen 1)
4	08:33 16:15	08:00 17:07	07:02 18:01	16:45 (Oerzen 2) 17:26 (Oerzen 3)	06:48 19:58	18:39 (Oerzen 1) 19:11 (Oerzen 1)
5	08:33 16:16	07:58 17:09	07:00 18:03	16:45 (Oerzen 2) 17:26 (Oerzen 3)	06:46 20:00	18:39 (Oerzen 1) 19:11 (Oerzen 1)
6	08:33 16:17	07:56 17:11	06:57 18:05	16:45 (Oerzen 2) 17:25 (Oerzen 3)	06:43 20:02	18:39 (Oerzen 1) 19:35 (Rep 11)
7	08:32 16:19	07:54 17:13	06:55 18:07	16:45 (Oerzen 2) 17:25 (Oerzen 3)	06:41 20:04	18:39 (Oerzen 1) 19:36 (Rep 11)
8	08:32 16:20	07:53 17:15	06:53 18:09	16:44 (Oerzen 2) 17:23 (Oerzen 3)	06:39 20:05	18:40 (Oerzen 1) 19:38 (Rep 11)
9	08:31 16:21	07:51 17:17	06:50 18:11	16:45 (Oerzen 2) 17:22 (Oerzen 3)	06:36 20:07	18:40 (Oerzen 1) 19:40 (Rep 11)
10	08:31 16:23	07:49 17:19	06:48 18:13	16:46 (Oerzen 2) 17:21 (Oerzen 3)	06:34 20:09	18:41 (Oerzen 1) 19:39 (Rep 11)
11	08:30 16:24	07:47 17:21	06:46 18:14	16:46 (Oerzen 2) 17:17 (Oerzen 3)	06:32 20:11	18:42 (Oerzen 1) 19:40 (Rep 11)
12	08:29 16:26	07:45 17:23	06:43 18:16	16:47 (Oerzen 2) 17:14 (Oerzen 2)	06:29 20:13	18:44 (Oerzen 1) 19:40 (Rep 11)
13	08:28 16:27	07:43 17:25	06:41 18:18	16:47 (Oerzen 2) 17:12 (Oerzen 2)	06:27 20:14	18:46 (Oerzen 1) 19:39 (Rep 11)
14	08:28 16:29	07:41 17:27	06:38 18:20	16:49 (Oerzen 2) 17:11 (Oerzen 2)	06:25 20:16	19:16 (Rep 11) 19:39 (Rep 11)
15	08:27 16:31	07:39 17:29	06:36 18:22	16:51 (Oerzen 2) 17:08 (Oerzen 2)	06:22 20:18	19:16 (Rep 11) 19:39 (Rep 11)
16	08:26 16:32	07:37 17:31	06:34 18:24	16:54 (Oerzen 2) 17:57 (Rep 10)	06:20 20:20	19:17 (Rep 11) 19:38 (Rep 11)
17	08:25 16:34	07:35 17:33	06:31 18:26	17:49 (Rep 10) 18:00 (Rep 10)	06:18 20:21	19:17 (Rep 11) 19:38 (Rep 11)
18	08:24 16:36	07:33 17:35	06:29 18:27	17:46 (Rep 10) 18:01 (Rep 10)	06:15 20:23	19:17 (Rep 11) 19:36 (Rep 11)
19	08:23 16:37	07:31 17:37	06:26 18:29	17:45 (Rep 10) 18:03 (Rep 10)	06:13 20:25	19:18 (Rep 11) 19:34 (Rep 11)
20	08:22 16:39	07:29 17:38	06:24 18:31	17:43 (Rep 10) 18:04 (Rep 10)	06:11 20:27	19:20 (Rep 11) 19:32 (Rep 11)
21	08:20 16:41	07:26 17:40	06:22 18:33	17:43 (Rep 10) 18:04 (Rep 10)	06:09 20:29	19:24 (Rep 11) 19:29 (Rep 11)
22	08:19 16:43	07:24 17:42	06:19 18:35	17:42 (Rep 10) 18:05 (Rep 10)	06:07 20:30	05:11 21:22
23	08:18 16:44	07:22 17:44	06:17 17:01 (Oerzen 2)	17:41 (Rep 10) 18:04 (Rep 10)	06:04 20:32	05:10 21:23
24	08:17 16:46	07:20 17:46	06:14 16:55 (Oerzen 2)	17:42 (Rep 10) 18:04 (Rep 10)	06:02 20:34	05:08 21:24
25	08:15 16:48	07:18 17:48	06:12 16:53 (Oerzen 2)	17:41 (Rep 10) 18:05 (Oerzen 1)	06:00 20:36	05:07 21:26
26	08:14 16:50	07:16 17:50	06:10 16:51 (Oerzen 2)	17:42 (Rep 10) 18:08 (Oerzen 1)	05:58 20:38	05:06 21:27
27	08:13 16:52	07:13 17:52	06:07 16:50 (Oerzen 2)	17:42 (Rep 10) 18:09 (Oerzen 1)	05:56 20:39	05:05 21:29
28	08:11 16:54	07:11 17:54	06:05 16:48 (Oerzen 2)	17:43 (Rep 10) 18:10 (Oerzen 1)	05:54 20:41	05:04 21:30
29	08:10 16:56		07:02 19:47	18:43 (Oerzen 1) 19:11 (Oerzen 1)	05:52 20:43	05:02 21:31
30	08:08 16:58		07:00 19:49	18:42 (Oerzen 1) 19:11 (Oerzen 1)	05:50 20:45	05:01 21:33
31	08:06 16:59		06:58 19:51	18:41 (Oerzen 1) 19:12 (Oerzen 1)		05:00 21:34
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung		148	874	644		

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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s13 - Oerzen, Westerheide 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	04:56	05:34		06:27	18:41 (Oerzen 1)	07:19	17:26 (Oerzen 2)	07:16	08:09		
	21:50	21:16		20:11	45 19:39 (Rep 11)	18:58	27 17:53 (Oerzen 2)	16:49	16:06		
2	04:57	05:36		06:29	18:40 (Oerzen 1)	07:21	17:25 (Oerzen 2)	07:18	08:11		
	21:49	21:14		20:08	46 19:38 (Rep 11)	18:56	29 17:54 (Oerzen 3)	16:47	16:06		
3	04:57	05:38		06:31	18:38 (Oerzen 1)	07:23	17:24 (Oerzen 2)	07:20	08:12		
	21:49	21:12		20:06	47 19:37 (Rep 11)	18:54	34 17:58 (Oerzen 3)	16:45	16:05		
4	04:58	05:39		06:32	18:37 (Oerzen 1)	07:24	17:22 (Oerzen 2)	07:21	08:14		
	21:48	21:10		20:04	45 19:35 (Rep 11)	18:51	37 17:59 (Oerzen 3)	16:43	16:04		
5	04:59	05:41		06:34	18:36 (Oerzen 1)	07:26	17:21 (Oerzen 2)	07:23	08:15		
	21:48	21:08		20:01	45 19:34 (Rep 11)	18:49	39 18:00 (Oerzen 3)	16:42	16:04		
6	05:00	05:43		06:36	18:34 (Oerzen 1)	07:28	17:21 (Oerzen 2)	07:25	08:16		
	21:47	21:07		19:59	42 19:31 (Rep 11)	18:46	40 18:01 (Oerzen 3)	16:40	16:03		
7	05:01	05:44		06:38	18:34 (Oerzen 1)	07:30	17:21 (Oerzen 2)	07:27	08:18		
	21:47	21:05		19:56	32 19:06 (Oerzen 1)	18:44	40 18:01 (Oerzen 3)	16:38	16:03		
8	05:02	05:46		06:39	18:34 (Oerzen 1)	07:31	17:21 (Oerzen 2)	07:29	08:19		
	21:46	21:03		19:54	32 19:06 (Oerzen 1)	18:42	40 18:01 (Oerzen 3)	16:36	16:02		
9	05:03	05:48		06:41	18:33 (Oerzen 1)	07:33	17:20 (Oerzen 2)	07:31	08:20		
	21:45	21:01		19:52	32 19:05 (Oerzen 1)	18:39	41 18:01 (Oerzen 3)	16:34	16:02		
10	05:04	05:49		06:43	18:33 (Oerzen 1)	07:35	17:20 (Oerzen 2)	07:33	08:21		
	21:44	20:59		19:49	32 19:05 (Oerzen 1)	18:37	40 18:00 (Oerzen 3)	16:33	16:02		
11	05:05	05:51		06:44	18:33 (Oerzen 1)	07:37	17:20 (Oerzen 2)	07:35	08:23		
	21:44	20:57		19:47	32 19:05 (Oerzen 1)	18:35	40 18:00 (Oerzen 3)	16:31	16:01		
12	05:06	05:53		06:46	18:32 (Oerzen 1)	07:39	17:20 (Oerzen 2)	07:36	08:24		
	21:43	20:55		19:44	31 19:03 (Oerzen 1)	18:32	39 17:59 (Oerzen 3)	16:29	16:01		
13	05:07	05:55		06:48	18:33 (Oerzen 1)	07:40	17:21 (Oerzen 2)	07:38	08:25		
	21:42	20:53		19:42	29 19:02 (Oerzen 1)	18:30	37 17:58 (Oerzen 3)	16:28	16:01		
14	05:08	05:56		06:50	18:34 (Oerzen 1)	07:42	17:22 (Oerzen 2)	07:40	08:26		
	21:41	20:51		19:39	28 19:02 (Oerzen 1)	18:28	35 17:57 (Oerzen 3)	16:26	16:01		
15	05:10	05:58		06:51	18:33 (Rep 10)	07:44	17:23 (Oerzen 2)	07:42	08:27		
	21:40	20:49		19:37	27 19:00 (Oerzen 1)	18:25	33 17:56 (Oerzen 3)	16:25	16:01		
16	05:11	06:00		06:53	18:32 (Rep 10)	07:46	17:24 (Oerzen 2)	07:44	08:28		
	21:39	20:46		19:35	26 18:58 (Oerzen 1)	18:23	30 17:54 (Oerzen 3)	16:23	16:01		
17	05:12	06:01		06:55	18:30 (Rep 10)	07:48	17:26 (Oerzen 2)	07:46	08:28		
	21:38	20:44		19:32	27 18:57 (Oerzen 1)	18:21	19 17:48 (Oerzen 3)	16:22	16:01		
18	05:14	06:03		06:56	18:29 (Rep 10)	07:50	17:29 (Oerzen 2)	07:48	08:29		
	21:36	20:42		19:30	24 18:53 (Oerzen 1)	18:19	12 17:41 (Oerzen 2)	16:20	16:02		
19	05:15	06:05		06:58	18:28 (Rep 10)	07:51		07:49	08:30		
	21:35	20:40		19:27	22 18:50 (Rep 10)	18:16		16:19	16:02		
20	05:16	06:07		07:00	18:28 (Rep 10)	07:53		07:51	08:31		
	21:34	20:38		19:25	22 18:50 (Rep 10)	18:14		16:18	16:02		
21	05:18	06:08		07:02	18:28 (Rep 10)	07:55		07:53	08:31		
	21:33	20:36		19:22	22 18:50 (Rep 10)	18:12		16:16	16:03		
22	05:19	06:10		07:03	18:27 (Rep 10)	07:57		07:55	08:32		
	21:31	20:33	7	19:34 (Rep 11)	19:20	22 18:49 (Rep 10)		16:15	16:03		
23	05:21	06:12		19:24 (Rep 11)	07:05	18:27 (Rep 10)		07:56	08:32		
	21:30	20:31	12	19:36 (Rep 11)	19:18	21 18:48 (Rep 10)		16:14	16:04		
24	05:22	06:13		19:22 (Rep 11)	07:07	18:28 (Rep 10)		07:58	08:33		
	21:28	20:29	16	19:38 (Rep 11)	19:15	19 18:47 (Rep 10)		16:13	16:04		
25	05:24	06:15		19:21 (Rep 11)	07:09	18:28 (Rep 10)		08:00	08:33		
	21:27	20:27	19	19:40 (Rep 11)	19:13	16 18:44 (Rep 10)		16:12	16:05		
26	05:25	06:17		19:19 (Rep 11)	07:10	18:30 (Rep 10)		08:01	08:33		
	21:25	20:24	21	19:40 (Rep 11)	19:10	12 18:42 (Rep 10)		16:11	16:06		
27	05:27	06:19		19:18 (Rep 11)	07:12	17:38 (Oerzen 2)		08:03	08:34		
	21:24	20:22	22	19:40 (Rep 11)	19:08	14 18:40 (Rep 10)		16:10	16:06		
28	05:28	06:20		19:18 (Rep 11)	07:14	17:33 (Oerzen 2)		08:05	08:34		
	21:22	20:20	23	19:41 (Rep 11)	19:06	15 17:48 (Oerzen 2)		16:09	16:07		
29	05:30	06:22		18:51 (Oerzen 1)	07:16	17:30 (Oerzen 2)		08:06	08:34		
	21:21	20:18	27	19:40 (Rep 11)	19:03	20 17:50 (Oerzen 2)		16:08	16:08		
30	05:31	06:24		18:46 (Oerzen 1)	07:17	17:28 (Oerzen 2)		08:08	08:34		
	21:19	20:15	37	19:40 (Rep 11)	19:01	23 17:51 (Oerzen 2)		16:07	16:09		
31	05:33	06:25		18:44 (Oerzen 1)		07:14			08:34		
	21:17	20:13	41	19:40 (Rep 11)		16:51			16:10		
Sonnenscheinstunden		509		458		382		329		261	237
astr.max.mögl.Beschattung			225			850		612			

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

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



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s14 - Oerzen, Westerheide 12A

### 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	08:34 16:11	08:05 17:01		07:09 17:56	46	16:33 (Oerzen 2) 17:19 (Oerzen 3)	06:55 19:53	18:29 (Oerzen 1) 19:03 (Oerzen 1)	05:48 20:47	04:59 21:35	
2	08:34 16:12	08:03 17:03		07:06 17:58	45	16:34 (Oerzen 2) 17:19 (Oerzen 3)	06:53 19:54	18:30 (Oerzen 1) 19:03 (Oerzen 1)	05:45 20:48	04:59 21:36	
3	08:34 16:14	08:02 17:05		07:04 18:00	45	16:33 (Oerzen 2) 17:18 (Oerzen 3)	06:50 19:56	18:30 (Oerzen 1) 19:02 (Oerzen 1)	05:44 20:50	04:58 21:37	
4	08:33 16:15	08:00 17:07		07:02 18:01	45	16:33 (Oerzen 2) 17:18 (Oerzen 3)	06:48 19:58	18:30 (Oerzen 1) 19:31 (Rep 11)	05:42 20:52	04:57 21:39	
5	08:33 16:16	07:58 17:09		07:00 18:03	43	16:34 (Oerzen 2) 17:17 (Oerzen 3)	06:46 20:00	18:31 (Oerzen 1) 19:33 (Rep 11)	05:40 20:54	04:56 21:40	
6	08:33 16:17	07:56 17:11		06:57 18:05	41	16:34 (Oerzen 2) 17:15 (Oerzen 3)	06:43 20:02	18:32 (Oerzen 1) 19:34 (Rep 11)	05:38 20:55	04:55 21:41	
7	08:32 16:19	07:54 17:13		06:55 18:07	39	16:35 (Oerzen 2) 17:14 (Oerzen 3)	06:41 20:04	18:32 (Oerzen 1) 19:34 (Rep 11)	05:36 20:57	04:55 21:42	
8	08:32 16:20	07:53 17:15		06:53 18:09	35	16:35 (Oerzen 2) 17:10 (Oerzen 3)	06:39 20:05	18:34 (Oerzen 1) 19:35 (Rep 11)	05:34 20:59	04:54 21:42	
9	08:31 16:21	07:51 17:17		06:50 18:11	25	16:37 (Oerzen 2) 17:02 (Oerzen 2)	06:36 20:07	18:36 (Oerzen 1) 19:36 (Rep 11)	05:32 21:01	04:54 21:43	
10	08:31 16:23	07:49 17:19		06:48 18:13	21	16:39 (Oerzen 2) 17:00 (Oerzen 2)	06:34 20:09	18:37 (Oerzen 1) 19:35 (Rep 11)	05:30 21:02	04:53 21:44	
11	08:30 16:24	07:47 17:21		06:46 18:15	17	16:40 (Oerzen 2) 16:57 (Oerzen 2)	06:32 20:11	19:11 (Rep 11) 19:35 (Rep 11)	05:28 21:04	04:53 21:45	
12	08:29 16:26	07:45 17:23		06:43 18:16	9	16:44 (Oerzen 2) 16:53 (Oerzen 2)	06:29 20:13	19:11 (Rep 11) 19:35 (Rep 11)	05:27 21:06	04:52 21:46	
13	08:28 16:27	07:43 17:25		06:41 18:18			06:27 20:14	19:10 (Rep 11) 19:34 (Rep 11)	05:25 21:07	04:52 21:46	
14	08:28 16:29	07:41 17:27		06:38 18:20	11	17:43 (Rep 10) 17:54 (Rep 10)	06:25 20:16	19:11 (Rep 11) 19:33 (Rep 11)	05:23 21:09	04:52 21:47	
15	08:27 16:31	07:39 17:29		06:36 18:22	15	17:40 (Rep 10) 17:55 (Rep 10)	06:22 20:18	19:12 (Rep 11) 19:32 (Rep 11)	05:22 21:11	04:52 21:48	
16	08:26 16:32	07:37 17:31		06:34 18:24	18	17:39 (Rep 10) 17:57 (Rep 10)	06:20 20:20	19:12 (Rep 11) 19:31 (Rep 11)	05:20 21:12	04:51 21:48	
17	08:25 16:34	07:35 17:33		06:31 18:26	21	17:38 (Rep 10) 17:59 (Rep 10)	06:18 20:22	19:14 (Rep 11) 19:30 (Rep 11)	05:18 21:14	04:51 21:49	
18	08:24 16:36	07:33 17:35	6	06:29 16:49 (Oerzen 2)	21	17:37 (Rep 10) 17:58 (Rep 10)	06:15 20:23	19:15 (Rep 11) 19:27 (Rep 11)	05:17 21:15	04:51 21:49	
19	08:23 16:37	07:31 17:37	14	06:26 16:45 (Oerzen 2)	23	17:36 (Rep 10) 17:59 (Rep 10)	06:13 20:25	19:18 (Rep 11) 19:24 (Rep 11)	05:15 21:17	04:51 21:49	
20	08:22 16:39	07:29 17:38	20	06:24 17:01 (Oerzen 2)	23	17:35 (Rep 10) 17:58 (Rep 10)	06:11 20:27		05:14 21:19	04:51 21:50	
21	08:20 16:41	07:26 17:40	23	06:22 17:03 (Oerzen 2)	23	17:35 (Rep 10) 17:58 (Rep 10)	06:09 20:29		05:12 21:20	04:52 21:50	
22	08:19 16:43	07:24 17:42	35	06:19 17:13 (Oerzen 3)	24	17:36 (Rep 10) 18:00 (Oerzen 1)	06:07 20:30		05:11 21:22	04:52 21:50	
23	08:18 16:44	07:22 17:44	39	06:17 17:16 (Oerzen 3)	26	17:35 (Rep 10) 18:01 (Oerzen 1)	06:04 20:32		05:10 21:23	04:52 21:50	
24	08:17 16:46	07:20 17:46	40	06:14 17:16 (Oerzen 3)	26	17:36 (Rep 10) 18:02 (Oerzen 1)	06:02 20:34		05:08 21:24	04:52 21:51	
25	08:15 16:48	07:18 17:48	43	06:12 17:18 (Oerzen 3)	29	17:34 (Oerzen 1) 18:03 (Oerzen 1)	06:00 20:36		05:07 21:26	04:53 21:51	
26	08:14 16:50	07:16 17:50	44	06:10 17:19 (Oerzen 3)	30	17:34 (Oerzen 1) 18:04 (Oerzen 1)	05:58 20:38		05:06 21:27	04:53 21:51	
27	08:13 16:52	07:13 17:52	45	06:07 17:19 (Oerzen 3)	31	17:32 (Oerzen 1) 18:03 (Oerzen 1)	05:56 20:39		05:05 21:29	04:53 21:50	
28	08:11 16:54	07:11 17:54	46	06:05 17:19 (Oerzen 3)	32	17:32 (Oerzen 1) 18:04 (Oerzen 1)	05:54 20:41		05:04 21:30	04:54 21:50	
29	08:10 16:56			07:02 19:47	33	18:31 (Oerzen 1) 19:04 (Oerzen 1)	05:52 20:43		05:02 21:31	04:55 21:50	
30	08:08 16:58			07:00 19:49	34	18:30 (Oerzen 1) 19:04 (Oerzen 1)	05:50 20:45		05:01 21:33	04:55 21:50	
31	08:06 16:59			06:58 19:51	34	18:30 (Oerzen 1) 19:04 (Oerzen 1)			05:00 21:34		
Sonnenscheinstunden		253	275	367	865	419	569	491	506		
astr.max.mögl.Beschattung			355								

**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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s14 - Oerzen, Westerheide 12A

### 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	04:56 21:50	05:34 21:16			06:27 20:11	19:10 (Rep 11) 19:34 (Rep 11)	07:19 18:58		07:16 16:49	08:09 16:06	
2	04:57 21:49	05:36 21:14			06:29 20:08	18:36 (Oerzen 1) 19:34 (Rep 11)	07:21 18:56	17:20 (Oerzen 2)	07:18 16:47	08:11 16:06	
3	04:57 21:49	05:38 21:12			06:31 20:06	18:33 (Oerzen 1) 19:33 (Rep 11)	07:23 18:54	17:18 (Oerzen 2)	07:20 16:45	08:12 16:05	
4	04:58 21:48	05:39 21:10			06:32 20:04	18:31 (Oerzen 1) 19:32 (Rep 11)	07:24 18:51	17:14 (Oerzen 2)	07:21 16:43	08:14 16:04	
5	04:59 21:48	05:41 21:08			06:34 20:01	18:29 (Oerzen 1) 19:32 (Rep 11)	07:26 18:49	17:13 (Oerzen 2)	07:23 16:42	08:15 16:04	
6	05:00 21:47	05:43 21:07			06:36 19:59	18:27 (Oerzen 1) 19:30 (Rep 11)	07:28 18:46	17:11 (Oerzen 2)	07:25 16:40	08:16 16:03	
7	05:01 21:47	05:44 21:05			06:38 19:56	18:26 (Oerzen 1) 19:28 (Rep 11)	07:30 18:44	17:10 (Oerzen 2)	07:27 16:38	08:18 16:03	
8	05:02 21:46	05:46 21:03			06:39 19:54	18:25 (Oerzen 1) 19:26 (Rep 11)	07:31 18:42	17:09 (Oerzen 2)	07:29 16:36	08:19 16:02	
9	05:03 21:45	05:48 21:01			06:41 19:52	18:24 (Oerzen 1) 19:21 (Rep 11)	07:33 18:39	17:09 (Oerzen 2)	07:31 16:34	08:20 16:02	
10	05:04 21:44	05:49 20:59			06:43 19:49	18:23 (Oerzen 1) 18:56 (Oerzen 1)	07:35 18:37	17:07 (Oerzen 2)	07:33 16:33	08:21 16:02	
11	05:05 21:44	05:51 20:57			06:44 19:47	18:23 (Oerzen 1) 18:56 (Oerzen 1)	07:37 18:35	17:07 (Oerzen 2)	07:35 16:31	08:23 16:01	
12	05:06 21:43	05:53 20:55			06:46 19:44	18:22 (Oerzen 1) 18:55 (Oerzen 1)	07:39 18:32	17:07 (Oerzen 2)	07:36 16:29	08:24 16:01	
13	05:07 21:42	05:55 20:53			06:48 19:42	18:22 (Oerzen 1) 18:55 (Oerzen 1)	07:40 18:30	17:06 (Oerzen 2)	07:38 16:28	08:25 16:01	
14	05:08 21:41	05:56 20:51			06:50 19:40	18:22 (Oerzen 1) 18:55 (Oerzen 1)	07:42 18:28	17:07 (Oerzen 2)	07:40 16:26	08:26 16:01	
15	05:10 21:40	05:58 20:49			06:51 19:37	18:21 (Oerzen 1) 18:53 (Oerzen 1)	07:44 18:25	17:07 (Oerzen 2)	07:42 16:25	08:27 16:01	
16	05:11 21:39	06:00 20:46			06:53 19:35	18:21 (Oerzen 1) 18:53 (Oerzen 1)	07:46 18:23	17:07 (Oerzen 2)	07:44 16:23	08:28 16:01	
17	05:12 21:38	06:01 20:44			06:55 19:32	18:22 (Oerzen 1) 18:52 (Oerzen 1)	07:48 18:21	17:07 (Oerzen 2)	07:46 16:22	08:28 16:02	
18	05:14 21:36	06:03 20:42			06:56 19:30	18:22 (Oerzen 1) 18:50 (Oerzen 1)	07:50 18:19	17:08 (Oerzen 2)	07:48 16:20	08:29 16:02	
19	05:15 21:35	06:05 20:40			06:58 19:27	18:23 (Rep 10) 18:49 (Oerzen 1)	07:51 18:16	17:09 (Oerzen 2)	07:49 16:19	08:30 16:02	
20	05:16 21:34	06:07 20:38			07:00 19:25	18:22 (Rep 10) 18:48 (Oerzen 1)	07:53 18:14	17:10 (Oerzen 2)	07:51 16:18	08:31 16:02	
21	05:18 21:33	06:08 20:36			07:02 19:22	18:21 (Rep 10) 18:46 (Oerzen 1)	07:55 18:12	17:10 (Oerzen 2)	07:53 16:16	08:31 16:03	
22	05:19 21:31	06:10 20:33			07:03 19:20	18:20 (Rep 10) 18:43 (Rep 10)	07:57 18:10	17:12 (Oerzen 2)	07:55 16:15	08:32 16:03	
23	05:21 21:30	06:12 20:31			07:05 19:18	18:20 (Rep 10) 18:43 (Rep 10)	07:59 18:08	17:15 (Oerzen 2)	07:56 16:14	08:32 16:04	
24	05:22 21:28	06:13 20:29	19:21 (Rep 11)	07:07	19:15	18:20 (Rep 10) 18:43 (Rep 10)	08:01 18:06	17:16 (Oerzen 2)	07:58 16:13	08:33 16:04	
25	05:24 21:27	06:15 20:27	19:18 (Rep 11)	07:09	19:13	18:19 (Rep 10) 18:41 (Rep 10)	07:03 17:03	17:17 (Oerzen 2)	08:00 16:12	08:33 16:05	
26	05:25 21:25	06:17 20:24	19:15 (Rep 11)	07:10	19:10	18:20 (Rep 10) 18:41 (Rep 10)	07:04 17:01	17:18 (Oerzen 2)	08:01 16:11	08:33 16:06	
27	05:27 21:24	06:19 20:22	19:14 (Rep 11)	07:12	19:08	18:20 (Rep 10) 18:40 (Rep 10)	07:06 16:59	17:19 (Oerzen 2)	08:03 16:10	08:34 16:06	
28	05:28 21:22	06:20 20:20	19:13 (Rep 11)	07:14	19:06	18:21 (Rep 10) 18:38 (Rep 10)	07:08 16:57	17:20 (Oerzen 2)	08:05 16:09	08:34 16:07	
29	05:30 21:21	06:22 20:18	19:12 (Rep 11)	07:16	19:03	18:22 (Rep 10) 18:35 (Rep 10)	07:10 16:55	17:21 (Oerzen 2)	08:06 16:08	08:34 16:08	
30	05:31 21:19	06:24 20:15	19:11 (Rep 11)	07:17	19:01	18:25 (Rep 10) 18:32 (Rep 10)	07:12 16:53	17:22 (Oerzen 2)	08:08 16:07	08:34 16:09	
31	05:33 21:17	06:25 20:13	19:11 (Rep 11)				07:14 16:51			08:34 16:10	
Sonnenscheinstunden		509	458		382		329		261	237	
astr.max.mögl.Beschattung			147		898		775				

**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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s15 - Oerzen, Westerheide 12C

### 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	08:34 16:11	08:05 17:01			07:09 17:56	44	16:38 (Oerzen 2) 17:22 (Oerzen 3)	06:55 19:53	34	18:35 (Oerzen 1) 19:09 (Oerzen 1)	05:48 20:47	04:59 21:35	
2	08:34 16:12	08:03 17:03			07:06 17:58	45	16:38 (Oerzen 2) 17:23 (Oerzen 3)	06:53 19:55	34	18:35 (Oerzen 1) 19:09 (Oerzen 1)	05:45 20:48	04:59 21:36	
3	08:34 16:14	08:02 17:05			07:04 18:00	45	16:37 (Oerzen 2) 17:22 (Oerzen 3)	06:50 19:56	35	18:35 (Oerzen 1) 19:10 (Oerzen 1)	05:44 20:50	04:58 21:37	
4	08:33 16:15	08:00 17:07			07:02 18:01	45	16:37 (Oerzen 2) 17:22 (Oerzen 3)	06:48 19:58	35	18:34 (Oerzen 1) 19:09 (Oerzen 1)	05:42 20:52	04:57 21:39	
5	08:33 16:16	07:58 17:09			07:00 18:03	45	16:37 (Oerzen 2) 17:22 (Oerzen 3)	06:46 20:00	33	18:35 (Oerzen 1) 19:08 (Oerzen 1)	05:40 20:54	04:56 21:40	
6	08:33 16:17	07:56 17:11			06:57 18:05	44	16:37 (Oerzen 2) 17:21 (Oerzen 3)	06:43 20:02	43	18:35 (Oerzen 1) 19:35 (Rep 11)	05:38 20:55	04:55 21:41	
7	08:32 16:19	07:54 17:13			06:55 18:07	43	16:37 (Oerzen 2) 17:20 (Oerzen 3)	06:41 20:04	47	18:35 (Oerzen 1) 19:36 (Rep 11)	05:36 20:57	04:55 21:42	
8	08:32 16:20	07:53 17:15			06:53 18:09	41	16:37 (Oerzen 2) 17:18 (Oerzen 3)	06:39 20:05	49	18:35 (Oerzen 1) 19:38 (Rep 11)	05:34 20:59	04:54 21:42	
9	08:31 16:21	07:51 17:17			06:50 18:11	38	16:38 (Oerzen 2) 17:16 (Oerzen 3)	06:36 20:07	49	18:36 (Oerzen 1) 19:39 (Rep 11)	05:32 21:01	04:54 21:43	
10	08:31 16:23	07:49 17:19			06:48 18:13	34	16:39 (Oerzen 2) 17:13 (Oerzen 3)	06:34 20:09	49	18:36 (Oerzen 1) 19:39 (Rep 11)	05:30 21:02	04:53 21:44	
11	08:30 16:24	07:47 17:21			06:46 18:15	28	16:39 (Oerzen 2) 17:07 (Oerzen 2)	06:32 20:11	48	18:38 (Oerzen 1) 19:40 (Rep 11)	05:28 21:04	04:53 21:45	
12	08:29 16:26	07:45 17:23			06:43 18:16	25	16:41 (Oerzen 2) 17:06 (Oerzen 2)	06:29 20:13	45	18:39 (Oerzen 1) 19:40 (Rep 11)	05:27 21:06	04:52 21:46	
13	08:28 16:27	07:43 17:25			06:41 18:18	21	16:42 (Oerzen 2) 17:03 (Oerzen 2)	06:27 20:14	40	18:41 (Oerzen 1) 19:39 (Rep 11)	05:25 21:07	04:52 21:46	
14	08:28 16:29	07:41 17:27			06:38 18:20	16	16:45 (Oerzen 2) 17:01 (Oerzen 2)	06:25 20:16	34	18:44 (Oerzen 1) 19:39 (Rep 11)	05:23 21:09	04:52 21:47	
15	08:27 16:31	07:39 17:29			06:36 18:22	9	16:49 (Oerzen 2) 17:54 (Rep 10)	06:22 20:18	24	19:15 (Rep 11) 19:39 (Rep 11)	05:22 21:11	04:52 21:48	
16	08:26 16:32	07:37 17:31			06:34 18:24	12	17:46 (Rep 10) 17:58 (Rep 10)	06:20 20:20	23	19:15 (Rep 11) 19:38 (Rep 11)	05:20 21:12	04:51 21:48	
17	08:25 16:34	07:35 17:33			06:31 18:26	16	17:44 (Rep 10) 18:00 (Rep 10)	06:18 20:22	22	19:16 (Rep 11) 19:38 (Rep 11)	05:18 21:14	04:51 21:49	
18	08:24 16:36	07:33 17:35			06:29 18:27	19	17:42 (Rep 10) 18:01 (Rep 10)	06:15 20:23	20	19:16 (Rep 11) 19:36 (Rep 11)	05:17 21:15	04:51 21:49	
19	08:23 16:37	07:31 17:37			06:26 18:29	21	17:41 (Rep 10) 18:02 (Rep 10)	06:13 20:25	18	19:17 (Rep 11) 19:35 (Rep 11)	05:15 21:17	04:51 21:49	
20	08:22 16:39	07:29 17:38			06:24 18:31	22	17:40 (Rep 10) 18:02 (Rep 10)	06:11 20:27	15	19:18 (Rep 11) 19:33 (Rep 11)	05:14 21:19	04:51 21:50	
21	08:20 16:41	07:26 17:40	12	16:50 (Oerzen 2) 17:02 (Oerzen 2)	06:22 18:33	23	17:39 (Rep 10) 18:02 (Rep 10)	06:09 20:29	11	19:20 (Rep 11) 19:31 (Rep 11)	05:12 21:20	04:52 21:50	
22	08:19 16:43	07:24 17:42	18	16:47 (Oerzen 2) 17:05 (Oerzen 2)	06:19 18:35	24	17:39 (Rep 10) 18:03 (Rep 10)	06:07 20:30			05:11 21:22	04:52 21:50	
23	08:18 16:44	07:22 17:44	27	16:45 (Oerzen 2) 17:14 (Oerzen 3)	06:17 18:36	23	17:39 (Rep 10) 18:02 (Rep 10)	06:04 20:32			05:10 21:23	04:52 21:50	
24	08:17 16:46	07:20 17:46	35	16:42 (Oerzen 2) 17:17 (Oerzen 3)	06:14 18:38	23	17:39 (Rep 10) 18:02 (Rep 10)	06:02 20:34			05:08 21:24	04:52 21:51	
25	08:15 16:48	07:18 17:48	38	16:41 (Oerzen 2) 17:19 (Oerzen 3)	06:12 18:40	25	17:39 (Rep 10) 18:04 (Oerzen 1)	06:00 20:36			05:07 21:26	04:53 21:51	
26	08:14 16:50	07:16 17:50	40	16:41 (Oerzen 2) 17:21 (Oerzen 3)	06:10 18:42	27	17:39 (Rep 10) 18:06 (Oerzen 1)	05:58 20:38			05:06 21:27	04:53 21:51	
27	08:13 16:52	07:13 17:52	42	16:40 (Oerzen 2) 17:22 (Oerzen 3)	06:07 18:44	27	17:40 (Rep 10) 18:07 (Oerzen 1)	05:56 20:39			05:05 21:29	04:53 21:50	
28	08:11 16:54	07:11 17:54	44	16:38 (Oerzen 2) 17:22 (Oerzen 3)	06:05 18:45	28	17:40 (Oerzen 1) 18:08 (Oerzen 1)	05:54 20:41			05:04 21:30	04:54 21:50	
29	08:10 16:56				07:02 19:47	30	18:39 (Oerzen 1) 19:09 (Oerzen 1)	05:52 20:43			05:02 21:31	04:55 21:50	
30	08:08 16:58				07:00 19:49	32	18:37 (Oerzen 1) 19:09 (Oerzen 1)	05:50 20:45			05:01 21:33	04:55 21:50	
31	08:06 16:59				06:58 19:51	33	18:37 (Oerzen 1) 19:10 (Oerzen 1)				05:00 21:34		
Sonnenscheinstunden		253	275		367			419			491		506
astr.max.mögl.Beschattung			256			908		708					

**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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s15 - Oerzen, Westerheide 12C**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	04:56	05:34		06:27		18:37 (Oerzen 1)	07:19	17:21 (Oerzen 2)	07:16	08:09	
	21:50	21:16		20:11	47	19:38 (Rep 11)	18:58	23	17:44 (Oerzen 2)	16:49	16:06
2	04:57	05:36		06:29		18:35 (Oerzen 1)	07:21		17:19 (Oerzen 2)	07:18	08:11
	21:49	21:14		20:08	49	19:38 (Rep 11)	18:56	26	17:45 (Oerzen 2)	16:47	16:06
3	04:57	05:38		06:31		18:33 (Oerzen 1)	07:23		17:17 (Oerzen 2)	07:20	08:12
	21:49	21:12		20:06	49	19:36 (Rep 11)	18:54	29	17:46 (Oerzen 2)	16:45	16:05
4	04:58	05:39		06:32		18:32 (Oerzen 1)	07:24		17:15 (Oerzen 2)	07:21	08:14
	21:48	21:10		20:04	49	19:35 (Rep 11)	18:51	37	17:52 (Oerzen 3)	16:43	16:04
5	04:59	05:41		06:34		18:32 (Oerzen 1)	07:26		17:14 (Oerzen 2)	07:23	08:15
	21:48	21:08		20:01	47	19:33 (Rep 11)	18:49	40	17:54 (Oerzen 3)	16:42	16:04
6	05:00	05:43		06:36		18:30 (Oerzen 1)	07:28		17:14 (Oerzen 2)	07:25	08:16
	21:47	21:07		19:59	43	19:30 (Rep 11)	18:46	41	17:55 (Oerzen 3)	16:40	16:03
7	05:01	05:44		06:38		18:30 (Oerzen 1)	07:30		17:13 (Oerzen 2)	07:27	08:18
	21:47	21:05		19:56	34	19:04 (Oerzen 1)	18:44	43	17:56 (Oerzen 3)	16:38	16:03
8	05:02	05:46		06:39		18:30 (Oerzen 1)	07:31		17:13 (Oerzen 2)	07:29	08:19
	21:46	21:03		19:54	34	19:04 (Oerzen 1)	18:42	44	17:57 (Oerzen 3)	16:36	16:02
9	05:03	05:48		06:41		18:28 (Oerzen 1)	07:33		17:12 (Oerzen 2)	07:31	08:20
	21:45	21:01		19:52	35	19:03 (Oerzen 1)	18:39	45	17:57 (Oerzen 3)	16:34	16:02
10	05:04	05:49		06:43		18:28 (Oerzen 1)	07:35		17:11 (Oerzen 2)	07:33	08:21
	21:44	20:59		19:49	35	19:03 (Oerzen 1)	18:37	45	17:56 (Oerzen 3)	16:33	16:02
11	05:05	05:51		06:44		18:29 (Oerzen 1)	07:37		17:11 (Oerzen 2)	07:35	08:23
	21:44	20:57		19:47	33	19:02 (Oerzen 1)	18:35	45	17:56 (Oerzen 3)	16:31	16:01
12	05:06	05:53		06:46		18:28 (Oerzen 1)	07:39		17:11 (Oerzen 2)	07:36	08:24
	21:43	20:55		19:44	33	19:01 (Oerzen 1)	18:32	45	17:56 (Oerzen 3)	16:29	16:01
13	05:07	05:55		06:48		18:28 (Oerzen 1)	07:40		17:11 (Oerzen 2)	07:38	08:25
	21:42	20:53		19:42	32	19:00 (Oerzen 1)	18:30	44	17:55 (Oerzen 3)	16:28	16:01
14	05:08	05:56		06:50		18:29 (Oerzen 1)	07:42		17:12 (Oerzen 2)	07:40	08:26
	21:41	20:51		19:40	31	19:00 (Oerzen 1)	18:28	43	17:55 (Oerzen 3)	16:26	16:01
15	05:10	05:58		06:51		18:29 (Oerzen 1)	07:44		17:12 (Oerzen 2)	07:42	08:27
	21:40	20:49		19:37	29	18:58 (Oerzen 1)	18:25	42	17:54 (Oerzen 3)	16:25	16:01
16	05:11	06:00		06:53		18:29 (Rep 10)	07:46		17:13 (Oerzen 2)	07:44	08:28
	21:39	20:46		19:35	28	18:57 (Oerzen 1)	18:23	40	17:53 (Oerzen 3)	16:23	16:01
17	05:12	06:01		06:55		18:28 (Rep 10)	07:48		17:14 (Oerzen 2)	07:46	08:28
	21:38	20:44		19:32	27	18:55 (Oerzen 1)	18:21	37	17:51 (Oerzen 3)	16:22	16:02
18	05:14	06:03		06:56		18:26 (Rep 10)	07:50		17:15 (Oerzen 2)	07:48	08:29
	21:36	20:42		19:30	26	18:52 (Oerzen 1)	18:19	33	17:48 (Oerzen 3)	16:20	16:02
19	05:15	06:05		06:58		18:26 (Rep 10)	07:51		17:17 (Oerzen 2)	07:49	08:30
	21:35	20:40		19:27	24	18:50 (Oerzen 1)	18:16	21	17:38 (Oerzen 2)	16:19	16:02
20	05:16	06:07		07:00		18:25 (Rep 10)	07:53		17:19 (Oerzen 2)	07:51	08:31
	21:34	20:38		19:25	23	18:48 (Rep 10)	18:14	17	17:36 (Oerzen 2)	16:18	16:02
21	05:18	06:08		07:02		18:25 (Rep 10)	07:55		17:21 (Oerzen 2)	07:53	08:31
	21:33	20:36	4	19:32 (Rep 11)	19:22	18:48 (Rep 10)	18:12	10	17:31 (Oerzen 2)	16:16	16:03
22	05:19	06:10		07:03		18:24 (Rep 10)	07:57			07:55	08:32
	21:31	20:33	12	19:36 (Rep 11)	19:20	18:47 (Rep 10)	18:10			16:15	16:03
23	05:21	06:12		07:05		18:24 (Rep 10)	07:59			07:56	08:32
	21:30	20:31	16	19:37 (Rep 11)	19:18	18:47 (Rep 10)	18:08			16:14	16:04
24	05:22	06:13		07:07		18:25 (Rep 10)	08:01			07:58	08:33
	21:28	20:29	19	19:39 (Rep 11)	19:15	18:46 (Rep 10)	18:06			16:13	16:04
25	05:24	06:15		07:09		18:24 (Rep 10)	07:03			08:00	08:33
	21:27	20:27	21	19:40 (Rep 11)	19:13	18:44 (Rep 10)	17:03			16:12	16:05
26	05:25	06:17		07:10		18:26 (Rep 10)	07:04			08:01	08:33
	21:25	20:24	23	19:40 (Rep 11)	19:10	18:42 (Rep 10)	17:01			16:11	16:06
27	05:27	06:19		07:12		18:27 (Rep 10)	07:06			08:03	08:34
	21:24	20:22	23	19:40 (Rep 11)	19:08	18:40 (Rep 10)	16:59			16:10	16:06
28	05:28	06:20		07:14		18:30 (Rep 10)	07:08			08:05	08:34
	21:22	20:20	24	19:41 (Rep 11)	19:06	18:38 (Rep 10)	16:57			16:09	16:07
29	05:30	06:22		07:16		17:26 (Oerzen 2)	07:10			08:06	08:34
	21:21	20:18	34	19:40 (Rep 11)	19:03	17:39 (Oerzen 2)	16:55			16:08	16:08
30	05:31	06:24		07:17		17:23 (Oerzen 2)	07:12			08:08	08:34
	21:19	20:15	41	19:40 (Rep 11)	19:01	17:42 (Oerzen 2)	16:53			16:07	16:09
31	05:33	06:25		07:14			07:14				08:34
	21:17	20:13	45	19:40 (Rep 11)			16:51				16:10
Sonnenscheinstunden		509		458		382		329		261	237
astr.max.mögl.Beschattung			262		887		750				

**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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s16 - Oerzen, Westerheide 18

### 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	08:34 16:11	08:05 17:01		07:09 17:56	49	16:28 (Oerzen 2) 17:17 (Oerzen 3)	06:55 19:53	18:28 (Oerzen 1) 19:03 (Oerzen 1)	05:48 20:47	04:59 21:35	
2	08:34 16:12	08:03 17:03		07:06 17:58	49	16:28 (Oerzen 2) 17:17 (Oerzen 3)	06:53 19:55	18:28 (Oerzen 1) 19:03 (Oerzen 1)	05:45 20:48	04:59 21:36	
3	08:34 16:14	08:02 17:05		07:04 18:00	48	16:28 (Oerzen 2) 17:16 (Oerzen 3)	06:50 19:56	18:28 (Oerzen 1) 19:03 (Oerzen 1)	05:44 20:50	04:58 21:37	
4	08:33 16:15	08:00 17:07		07:02 18:01	47	16:28 (Oerzen 2) 17:15 (Oerzen 3)	06:48 19:58	18:28 (Oerzen 1) 19:28 (Rep 11)	05:42 20:52	04:57 21:39	
5	08:33 16:16	07:58 17:09		07:00 18:03	46	16:29 (Oerzen 2) 17:15 (Oerzen 3)	06:46 20:00	18:28 (Oerzen 1) 19:32 (Rep 11)	05:40 20:54	04:56 21:40	
6	08:33 16:17	07:56 17:11		06:57 18:05	44	16:29 (Oerzen 2) 17:13 (Oerzen 3)	06:43 20:02	18:29 (Oerzen 1) 19:35 (Rep 11)	05:38 20:55	04:55 21:41	
7	08:32 16:19	07:54 17:13		06:55 18:07	41	16:30 (Oerzen 2) 17:11 (Oerzen 3)	06:41 20:04	18:29 (Oerzen 1) 19:35 (Rep 11)	05:36 20:57	04:55 21:42	
8	08:32 16:20	07:53 17:15		06:53 18:09	37	16:30 (Oerzen 2) 17:07 (Oerzen 3)	06:39 20:05	18:30 (Oerzen 1) 19:36 (Rep 11)	05:34 20:59	04:54 21:43	
9	08:31 16:21	07:51 17:17		06:50 18:11	25	16:32 (Oerzen 2) 16:57 (Oerzen 2)	06:36 20:07	18:31 (Oerzen 1) 19:37 (Rep 11)	05:32 21:01	04:54 21:43	
10	08:31 16:23	07:49 17:19		06:48 18:13	22	16:34 (Oerzen 2) 16:56 (Oerzen 2)	06:34 20:09	18:32 (Oerzen 1) 19:36 (Rep 11)	05:30 21:02	04:53 21:44	
11	08:30 16:24	07:47 17:21		06:46 18:15	16	16:36 (Oerzen 2) 16:52 (Oerzen 2)	06:32 20:11	18:34 (Oerzen 1) 19:37 (Rep 11)	05:28 21:04	04:53 21:45	
12	08:29 16:26	07:45 17:23		06:43 18:16	8	16:40 (Oerzen 2) 16:48 (Oerzen 2)	06:29 20:13	18:38 (Oerzen 1) 19:37 (Rep 11)	05:27 21:06	04:52 21:46	
13	08:28 16:27	07:43 17:25		06:41 18:18			06:27 20:14	19:12 (Rep 11) 19:37 (Rep 11)	05:25 21:07	04:52 21:46	
14	08:28 16:29	07:41 17:27		06:38 18:20	12	17:42 (Rep 10) 17:54 (Rep 10)	06:25 20:16	19:11 (Rep 11) 19:36 (Rep 11)	05:23 21:09	04:52 21:47	
15	08:27 16:31	07:39 17:29		06:36 18:22	16	17:39 (Rep 10) 17:55 (Rep 10)	06:22 20:18	19:11 (Rep 11) 19:35 (Rep 11)	05:22 21:11	04:52 21:48	
16	08:26 16:32	07:37 17:31		06:34 18:24	19	17:38 (Rep 10) 17:57 (Rep 10)	06:20 20:20	19:12 (Rep 11) 19:35 (Rep 11)	05:20 21:12	04:51 21:48	
17	08:25 16:34	07:35 17:33	12	06:31 16:53 (Oerzen 2)	21	17:37 (Rep 10) 17:58 (Rep 10)	06:18 20:22	19:13 (Rep 11) 19:34 (Rep 11)	05:18 21:14	04:51 21:49	
18	08:24 16:36	07:33 17:35	18	06:29 16:56 (Oerzen 2)	22	17:36 (Rep 10) 17:58 (Rep 10)	06:15 20:23	19:13 (Rep 11) 19:32 (Rep 11)	05:17 21:15	04:51 21:49	
19	08:23 16:37	07:31 17:37	23	06:26 16:59 (Oerzen 2)	24	17:35 (Rep 10) 17:59 (Rep 10)	06:13 20:25	19:14 (Rep 11) 19:30 (Rep 11)	05:15 21:17	04:51 21:49	
20	08:22 16:39	07:29 17:38	25	06:24 16:59 (Oerzen 2)	24	17:34 (Rep 10) 17:58 (Rep 10)	06:11 20:27	19:16 (Rep 11) 19:28 (Rep 11)	05:14 21:19	04:51 21:50	
21	08:20 16:41	07:26 17:40	38	06:22 17:10 (Oerzen 3)	24	17:34 (Rep 10) 17:58 (Rep 10)	06:09 20:29		05:12 21:20	04:52 21:50	
22	08:19 16:43	07:24 17:42	41	06:19 17:13 (Oerzen 3)	23	17:35 (Rep 10) 17:58 (Rep 10)	06:07 20:30		05:11 21:22	04:52 21:50	
23	08:18 16:44	07:22 17:44	44	06:17 17:15 (Oerzen 3)	26	17:34 (Rep 10) 18:00 (Oerzen 1)	06:04 20:32		05:10 21:23	04:52 21:50	
24	08:17 16:46	07:20 17:46	46	06:14 17:15 (Oerzen 3)	27	17:35 (Rep 10) 18:02 (Oerzen 1)	06:02 20:34		05:08 21:24	04:52 21:51	
25	08:15 16:48	07:18 17:48	47	06:12 17:16 (Oerzen 3)	28	17:34 (Oerzen 1) 18:02 (Oerzen 1)	06:00 20:36		05:07 21:26	04:53 21:51	
26	08:14 16:50	07:16 17:50	48	06:10 17:17 (Oerzen 3)	30	17:33 (Oerzen 1) 18:03 (Oerzen 1)	05:58 20:38		05:06 21:27	04:53 21:51	
27	08:13 16:52	07:13 17:52	49	06:07 17:18 (Oerzen 3)	32	17:31 (Oerzen 1) 18:03 (Oerzen 1)	05:56 20:39		05:05 21:29	04:53 21:50	
28	08:11 16:54	07:11 17:54	49	06:05 17:17 (Oerzen 3)	34	17:30 (Oerzen 1) 18:04 (Oerzen 1)	05:54 20:41		05:04 21:30	04:54 21:50	
29	08:10 16:56			07:02 19:47	35	18:30 (Oerzen 1) 19:05 (Oerzen 1)	05:52 20:43		05:02 21:31	04:55 21:50	
30	08:08 16:58			07:00 19:49	35	18:29 (Oerzen 1) 19:04 (Oerzen 1)	05:50 20:45		05:01 21:33	04:55 21:50	
31	08:06 16:59			06:58 19:51	35	18:29 (Oerzen 1) 19:04 (Oerzen 1)			05:00 21:34		
Sonnenscheinstunden		253	275	367	899	419	678	491	506		
astr.max.mögl.Beschattung			440								

**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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s16 - Oerzen, Westerheide 18**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	04:56   21:50	05:34   21:16		06:27   20:11	18:33 (Oerzen 1)   19:36 (Rep 11)	07:19   18:58		07:16   16:49	08:09   16:06		
2	04:57   21:49	05:36   21:14		06:29   20:08	18:31 (Oerzen 1)   19:35 (Rep 11)	07:21   18:56	17:16 (Oerzen 2)   17:30 (Oerzen 2)	07:18   16:47	08:11   16:06		
3	04:57   21:49	05:38   21:12		06:31   20:06	18:28 (Oerzen 1)   19:34 (Rep 11)	07:23   18:54	17:13 (Oerzen 2)   17:08 (Oerzen 2)	07:20   16:45	08:12   16:05		
4	04:58   21:48	05:39   21:10		06:32   20:04	18:27 (Oerzen 1)   19:33 (Rep 11)	07:24   18:51	17:10 (Oerzen 2)   17:34 (Oerzen 2)	07:21   16:43	08:14   16:04		
5	04:59   21:48	05:41   21:08		06:34   20:01	18:26 (Oerzen 1)   19:32 (Rep 11)	07:26   18:49	17:08 (Oerzen 2)   17:35 (Oerzen 2)	07:23   16:42	08:15   16:04		
6	05:00   21:47	05:43   21:07		06:36   19:59	18:24 (Oerzen 1)   19:30 (Rep 11)	07:28   18:46	17:06 (Oerzen 2)   17:46 (Oerzen 3)	07:25   16:40	08:16   16:03		
7	05:01   21:47	05:44   21:05		06:38   19:56	18:23 (Oerzen 1)   19:28 (Rep 11)	07:30   18:44	17:05 (Oerzen 2)   17:48 (Oerzen 3)	07:27   16:38	08:18   16:03		
8	05:02   21:46	05:46   21:03		06:39   19:54	18:23 (Oerzen 1)   19:24 (Rep 11)	07:31   18:42	17:04 (Oerzen 2)   17:49 (Oerzen 3)	07:29   16:36	08:19   16:02		
9	05:03   21:45	05:48   21:01		06:41   19:52	18:21 (Oerzen 1)   19:21 (Rep 11)	07:33   18:39	17:04 (Oerzen 2)   17:50 (Oerzen 3)	07:31   16:34	08:20   16:02		
10	05:04   21:44	05:49   20:59		06:43   19:49	18:21 (Oerzen 1)   19:19 (Rep 11)	07:35   18:37	17:02 (Oerzen 2)   17:50 (Oerzen 3)	07:33   16:33	08:21   16:02		
11	05:05   21:44	05:51   20:57		06:44   19:47	18:21 (Oerzen 1)   19:17 (Rep 11)	07:37   18:35	17:01 (Oerzen 2)   17:50 (Oerzen 3)	07:35   16:31	08:23   16:01		
12	05:06   21:43	05:53   20:55		06:46   19:44	18:20 (Oerzen 1)   19:15 (Rep 11)	07:39   18:32	17:01 (Oerzen 2)   17:50 (Oerzen 3)	07:37   16:29	08:24   16:01		
13	05:07   21:42	05:55   20:53		06:48   19:42	18:20 (Oerzen 1)   19:13 (Rep 11)	07:40   18:30	17:01 (Oerzen 2)   17:50 (Oerzen 3)	07:38   16:28	08:25   16:01		
14	05:08   21:41	05:56   20:51		06:50   19:40	18:20 (Oerzen 1)   19:11 (Rep 11)	07:42   18:28	17:01 (Oerzen 2)   17:50 (Oerzen 3)	07:40   16:26	08:26   16:01		
15	05:10   21:40	05:58   20:49		06:51   19:37	18:20 (Oerzen 1)   19:09 (Rep 11)	07:44   18:25	17:01 (Oerzen 2)   17:50 (Oerzen 3)	07:42   16:25	08:27   16:01		
16	05:11   21:39	06:00   20:46		06:53   19:35	18:20 (Oerzen 1)   19:07 (Rep 11)	07:46   18:23	17:01 (Oerzen 2)   17:50 (Oerzen 3)	07:44   16:23	08:28   16:01		
17	05:12   21:38	06:01   20:44		06:55   19:32	18:21 (Oerzen 1)   19:05 (Rep 11)	07:48   18:21	17:01 (Oerzen 2)   17:48 (Oerzen 3)	07:46   16:22	08:28   16:02		
18	05:14   21:36	06:03   20:42		06:56   19:30	18:21 (Oerzen 1)   19:03 (Rep 11)	07:50   18:19	17:02 (Oerzen 2)   17:47 (Oerzen 3)	07:48   16:20	08:29   16:02		
19	05:15   21:35	06:05   20:40		06:58   19:27	18:22 (Rep 10)   19:01 (Rep 11)	07:51   18:16	17:02 (Oerzen 2)   17:46 (Oerzen 3)	07:49   16:19	08:30   16:02		
20	05:16   21:34	06:07   20:38		07:00   19:25	18:21 (Rep 10)   19:00 (Rep 11)	07:53   18:14	17:03 (Oerzen 2)   17:44 (Oerzen 3)	07:51   16:18	08:31   16:02		
21	05:18   21:33	06:08   20:36		07:02   19:23	18:20 (Rep 10)   18:59 (Rep 11)	07:55   18:12	17:03 (Oerzen 2)   17:44 (Oerzen 3)	07:53   16:16	08:31   16:03		
22	05:19   21:31	06:10   20:33	19:25 (Rep 11)	07:03   19:20	18:19 (Rep 10)   18:43 (Rep 10)	07:57   18:10	17:04 (Oerzen 2)   17:44 (Oerzen 3)	07:55   16:15	08:32   16:03		
23	05:21   21:30	06:12   20:31	19:20 (Rep 11)	07:05   19:18	18:19 (Rep 10)   18:43 (Rep 10)	07:59   18:08	17:06 (Oerzen 2)   17:46 (Oerzen 3)	07:56   16:14	08:32   16:04		
24	05:22   21:28	06:13   20:29	19:32 (Rep 11)	07:07   19:15	18:19 (Rep 10)   18:43 (Rep 10)	08:01   18:06	17:08 (Oerzen 2)   17:48 (Oerzen 3)	07:58   16:13	08:33   16:04		
25	05:24   21:27	06:15   20:27	19:34 (Rep 11)	07:09   19:13	18:18 (Rep 10)   18:41 (Rep 10)	07:03	17:25 (Oerzen 2)   17:49 (Oerzen 3)	08:00   16:12	08:33   16:05		
26	05:25   21:25	06:17   20:24	19:16 (Rep 11)	07:10   19:10	18:18 (Rep 10)   18:40 (Rep 10)	07:04	16:12 (Oerzen 2)   17:46 (Oerzen 3)	08:01   16:11	08:33   16:06		
27	05:27   21:24	06:19   20:22	19:36 (Rep 11)	07:12   19:08	18:19 (Rep 10)   18:39 (Rep 10)	07:06	16:21 (Oerzen 2)   17:44 (Oerzen 3)	08:03   16:10	08:34   16:06		
28	05:28   21:22	06:20   20:20	19:14 (Rep 11)	07:14   19:06	18:21 (Rep 10)   18:38 (Rep 10)	07:08	16:11 (Oerzen 2)   17:43 (Oerzen 3)	08:05   16:09	08:34   16:07		
29	05:30   21:21	06:22   20:18	19:13 (Rep 11)	07:16   19:03	18:21 (Rep 10)   18:35 (Rep 10)	07:10	16:10 (Oerzen 2)   17:42 (Oerzen 3)	08:06   16:08	08:34   16:08		
30	05:31   21:19	06:24   20:15	19:37 (Rep 11)	07:17   19:01	18:24 (Rep 10)   18:32 (Rep 10)	07:12	16:09 (Oerzen 2)   17:41 (Oerzen 3)	08:08   16:07	08:34   16:09		
31	05:33   21:17	06:25   20:13	19:37 (Rep 11)	07:18   18:37 (Oerzen 1)	18:32 (Rep 10)   18:32 (Rep 10)	07:14	16:08 (Oerzen 2)   17:40 (Oerzen 3)	08:09   16:06	08:34   16:10		
Sonnenscheinstunden		509	458	382	329	261	237				
astr.max.mögl.Beschattung			206	967	884						

**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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s17 - Oerzen, Westerheide 19**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	08:34	08:05		07:09	16:22 (Oerzen 2)	06:55	18:22 (Oerzen 1)	05:48	04:59
	16:11	17:01		17:56	38 17:03 (Oerzen 3)	19:53	37 19:25 (Rep 11)	20:47	21:35
2	08:34	08:03		07:06	16:24 (Oerzen 2)	06:53	18:27 (Oerzen 1)	05:45	04:59
	16:12	17:03		17:58	28 17:00 (Oerzen 3)	19:55	28 19:25 (Rep 11)	20:48	21:36
3	08:34	08:02		07:04	16:26 (Oerzen 2)	06:50	19:02 (Rep 11)	05:44	04:58
	16:14	17:05		18:00	13 16:39 (Oerzen 2)	19:56	24 19:26 (Rep 11)	20:50	21:37
4	08:33	08:00		07:02		06:48	19:01 (Rep 11)	05:42	04:57
	16:15	17:07		18:01		19:58	24 19:25 (Rep 11)	20:52	21:39
5	08:33	07:58		07:00		06:46	19:01 (Rep 11)	05:40	04:56
	16:16	17:09		18:03		20:00	24 19:25 (Rep 11)	20:54	21:40
6	08:33	07:56		06:57		06:43	19:01 (Rep 11)	05:38	04:55
	16:17	17:11		18:05		20:02	24 19:25 (Rep 11)	20:55	21:41
7	08:32	07:54		06:55		06:41	19:00 (Rep 11)	05:36	04:55
	16:19	17:13		18:07		20:04	24 19:24 (Rep 11)	20:57	21:42
8	08:32	07:53		06:53	17:33 (Rep 10)	06:39	19:01 (Rep 11)	05:34	04:54
	16:20	17:15		18:09	9 17:42 (Rep 10)	20:05	23 19:24 (Rep 11)	20:59	21:43
9	08:31	07:51	16:29 (Oerzen 2)	06:50	17:31 (Rep 10)	06:36	19:02 (Rep 11)	05:32	04:54
	16:21	17:17	11 16:40 (Oerzen 2)	18:11	13 17:44 (Rep 10)	20:07	21 19:23 (Rep 11)	21:01	21:43
10	08:31	07:49	16:26 (Oerzen 2)	06:48	17:29 (Rep 10)	06:34	19:02 (Rep 11)	05:30	04:53
	16:23	17:19	17 16:43 (Oerzen 2)	18:13	18 17:47 (Rep 10)	20:09	19 19:21 (Rep 11)	21:02	21:44
11	08:30	07:47	16:24 (Oerzen 2)	06:46	17:27 (Rep 10)	06:32	19:03 (Rep 11)	05:28	04:53
	16:24	17:21	21 16:45 (Oerzen 2)	18:15	21 17:48 (Rep 10)	20:11	16 19:19 (Rep 11)	21:04	21:45
12	08:29	07:45	16:23 (Oerzen 2)	06:43	17:27 (Rep 10)	06:29	19:05 (Rep 11)	05:27	04:52
	16:26	17:23	24 16:47 (Oerzen 2)	18:16	22 17:49 (Rep 10)	20:13	12 19:17 (Rep 11)	21:06	21:46
13	08:28	07:43	16:21 (Oerzen 2)	06:41	17:26 (Rep 10)	06:27	19:09 (Rep 11)	05:25	04:52
	16:27	17:25	27 16:48 (Oerzen 2)	18:18	22 17:48 (Rep 10)	20:14	3 19:12 (Rep 11)	21:07	21:46
14	08:28	07:41	16:20 (Oerzen 2)	06:38	17:24 (Oerzen 1)	06:25		05:23	04:52
	16:29	17:27	29 16:49 (Oerzen 2)	18:20	25 17:49 (Rep 10)	20:16		21:09	21:47
15	08:27	07:39	16:19 (Oerzen 2)	06:36	17:22 (Oerzen 1)	06:22		05:22	04:52
	16:31	17:29	36 16:59 (Oerzen 3)	18:22	26 17:48 (Rep 10)	20:18		21:11	21:48
16	08:26	07:37	16:18 (Oerzen 2)	06:34	17:20 (Oerzen 1)	06:20		05:20	04:51
	16:32	17:31	44 17:02 (Oerzen 3)	18:24	28 17:48 (Rep 10)	20:20		21:12	21:48
17	08:25	07:35	16:18 (Oerzen 2)	06:31	17:20 (Oerzen 1)	06:18		05:18	04:51
	16:34	17:33	46 17:04 (Oerzen 3)	18:26	29 17:49 (Oerzen 1)	20:22		21:14	21:49
18	08:24	07:33	16:18 (Oerzen 2)	06:29	17:18 (Oerzen 1)	06:15		05:17	04:51
	16:36	17:35	48 17:06 (Oerzen 3)	18:27	31 17:49 (Oerzen 1)	20:23		21:15	21:49
19	08:23	07:31	16:17 (Oerzen 2)	06:26	17:17 (Oerzen 1)	06:13		05:15	04:51
	16:37	17:37	50 17:07 (Oerzen 3)	18:29	33 17:50 (Oerzen 1)	20:25		21:17	21:49
20	08:22	07:29	16:17 (Oerzen 2)	06:24	17:16 (Oerzen 1)	06:11		05:14	04:51
	16:39	17:38	50 17:07 (Oerzen 3)	18:31	33 17:49 (Oerzen 1)	20:27		21:19	21:50
21	08:21	07:26	16:17 (Oerzen 2)	06:22	17:16 (Oerzen 1)	06:09		05:12	04:52
	16:41	17:40	50 17:07 (Oerzen 3)	18:33	34 17:50 (Oerzen 1)	20:29		21:20	21:50
22	08:19	07:24	16:17 (Oerzen 2)	06:19	17:16 (Oerzen 1)	06:07		05:11	04:52
	16:43	17:42	51 17:08 (Oerzen 3)	18:35	34 17:50 (Oerzen 1)	20:30		21:22	21:50
23	08:18	07:22	16:17 (Oerzen 2)	06:17	17:15 (Oerzen 1)	06:04		05:10	04:52
	16:44	17:44	51 17:08 (Oerzen 3)	18:36	34 17:49 (Oerzen 1)	20:32		21:23	21:50
24	08:17	07:20	16:17 (Oerzen 2)	06:14	17:16 (Oerzen 1)	06:02		05:08	04:52
	16:46	17:46	50 17:07 (Oerzen 3)	18:38	33 17:49 (Oerzen 1)	20:34		21:24	21:51
25	08:15	07:18	16:18 (Oerzen 2)	06:12	17:15 (Oerzen 1)	06:00		05:07	04:53
	16:48	17:48	49 17:07 (Oerzen 3)	18:40	33 17:48 (Oerzen 1)	20:36		21:26	21:51
26	08:14	07:16	16:19 (Oerzen 2)	06:10	17:16 (Oerzen 1)	05:58		05:06	04:53
	16:50	17:50	48 17:07 (Oerzen 3)	18:42	32 17:48 (Oerzen 1)	20:38		21:27	21:51
27	08:13	07:13	16:20 (Oerzen 2)	06:07	17:15 (Oerzen 1)	05:56		05:05	04:53
	16:52	17:52	46 17:06 (Oerzen 3)	18:44	31 17:46 (Oerzen 1)	20:39		21:29	21:50
28	08:11	07:11	16:20 (Oerzen 2)	06:05	17:16 (Oerzen 1)	05:54		05:04	04:54
	16:54	17:54	44 17:04 (Oerzen 3)	18:45	30 18:16 (Rep 11)	20:41		21:30	21:50
29	08:10			07:02	18:18 (Oerzen 1)	05:52		05:02	04:55
	16:56			19:47	37 19:21 (Rep 11)	20:43		21:31	21:50
30	08:08			07:00	18:18 (Oerzen 1)	05:50		05:01	04:55
	16:58			19:49	40 19:23 (Rep 11)	20:45		21:33	21:50
31	08:06			06:58	18:20 (Oerzen 1)			05:00	
	16:59			19:51	39 19:24 (Rep 11)			21:34	
Sonnenscheinstunden	253	275		367		419		491	506
astr.max.mögl.Beschattung		792		766		279			

**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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s17 - Oerzen, Westerheide 19**Annahmen für Schattenwurfberechnung**

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli	August	September	Oktober	November	Dezember			
1	04:56 21:50	05:34 21:16	06:27 20:11	19:02 (Rep 11) 19:18 (Rep 11)	07:19 18:58	18:06 (Rep 10) 18:28 (Rep 10)	07:16 16:49	15:56 (Oerzen 2) 16:12 (Oerzen 2)	08:09 16:06
2	04:57 21:49	05:36 21:14	06:29 20:08	19:01 (Rep 11) 19:20 (Rep 11)	07:21 18:56	18:06 (Rep 10) 18:27 (Rep 10)	07:18 16:47	15:59 (Oerzen 2) 16:09 (Oerzen 2)	08:11 16:06
3	04:57 21:49	05:38 21:12	06:31 20:06	18:59 (Rep 11) 19:20 (Rep 11)	07:23 18:54	18:07 (Rep 10) 18:26 (Rep 10)	07:20 16:45		08:12 16:05
4	04:58 21:48	05:39 21:10	06:32 20:04	18:58 (Rep 11) 19:21 (Rep 11)	07:24 18:51	18:07 (Rep 10) 18:22 (Rep 10)	07:21 16:43		08:14 16:04
5	04:59 21:48	05:41 21:08	06:34 20:01	18:57 (Rep 11) 19:21 (Rep 11)	07:26 18:49	18:08 (Rep 10) 18:20 (Rep 10)	07:23 16:42		08:15 16:04
6	05:00 21:47	05:43 21:07	06:36 19:59	18:56 (Rep 11) 19:20 (Rep 11)	07:28 18:46	18:11 (Rep 10) 18:18 (Rep 10)	07:25 16:40		08:16 16:03
7	05:01 21:47	05:44 21:05	06:38 19:56	18:56 (Rep 11) 19:21 (Rep 11)	07:30 18:44		07:27 16:38		08:18 16:03
8	05:02 21:46	05:46 21:03	06:39 19:54	18:56 (Rep 11) 19:20 (Rep 11)	07:31 18:42		07:29 16:36		08:19 16:02
9	05:03 21:45	05:48 21:01	06:41 19:52	18:55 (Rep 11) 19:19 (Rep 11)	07:33 18:39		07:31 16:34		08:20 16:02
10	05:04 21:44	05:49 20:59	06:43 19:49	18:21 (Oerzen 1) 19:19 (Rep 11)	07:35 18:37	17:03 (Oerzen 2) 17:11 (Oerzen 2)	07:33 16:33		08:21 16:02
11	05:05 21:44	05:51 20:57	06:44 19:47	18:15 (Oerzen 1) 19:18 (Rep 11)	07:37 18:35	16:59 (Oerzen 2) 17:31 (Oerzen 3)	07:35 16:31		08:23 16:01
12	05:06 21:43	05:53 20:55	06:46 19:44	18:12 (Oerzen 1) 19:16 (Rep 11)	07:39 18:32	16:56 (Oerzen 2) 17:35 (Oerzen 3)	07:37 16:29		08:24 16:01
13	05:07 21:42	05:55 20:53	06:48 19:42	18:10 (Oerzen 1) 19:14 (Rep 11)	07:40 18:30	16:54 (Oerzen 2) 17:36 (Oerzen 3)	07:38 16:28		08:25 16:01
14	05:08 21:41	05:56 20:51	06:50 19:40	18:08 (Oerzen 1) 19:12 (Rep 11)	07:42 18:28	16:53 (Oerzen 2) 17:38 (Oerzen 3)	07:40 16:26		08:26 16:01
15	05:10 21:40	05:58 20:49	06:51 19:37	18:06 (Oerzen 1) 19:08 (Rep 11)	07:44 18:25	16:52 (Oerzen 2) 17:38 (Oerzen 3)	07:42 16:25		08:27 16:01
16	05:11 21:39	06:00 20:46	06:53 19:35	18:05 (Oerzen 1) 18:35 (Oerzen 1)	07:46 18:23	16:51 (Oerzen 2) 17:39 (Oerzen 3)	07:44 16:23		08:28 16:01
17	05:12 21:38	06:01 20:44	06:55 19:32	18:04 (Oerzen 1) 18:36 (Oerzen 1)	07:48 18:21	16:50 (Oerzen 2) 17:39 (Oerzen 3)	07:46 16:22		08:28 16:01
18	05:14 21:36	06:03 20:42	06:56 19:30	18:03 (Oerzen 1) 18:35 (Oerzen 1)	07:50 18:19	16:49 (Oerzen 2) 17:39 (Oerzen 3)	07:48 16:20		08:29 16:02
19	05:15 21:35	06:05 20:40	06:58 19:27	18:02 (Oerzen 1) 18:36 (Oerzen 1)	07:51 18:16	16:49 (Oerzen 2) 17:39 (Oerzen 3)	07:49 16:19		08:30 16:02
20	05:16 21:34	06:07 20:38	07:00 19:25	18:02 (Oerzen 1) 18:36 (Oerzen 1)	07:53 18:14	16:48 (Oerzen 2) 17:39 (Oerzen 3)	07:51 16:18		08:31 16:02
21	05:18 21:33	06:08 20:36	07:02 19:22	18:02 (Oerzen 1) 18:36 (Oerzen 1)	07:55 18:12	16:47 (Oerzen 2) 17:38 (Oerzen 3)	07:53 16:16		08:31 16:03
22	05:19 21:31	06:10 20:33	07:03 19:20	18:01 (Oerzen 1) 18:34 (Oerzen 1)	07:57 18:10	16:47 (Oerzen 2) 17:37 (Oerzen 3)	07:55 16:15		08:32 16:03
23	05:21 21:30	06:12 20:31	07:05 19:18	18:01 (Oerzen 1) 18:34 (Oerzen 1)	07:59 18:08	16:47 (Oerzen 2) 17:36 (Oerzen 3)	07:56 16:14		08:32 16:04
24	05:22 21:28	06:13 20:29	07:07 19:15	18:01 (Oerzen 1) 18:34 (Oerzen 1)	08:01 18:06	16:47 (Oerzen 2) 17:35 (Oerzen 3)	07:58 16:13		08:33 16:04
25	05:24 21:27	06:15 20:27	07:09 19:13	18:00 (Oerzen 1) 18:32 (Oerzen 1)	07:03 17:03	15:47 (Oerzen 2) 16:33 (Oerzen 3)	08:00 16:12		08:33 16:05
26	05:25 21:25	06:17 20:24	07:10 19:10	18:01 (Oerzen 1) 18:31 (Oerzen 1)	07:04 17:01	15:48 (Oerzen 2) 16:31 (Oerzen 3)	08:01 16:11		08:33 16:06
27	05:27 21:24	06:19 20:22	07:12 19:08	18:02 (Oerzen 1) 18:30 (Oerzen 1)	07:06 16:59	15:48 (Oerzen 2) 16:18 (Oerzen 2)	08:03 16:10		08:34 16:06
28	05:28 21:22	06:20 20:20	07:14 19:06	18:03 (Oerzen 1) 18:30 (Rep 10)	07:08 16:57	15:49 (Oerzen 2) 16:17 (Oerzen 2)	08:05 16:09		08:34 16:07
29	05:30 21:21	06:22 20:18	07:16 19:03	18:03 (Oerzen 1) 18:29 (Rep 10)	07:10 16:55	15:51 (Oerzen 2) 16:17 (Oerzen 2)	08:06 16:08		08:34 16:08
30	05:31 21:19	06:24 20:15	19:09 (Rep 11) 19:13 (Rep 11)	07:17 19:01	18:05 (Rep 10) 18:28 (Rep 10)	15:52 (Oerzen 2) 16:16 (Oerzen 2)	08:08 16:07		08:34 16:09
31	05:33 21:17	06:25 20:13	19:05 (Rep 11) 19:17 (Rep 11)		07:14 16:51	15:54 (Oerzen 2) 16:14 (Oerzen 2)			08:34 16:10
Sonnenscheinstunden	509	458	382	329	261	261	237		
astr.max.mögl.Beschattung		16	874	951	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) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s18 - Oerzen, Westerheide 20

### Annahmen für Schattenwurfberechnung

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

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

Januar		Februar		März		April		Mai		Juni	
1	08:34 16:11	08:05 17:01		07:09 17:56	51	16:22 (Oerzen 2) 17:13 (Oerzen 3)	06:55 19:53	18:23 (Oerzen 1) 18:59 (Oerzen 1)	05:48 20:47	04:59 21:35	
2	08:34 16:12	08:03 17:03		07:06 17:58	49	16:23 (Oerzen 2) 17:12 (Oerzen 3)	06:53 19:55	18:23 (Oerzen 1) 18:58 (Oerzen 1)	05:46 20:48	04:59 21:36	
3	08:34 16:14	08:02 17:05		07:04 18:00	48	16:23 (Oerzen 2) 17:11 (Oerzen 3)	06:50 19:56	18:24 (Oerzen 1) 19:29 (Rep 11)	05:44 20:50	04:58 21:37	
4	08:33 16:15	08:00 17:07		07:02 18:01	46	16:24 (Oerzen 2) 17:10 (Oerzen 3)	06:48 19:58	18:24 (Oerzen 1) 19:31 (Rep 11)	05:42 20:52	04:57 21:39	
5	08:33 16:16	07:58 17:09		07:00 18:03	43	16:25 (Oerzen 2) 17:08 (Oerzen 3)	06:46 20:00	18:25 (Oerzen 1) 19:33 (Rep 11)	05:40 20:54	04:56 21:40	
6	08:33 16:17	07:56 17:11		06:57 18:05	38	16:25 (Oerzen 2) 17:05 (Oerzen 3)	06:43 20:02	18:26 (Oerzen 1) 19:34 (Rep 11)	05:38 20:55	04:55 21:41	
7	08:32 16:19	07:54 17:13		06:55 18:07	24	16:27 (Oerzen 2) 16:51 (Oerzen 2)	06:41 20:04	18:26 (Oerzen 1) 19:34 (Rep 11)	05:36 20:57	04:55 21:42	
8	08:32 16:20	07:53 17:15		06:53 18:09	19	16:29 (Oerzen 2) 16:48 (Oerzen 2)	06:39 20:05	18:28 (Oerzen 1) 19:35 (Rep 11)	05:34 20:59	04:54 21:43	
9	08:31 16:21	07:51 17:17		06:50 18:11	13	16:32 (Oerzen 2) 16:45 (Oerzen 2)	06:36 20:07	18:30 (Oerzen 1) 19:35 (Rep 11)	05:32 21:01	04:54 21:43	
10	08:31 16:23	07:49 17:19		06:48 18:13			06:34 20:09	18:33 (Oerzen 1) 19:34 (Rep 11)	05:30 21:02	04:53 21:44	
11	08:30 16:24	07:47 17:21		06:46 18:15			06:32 20:11	19:09 (Rep 11) 19:34 (Rep 11)	05:28 21:04	04:53 21:45	
12	08:29 16:26	07:45 17:23		06:43 18:16	9	17:41 (Rep 10) 17:50 (Rep 10)	06:29 20:13	19:09 (Rep 11) 19:34 (Rep 11)	05:27 21:06	04:52 21:46	
13	08:28 16:27	07:43 17:25		06:41 18:18	15	17:37 (Rep 10) 17:52 (Rep 10)	06:27 20:14	19:09 (Rep 11) 19:34 (Rep 11)	05:25 21:07	04:52 21:46	
14	08:28 16:29	07:41 17:27	13	16:35 (Oerzen 2) 16:48 (Oerzen 2)	18	17:36 (Rep 10) 17:54 (Rep 10)	06:25 20:16	19:09 (Rep 11) 19:33 (Rep 11)	05:23 21:09	04:52 21:47	
15	08:27 16:31	07:39 17:29	19	16:31 (Oerzen 2) 16:50 (Oerzen 2)	21	17:34 (Rep 10) 17:55 (Rep 10)	06:22 20:18	19:09 (Rep 11) 19:32 (Rep 11)	05:22 21:11	04:52 21:48	
16	08:26 16:32	07:37 17:31	23	16:29 (Oerzen 2) 16:52 (Oerzen 2)	23	17:33 (Rep 10) 17:56 (Rep 10)	06:20 20:20	19:10 (Rep 11) 19:31 (Rep 11)	05:20 21:12	04:51 21:48	
17	08:25 16:34	07:35 17:33	26	16:28 (Oerzen 2) 16:54 (Oerzen 2)	23	17:33 (Rep 10) 17:56 (Rep 10)	06:18 20:22	19:11 (Rep 11) 19:30 (Rep 11)	05:18 21:14	04:51 21:49	
18	08:24 16:36	07:33 17:35	29	16:27 (Oerzen 2) 16:56 (Oerzen 2)	24	17:32 (Rep 10) 17:56 (Rep 10)	06:15 20:23	19:12 (Rep 11) 19:27 (Rep 11)	05:17 21:15	04:51 21:49	
19	08:23 16:37	07:31 17:37	41	16:26 (Oerzen 2) 17:07 (Oerzen 3)	24	17:32 (Rep 10) 17:56 (Rep 10)	06:13 20:25	19:15 (Rep 11) 19:24 (Rep 11)	05:15 21:17	04:51 21:49	
20	08:22 16:39	07:29 17:38	45	16:24 (Oerzen 2) 17:09 (Oerzen 3)	24	17:31 (Rep 10) 17:55 (Rep 10)	06:11 20:27		05:14 21:19	04:51 21:50	
21	08:21 16:41	07:26 17:40	47	16:24 (Oerzen 2) 17:11 (Oerzen 3)	26	17:31 (Rep 10) 17:57 (Oerzen 1)	06:09 20:29		05:12 21:20	04:52 21:50	
22	08:19 16:43	07:24 17:42	49	16:23 (Oerzen 2) 17:12 (Oerzen 3)	27	17:31 (Oerzen 1) 17:58 (Oerzen 1)	06:07 20:30		05:11 21:22	04:52 21:50	
23	08:18 16:44	07:22 17:44	50	16:23 (Oerzen 2) 17:13 (Oerzen 3)	30	17:29 (Oerzen 1) 17:59 (Oerzen 1)	06:04 20:32		05:10 21:23	04:52 21:50	
24	08:17 16:46	07:20 17:46	51	16:22 (Oerzen 2) 17:13 (Oerzen 3)	32	17:28 (Oerzen 1) 18:00 (Oerzen 1)	06:02 20:34		05:08 21:24	04:52 21:51	
25	08:15 16:48	07:18 17:48	51	16:22 (Oerzen 2) 17:13 (Oerzen 3)	33	17:27 (Oerzen 1) 18:00 (Oerzen 1)	06:00 20:36		05:07 21:26	04:53 21:51	
26	08:14 16:50	07:16 17:50	52	16:22 (Oerzen 2) 17:14 (Oerzen 3)	34	17:26 (Oerzen 1) 18:00 (Oerzen 1)	05:58 20:38		05:06 21:27	04:53 21:51	
27	08:13 16:52	07:13 17:52	52	16:22 (Oerzen 2) 17:14 (Oerzen 3)	35	17:25 (Oerzen 1) 18:00 (Oerzen 1)	05:56 20:39		05:05 21:29	04:53 21:50	
28	08:11 16:54	07:11 17:54	51	16:22 (Oerzen 2) 17:13 (Oerzen 3)	36	17:24 (Oerzen 1) 18:00 (Oerzen 1)	05:54 20:41		05:04 21:30	04:54 21:50	
29	08:10 16:56			07:02 19:47	37	18:24 (Oerzen 1) 19:01 (Oerzen 1)	05:52 20:43		05:02 21:31	04:55 21:50	
30	08:08 16:58			07:00 19:49	37	18:23 (Oerzen 1) 19:00 (Oerzen 1)	05:50 20:45		05:01 21:33	04:55 21:50	
31	08:06 16:59			06:58 19:51	36	18:24 (Oerzen 1) 19:00 (Oerzen 1)			05:00 21:34		
Sonnenscheinstunden		253	275	367	875	419	623	491	506		
astr.max.mögl.Beschattung			599								

**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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s18 - Oerzen, Westerheide 20

### Annahmen für Schattenwurfberechnung

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

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

Juli		August		September		Oktober		November		Dezember	
1	04:56   21:50	05:34   21:16		06:27   20:11	19:08 (Rep 11)   18:58	07:19   18:32 (Oerzen 1)   07:21	18:19 (Rep 10)   16:49	07:16   16:06	08:09   16:06		
2	04:57   21:49	05:36   21:14		06:29   20:08	18:32 (Oerzen 1)   18:56	07:21   18:26 (Rep 10)   16:47	18:23 (Rep 10)   16:18	07:18   16:06	08:11   16:06		
3	04:57   21:49	05:38   21:12		06:31   20:06	18:27 (Oerzen 1)   18:54	07:23   17:11 (Oerzen 2)   16:43	18:26 (Rep 10)   16:16	07:20   16:05	08:12   16:05		
4	04:58   21:48	05:39   21:10		06:32   20:04	18:25 (Oerzen 1)   18:51	07:24   17:07 (Oerzen 2)   16:43	17:11 (Oerzen 2)   16:43	07:21   16:04	08:14   16:04		
5	04:59   21:48	05:41   21:08		06:34   20:01	18:24 (Oerzen 1)   18:49	07:26   17:04 (Oerzen 2)   16:42	17:20 (Oerzen 2)   16:42	07:23   16:04	08:15   16:04		
6	05:00   21:47	05:43   21:07		06:36   19:59	18:21 (Oerzen 1)   18:46	07:28   17:02 (Oerzen 2)   16:40	17:24 (Oerzen 2)   16:40	07:25   16:03	08:16   16:03		
7	05:01   21:47	05:44   21:05		06:38   19:56	18:20 (Oerzen 1)   18:44	07:30   17:01 (Oerzen 2)   16:38	17:04 (Oerzen 2)   16:38	07:27   16:03	08:18   16:03		
8	05:02   21:46	05:46   21:03		06:39   19:54	18:19 (Oerzen 1)   18:42	07:31   17:00 (Oerzen 2)   16:36	17:39 (Oerzen 3)   16:36	07:29   16:02	08:19   16:02		
9	05:03   21:45	05:48   21:01		06:41   19:52	18:17 (Oerzen 1)   18:39	07:33   16:59 (Oerzen 2)   16:34	17:42 (Oerzen 3)   16:34	07:31   16:02	08:20   16:02		
10	05:04   21:44	05:49   20:59		06:43   19:49	19:22 (Rep 11)   18:39	07:35   16:57 (Oerzen 2)   16:33	17:44 (Oerzen 2)   16:33	07:33   16:02	08:21   16:02		
11	05:05   21:44	05:51   20:57		06:44   19:47	18:52 (Oerzen 1)   18:37	07:37   16:56 (Oerzen 2)   16:33	17:44 (Oerzen 3)   16:33	07:35   16:02	08:23   16:02		
12	05:06   21:43	05:53   20:55		06:46   19:44	18:16 (Oerzen 1)   18:35	07:39   16:56 (Oerzen 2)   16:31	17:46 (Oerzen 3)   16:31	07:37   16:01	08:24   16:01		
13	05:07   21:42	05:55   20:53		06:48   19:42	18:51 (Oerzen 1)   18:32	07:40   16:55 (Oerzen 2)   16:29	17:46 (Oerzen 3)   16:29	07:38   16:01	08:25   16:01		
14	05:08   21:41	05:56   20:51		06:50   19:40	18:15 (Oerzen 1)   18:30	07:42   16:55 (Oerzen 2)   16:28	17:46 (Oerzen 3)   16:28	07:40   16:01	08:26   16:01		
15	05:10   21:40	05:58   20:49		06:51   19:37	18:51 (Oerzen 1)   18:28	07:44   16:54 (Oerzen 2)   16:26	17:46 (Oerzen 3)   16:26	07:42   16:01	08:27   16:01		
16	05:11   21:39	06:00   20:46		06:53   19:35	18:50 (Oerzen 1)   18:25	07:46   16:54 (Oerzen 2)   16:25	17:46 (Oerzen 3)   16:25	07:44   16:01	08:28   16:01		
17	05:12   21:38	06:01   20:44		06:55   19:32	18:14 (Oerzen 1)   18:21	07:48   16:54 (Oerzen 2)   16:23	17:46 (Oerzen 3)   16:23	07:46   16:01	08:28   16:01		
18	05:14   21:36	06:03   20:42		06:56   19:30	18:49 (Oerzen 1)   18:19	07:50   16:54 (Oerzen 2)   16:22	17:46 (Oerzen 3)   16:22	07:48   16:02	08:29   16:02		
19	05:15   21:35	06:05   20:40		06:58   19:27	18:47 (Oerzen 1)   18:16	07:51   16:54 (Oerzen 2)   16:19	17:45 (Oerzen 3)   16:19	07:49   16:02	08:30   16:02		
20	05:16   21:34	06:07   20:38		07:00   19:25	18:15 (Oerzen 1)   18:14	07:53   16:55 (Oerzen 2)   16:18	17:44 (Oerzen 3)   16:18	07:51   16:02	08:31   16:02		
21	05:18   21:33	06:08   20:36		07:02   19:23	18:45 (Oerzen 1)   18:12	07:55   16:54 (Oerzen 2)   16:17	17:43 (Oerzen 3)   16:17	07:53   16:03	08:31   16:03		
22	05:19   21:31	06:10   20:33		07:03   19:20	18:16 (Rep 10)   18:10	07:57   16:54 (Oerzen 2)   16:15	17:41 (Oerzen 3)   16:15	07:55   16:03	08:32   16:03		
23	05:21   21:30	06:12   20:31		07:05   19:18	18:42 (Oerzen 1)   18:08	07:59   16:56 (Oerzen 2)   16:14	17:39 (Oerzen 3)   16:14	07:56   16:04	08:32   16:04		
24	05:22   21:28	06:13   20:29	11	07:07   19:15	18:16 (Rep 10)   18:06	08:01   16:57 (Oerzen 2)   16:13	17:36 (Oerzen 3)   16:13	07:58   16:04	08:33   16:04		
25	05:24   21:27	06:15   20:27	15	07:09   19:13	18:40 (Rep 10)   17:03	08:03   16:58 (Oerzen 2)   16:12	17:25 (Oerzen 2)   16:12	08:00   16:05	08:33   16:05		
26	05:25   21:25	06:17   20:24	19	07:10   19:10	18:14 (Rep 10)   17:01	08:04   16:59 (Oerzen 2)   16:11	16:23 (Oerzen 2)   16:11	08:01   16:06	08:33   16:06		
27	05:27   21:24	06:19   20:22	21	07:12   19:08	18:38 (Rep 10)   16:59	08:06   16:02 (Oerzen 2)   16:10	16:21 (Oerzen 2)   16:10	08:03   16:06	08:34   16:06		
28	05:28   21:22	06:20   20:20	23	07:14   19:06	18:15 (Rep 10)   16:57	08:08   16:05 (Oerzen 2)   16:09	16:19 (Oerzen 2)   16:09	08:05   16:07	08:34   16:07		
29	05:30   21:21	06:22   20:18	23	07:16   19:03	18:42 (Oerzen 1)   16:55	08:10   16:06 (Oerzen 2)   16:08	16:16 (Oerzen 2)   16:08	08:06   16:08	08:34   16:08		
30	05:31   21:19	06:24   20:15	25	07:17   19:01	18:17 (Rep 10)   16:53	08:12   16:08 (Oerzen 2)   16:07	16:16 (Oerzen 2)   16:07	08:08   16:09	08:34   16:09		
31	05:33   21:17	06:25   20:13	25	07:19   19:34 (Rep 11)   16:51	18:32 (Rep 10)   16:51	08:14   16:09 (Oerzen 2)   16:10	16:17 (Oerzen 2)   16:10	08:10   16:10	08:34   16:10		
Sonnenscheinstunden		509	458	382	329	965	261	237			
astr.max.mögl.Beschattung			162	1002							

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

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



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s19 - Oerzen, Westerheide 22

### 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	08:34	08:05		07:09	16:21 (Oerzen 2)	06:55	18:26 (Oerzen 1)	05:48	04:59
	16:11	17:01		17:56	54 17:15 (Oerzen 3)	19:53	38 19:04 (Oerzen 1)	20:47	21:35
2	08:34	08:03		07:07	16:21 (Oerzen 2)	06:53	18:26 (Oerzen 1)	05:46	04:59
	16:12	17:03		17:58	54 17:15 (Oerzen 3)	19:55	38 19:04 (Oerzen 1)	20:48	21:36
3	08:34	08:02		07:04	16:21 (Oerzen 2)	06:50	18:26 (Oerzen 1)	05:44	04:58
	16:14	17:05		18:00	52 17:13 (Oerzen 3)	19:56	38 19:04 (Oerzen 1)	20:50	21:37
4	08:33	08:00		07:02	16:22 (Oerzen 2)	06:48	18:25 (Oerzen 1)	05:42	04:57
	16:15	17:07		18:01	51 17:13 (Oerzen 3)	19:58	38 19:03 (Oerzen 1)	20:52	21:39
5	08:33	07:58		07:00	16:22 (Oerzen 2)	06:46	18:25 (Oerzen 1)	05:40	04:56
	16:16	17:09		18:03	50 17:12 (Oerzen 3)	20:00	40 19:29 (Rep 11)	20:54	21:40
6	08:33	07:56		06:57	16:22 (Oerzen 2)	06:43	18:26 (Oerzen 1)	05:38	04:55
	16:17	17:11		18:05	48 17:10 (Oerzen 3)	20:02	49 19:34 (Rep 11)	20:55	21:41
7	08:32	07:54		06:55	16:24 (Oerzen 2)	06:41	18:26 (Oerzen 1)	05:36	04:55
	16:19	17:13		18:07	44 17:08 (Oerzen 3)	20:04	52 19:35 (Rep 11)	20:57	21:42
8	08:32	07:53		06:53	16:24 (Oerzen 2)	06:39	18:26 (Oerzen 1)	05:34	04:54
	16:20	17:15		18:09	36 17:03 (Oerzen 3)	20:05	55 19:37 (Rep 11)	20:59	21:43
9	08:31	07:51		06:50	16:26 (Oerzen 2)	06:36	18:27 (Oerzen 1)	05:32	04:54
	16:21	17:17		18:11	26 16:52 (Oerzen 2)	20:07	55 19:38 (Rep 11)	21:01	21:43
10	08:31	07:49		06:48	16:28 (Oerzen 2)	06:34	18:27 (Oerzen 1)	05:30	04:53
	16:23	17:19		18:13	22 16:50 (Oerzen 2)	20:09	54 19:38 (Rep 11)	21:02	21:44
11	08:30	07:47		06:46	16:30 (Oerzen 2)	06:32	18:29 (Oerzen 1)	05:28	04:53
	16:24	17:21		18:15	17 16:47 (Oerzen 2)	20:11	52 19:38 (Rep 11)	21:04	21:45
12	08:29	07:45		06:43	16:35 (Oerzen 2)	06:29	18:30 (Oerzen 1)	05:27	04:52
	16:26	17:23		18:16	8 16:43 (Oerzen 2)	20:13	49 19:38 (Rep 11)	21:06	21:46
13	08:28	07:43		06:41		06:27	18:33 (Oerzen 1)	05:25	04:52
	16:27	17:25		18:18		20:14	46 19:39 (Rep 11)	21:07	21:46
14	08:28	07:41		06:38	17:42 (Rep 10)	06:25	18:35 (Oerzen 1)	05:23	04:52
	16:29	17:27		18:20	12 17:54 (Rep 10)	20:16	40 19:38 (Rep 11)	21:09	21:47
15	08:27	07:39	16:37 (Oerzen 2)	06:36	17:39 (Rep 10)	06:22	19:12 (Rep 11)	05:22	04:52
	16:31	17:29	8 16:45 (Oerzen 2)	18:22	17 17:56 (Rep 10)	20:18	26 19:38 (Rep 11)	21:11	21:48
16	08:26	07:37	16:33 (Oerzen 2)	06:34	17:37 (Rep 10)	06:20	19:12 (Rep 11)	05:20	04:51
	16:32	17:31	17 16:50 (Oerzen 2)	18:24	20 17:57 (Rep 10)	20:20	25 19:37 (Rep 11)	21:12	21:48
17	08:25	07:35	16:31 (Oerzen 2)	06:31	17:36 (Rep 10)	06:18	19:12 (Rep 11)	05:18	04:51
	16:34	17:33	21 16:52 (Oerzen 2)	18:26	22 17:58 (Rep 10)	20:22	25 19:37 (Rep 11)	21:14	21:49
18	08:24	07:33	16:29 (Oerzen 2)	06:29	17:34 (Rep 10)	06:15	19:12 (Rep 11)	05:17	04:51
	16:36	17:35	25 16:54 (Oerzen 2)	18:27	24 17:58 (Rep 10)	20:23	23 19:35 (Rep 11)	21:15	21:49
19	08:23	07:31	16:27 (Oerzen 2)	06:26	17:34 (Rep 10)	06:13	19:13 (Rep 11)	05:15	04:51
	16:37	17:37	29 16:56 (Oerzen 2)	18:29	24 17:58 (Rep 10)	20:25	21 19:34 (Rep 11)	21:17	21:49
20	08:22	07:29	16:25 (Oerzen 2)	06:24	17:33 (Rep 10)	06:11	19:14 (Rep 11)	05:14	04:51
	16:39	17:39	40 17:07 (Oerzen 3)	18:31	25 17:58 (Rep 10)	20:27	19 19:33 (Rep 11)	21:19	21:50
21	08:21	07:26	16:24 (Oerzen 2)	06:22	17:33 (Rep 10)	06:09	19:15 (Rep 11)	05:12	04:52
	16:41	17:40	46 17:10 (Oerzen 3)	18:33	25 17:58 (Rep 10)	20:29	16 19:31 (Rep 11)	21:20	21:50
22	08:19	07:24	16:24 (Oerzen 2)	06:19	17:33 (Rep 10)	06:07	19:17 (Rep 11)	05:11	04:52
	16:43	17:42	48 17:12 (Oerzen 3)	18:35	25 17:58 (Rep 10)	20:30	12 19:29 (Rep 11)	21:22	21:50
23	08:18	07:22	16:23 (Oerzen 2)	06:17	17:33 (Rep 10)	06:04		05:10	04:52
	16:44	17:44	50 17:13 (Oerzen 3)	18:36	25 17:58 (Oerzen 1)	20:32		21:23	21:50
24	08:17	07:20	16:22 (Oerzen 2)	06:14	17:33 (Rep 10)	06:02		05:08	04:52
	16:46	17:46	51 17:13 (Oerzen 3)	18:38	27 18:00 (Oerzen 1)	20:34		21:24	21:51
25	08:15	07:18	16:22 (Oerzen 2)	06:12	17:33 (Rep 10)	06:00		05:07	04:53
	16:48	17:48	52 17:14 (Oerzen 3)	18:40	28 18:01 (Oerzen 1)	20:36		21:26	21:51
26	08:14	07:16	16:22 (Oerzen 2)	06:10	17:32 (Oerzen 1)	05:58		05:06	04:53
	16:50	17:50	53 17:15 (Oerzen 3)	18:42	30 18:02 (Oerzen 1)	20:38		21:27	21:51
27	08:13	07:13	16:22 (Oerzen 2)	06:07	17:30 (Oerzen 1)	05:56		05:05	04:53
	16:52	17:52	53 17:15 (Oerzen 3)	18:44	32 18:02 (Oerzen 1)	20:39		21:29	21:50
28	08:11	07:11	16:21 (Oerzen 2)	06:05	17:29 (Oerzen 1)	05:54		05:04	04:54
	16:54	17:54	54 17:15 (Oerzen 3)	18:45	34 18:03 (Oerzen 1)	20:41		21:30	21:50
29	08:10			07:02	18:28 (Oerzen 1)	05:52		05:02	04:55
	16:56			19:47	36 19:04 (Oerzen 1)	20:43		21:31	21:50
30	08:08			07:00	18:27 (Oerzen 1)	05:50		05:01	04:55
	16:58			19:49	37 19:04 (Oerzen 1)	20:45		21:33	21:50
31	08:06			06:58	18:27 (Oerzen 1)			05:00	
	16:59			19:51	37 19:04 (Oerzen 1)			21:34	
Sonnenscheinstunden	253	275		367		419		491	
astr.max.mögl.Beschattung		547		942		811			506

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s19 - Oerzen, Westerheide 22

## 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	04:56	05:34		06:27	18:28 (Oerzen 1)	07:19		07:16	08:09		
	21:50	21:16		20:11	19:37 (Rep 11)	18:58		16:49	16:06		
2	04:57	05:36		06:29	18:26 (Oerzen 1)	07:21		17:10 (Oerzen 2)	07:18	08:11	
	21:49	21:14		20:08	19:36 (Rep 11)	18:56	14	17:24 (Oerzen 2)	16:47	16:06	
3	04:57	05:38		06:31	18:24 (Oerzen 1)	07:23		17:07 (Oerzen 2)	07:20	08:12	
	21:49	21:12		20:06	19:35 (Rep 11)	18:54	20	17:27 (Oerzen 2)	16:45	16:05	
4	04:58	05:39		06:32	18:23 (Oerzen 1)	07:24		17:04 (Oerzen 2)	07:21	08:14	
	21:48	21:10		20:04	19:34 (Rep 11)	18:51	24	17:28 (Oerzen 2)	16:44	16:04	
5	04:59	05:41		06:34	18:23 (Oerzen 1)	07:26		17:02 (Oerzen 2)	07:23	08:15	
	21:48	21:08		20:01	19:32 (Rep 11)	18:49	28	17:30 (Oerzen 2)	16:42	16:04	
6	05:00	05:43		06:36	18:21 (Oerzen 1)	07:28		17:00 (Oerzen 2)	07:25	08:16	
	21:47	21:07		19:59	19:29 (Rep 11)	18:46	41	17:42 (Oerzen 3)	16:40	16:03	
7	05:01	05:44		06:38	18:21 (Oerzen 1)	07:30		16:59 (Oerzen 2)	07:27	08:18	
	21:47	21:05		19:56	19:25 (Rep 11)	18:44	46	17:45 (Oerzen 3)	16:38	16:03	
8	05:02	05:46		06:39	18:20 (Oerzen 1)	07:31		16:58 (Oerzen 2)	07:29	08:19	
	21:46	21:03		19:54	18:58 (Oerzen 1)	18:42	48	17:46 (Oerzen 3)	16:36	16:02	
9	05:03	05:48		06:41	18:19 (Oerzen 1)	07:33		16:57 (Oerzen 2)	07:31	08:20	
	21:45	21:01		19:52	18:57 (Oerzen 1)	18:39	50	17:47 (Oerzen 3)	16:35	16:02	
10	05:04	05:49		06:43	18:19 (Oerzen 1)	07:35		16:55 (Oerzen 2)	07:33	08:21	
	21:44	20:59		19:49	18:57 (Oerzen 1)	18:37	52	17:47 (Oerzen 3)	16:33	16:02	
11	05:05	05:51		06:44	18:19 (Oerzen 1)	07:37		16:55 (Oerzen 2)	07:35	08:23	
	21:44	20:57		19:47	18:57 (Oerzen 1)	18:35	53	17:48 (Oerzen 3)	16:31	16:01	
12	05:06	05:53		06:46	18:18 (Oerzen 1)	07:39		16:54 (Oerzen 2)	07:37	08:24	
	21:43	20:55		19:44	18:56 (Oerzen 1)	18:32	54	17:48 (Oerzen 3)	16:29	16:01	
13	05:07	05:55		06:48	18:18 (Oerzen 1)	07:40		16:54 (Oerzen 2)	07:38	08:25	
	21:42	20:53		19:42	18:55 (Oerzen 1)	18:30	54	17:48 (Oerzen 3)	16:28	16:01	
14	05:08	05:56		06:50	18:19 (Oerzen 1)	07:42		16:54 (Oerzen 2)	07:40	08:26	
	21:41	20:51		19:40	18:55 (Oerzen 1)	18:28	54	17:48 (Oerzen 3)	16:26	16:01	
15	05:10	05:58		06:51	18:18 (Oerzen 1)	07:44		16:54 (Oerzen 2)	07:42	08:27	
	21:40	20:49		19:37	18:53 (Oerzen 1)	18:25	53	17:47 (Oerzen 3)	16:25	16:01	
16	05:11	06:00		06:53	18:19 (Oerzen 1)	07:46		16:54 (Oerzen 2)	07:44	08:28	
	21:39	20:46		19:35	18:52 (Oerzen 1)	18:23	53	17:47 (Oerzen 3)	16:23	16:01	
17	05:12	06:01		06:55	18:20 (Oerzen 1)	07:48		16:54 (Oerzen 2)	07:46	08:28	
	21:38	20:44		19:32	18:51 (Oerzen 1)	18:21	52	17:46 (Oerzen 3)	16:22	16:02	
18	05:14	06:03		06:56	18:20 (Oerzen 1)	07:50		16:54 (Oerzen 2)	07:48	08:29	
	21:36	20:42		19:30	18:49 (Oerzen 1)	18:19	51	17:45 (Oerzen 3)	16:20	16:02	
19	05:15	06:05		06:58	18:20 (Rep 10)	07:51		16:55 (Oerzen 2)	07:49	08:30	
	21:35	20:40		19:27	18:47 (Oerzen 1)	18:16	49	17:44 (Oerzen 3)	16:19	16:02	
20	05:16	06:07		07:00	18:19 (Rep 10)	07:53		16:55 (Oerzen 2)	07:51	08:31	
	21:34	20:38	5	19:31 (Rep 11)	18:45 (Oerzen 1)	18:14	48	17:43 (Oerzen 3)	16:18	16:02	
21	05:18	06:08		07:02	18:19 (Rep 10)	07:55		16:55 (Oerzen 2)	07:53	08:31	
	21:33	20:36	12	19:34 (Rep 11)	18:44 (Rep 10)	18:12	45	17:40 (Oerzen 3)	16:16	16:03	
22	05:19	06:10		07:03	18:18 (Rep 10)	07:57		16:56 (Oerzen 2)	07:55	08:32	
	21:31	20:33	16	19:36 (Rep 11)	18:43 (Rep 10)	18:10	36	17:36 (Oerzen 3)	16:15	16:03	
23	05:21	06:12		07:05	18:17 (Rep 10)	07:59		16:57 (Oerzen 2)	07:56	08:32	
	21:30	20:31	20	19:37 (Rep 11)	18:43 (Rep 10)	18:08	28	17:25 (Oerzen 2)	16:14	16:04	
24	05:22	06:13		07:07	18:18 (Rep 10)	08:01		16:59 (Oerzen 2)	07:58	08:33	
	21:28	20:29	22	19:38 (Rep 11)	18:42 (Rep 10)	18:06	24	17:23 (Oerzen 2)	16:13	16:04	
25	05:24	06:15		07:09	18:17 (Rep 10)	07:03		16:01 (Oerzen 2)	08:00	08:33	
	21:27	20:27	23	19:39 (Rep 11)	18:41 (Rep 10)	17:03	20	16:21 (Oerzen 2)	16:12	16:05	
26	05:25	06:17		07:10	18:18 (Rep 10)	07:04		16:03 (Oerzen 2)	08:01	08:33	
	21:25	20:24	25	19:39 (Rep 11)	18:40 (Rep 10)	17:01	15	16:18 (Oerzen 2)	16:11	16:06	
27	05:27	06:19		07:12	18:18 (Rep 10)	07:06		16:08 (Oerzen 2)	08:03	08:34	
	21:24	20:22	25	19:39 (Rep 11)	18:39 (Rep 10)	16:59	5	16:13 (Oerzen 2)	16:10	16:06	
28	05:28	06:20		07:14	18:20 (Rep 10)	07:08			08:05	08:34	
	21:22	20:20	26	19:39 (Rep 11)	18:37 (Rep 10)	16:57			16:09	16:07	
29	05:30	06:22		07:16	18:20 (Rep 10)	07:10			08:06	08:34	
	21:21	20:18	41	19:39 (Rep 11)	18:34 (Rep 10)	16:55			16:08	16:08	
30	05:31	06:24		07:17	18:23 (Rep 10)	07:12			08:08	08:34	
	21:19	20:15	47	19:39 (Rep 11)	18:31 (Rep 10)	16:53			16:07	16:09	
31	05:33	06:25		07:14						08:34	
	21:17	20:13	49	19:38 (Rep 11)		16:51				16:10	
Sonnenscheinstunden		509		382		329		261		237	
astr.max.mögl.Beschattung			311		1008		1017				

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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s20 - Oerzen, Westerheide 28**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	08:34	08:05		07:09		16:14 (Oerzen 2)	06:55	18:26 (Oerzen 1)	05:48	04:59	
	16:11	17:01		17:56	59	17:13 (Oerzen 3)	19:53	19:24 (Rep 9)	20:47	21:35	
2	08:34	08:03		07:07		16:14 (Oerzen 2)	06:53	18:25 (Oerzen 1)	05:46	04:59	
	16:12	17:03		17:58	59	17:13 (Oerzen 3)	19:55	19:24 (Rep 9)	20:48	21:36	
3	08:34	08:02		07:04		16:14 (Oerzen 2)	06:50	18:25 (Oerzen 1)	05:44	04:58	
	16:14	17:05		18:00	58	17:12 (Oerzen 3)	19:56	19:24 (Rep 9)	20:50	21:37	
4	08:33	08:00		07:02		16:14 (Oerzen 2)	06:48	18:24 (Oerzen 1)	05:42	04:57	
	16:15	17:07		18:01	57	17:11 (Oerzen 3)	19:58	19:23 (Rep 9)	20:52	21:39	
5	08:33	07:58		07:00		16:15 (Oerzen 2)	06:46	18:24 (Oerzen 1)	05:40	04:56	
	16:16	17:09		18:03	55	17:10 (Oerzen 3)	20:00	19:23 (Rep 9)	20:54	21:40	
6	08:33	07:56		06:57		16:15 (Oerzen 2)	06:43	18:24 (Oerzen 1)	05:38	04:55	
	16:17	17:11		18:05	53	17:08 (Oerzen 3)	20:02	19:22 (Rep 9)	20:55	21:41	
7	08:32	07:54		06:55		16:16 (Oerzen 2)	06:41	18:23 (Oerzen 1)	05:36	04:55	
	16:19	17:13		18:07	51	17:07 (Oerzen 3)	20:04	19:20 (Rep 9)	20:57	21:42	
8	08:32	07:53		06:53		16:16 (Oerzen 2)	06:39	18:24 (Oerzen 1)	05:34	04:54	
	16:20	17:15		18:09	44	17:03 (Oerzen 3)	20:05	19:36 (Rep 11)	20:59	21:43	
9	08:31	07:51		06:50		16:18 (Oerzen 2)	06:36	18:24 (Oerzen 1)	05:32	04:54	
	16:21	17:17		18:11	31	16:49 (Oerzen 2)	20:07	19:38 (Rep 11)	21:01	21:43	
10	08:31	07:49		06:48		16:20 (Oerzen 2)	06:34	18:24 (Oerzen 1)	05:30	04:53	
	16:23	17:19		18:13	27	16:47 (Oerzen 2)	20:09	19:39 (Rep 11)	21:02	21:44	
11	08:30	07:47		06:46		16:21 (Oerzen 2)	06:32	18:24 (Oerzen 1)	05:28	04:53	
	16:24	17:21		18:15	24	16:45 (Oerzen 2)	20:11	19:40 (Rep 11)	21:04	21:45	
12	08:29	07:45		06:43		16:24 (Oerzen 2)	06:29	18:25 (Oerzen 1)	05:27	04:52	
	16:26	17:23		18:16	18	16:42 (Oerzen 2)	20:13	19:41 (Rep 11)	21:06	21:46	
13	08:28	07:43		06:41		16:28 (Oerzen 2)	06:27	18:26 (Oerzen 1)	05:25	04:52	
	16:27	17:25		18:18	8	16:36 (Oerzen 2)	20:14	19:42 (Rep 11)	21:07	21:46	
14	08:28	07:41	16:31 (Oerzen 2)	06:38		17:44 (Rep 10)	06:25	18:26 (Oerzen 1)	05:23	04:52	
	16:29	17:27	11	16:42 (Oerzen 2)	18:20	17:51 (Rep 10)	20:16	19:41 (Rep 11)	21:09	21:47	
15	08:27	07:39	16:26 (Oerzen 2)	06:36		17:41 (Rep 10)	06:22	18:28 (Oerzen 1)	05:22	04:52	
	16:31	17:29	19	16:45 (Oerzen 2)	18:22	17:55 (Rep 10)	20:18	19:41 (Rep 11)	21:11	21:48	
16	08:26	07:37	16:24 (Oerzen 2)	06:34		17:38 (Rep 10)	06:20	18:29 (Oerzen 1)	05:20	04:51	
	16:32	17:31	23	16:47 (Oerzen 2)	18:24	17:56 (Rep 10)	20:20	19:41 (Rep 11)	21:12	21:48	
17	08:25	07:35	16:22 (Oerzen 2)	06:31		17:37 (Rep 10)	06:18	18:31 (Oerzen 1)	05:18	04:51	
	16:34	17:33	27	16:49 (Oerzen 2)	18:26	17:58 (Rep 10)	20:22	19:41 (Rep 11)	21:14	21:49	
18	08:24	07:33	16:21 (Oerzen 2)	06:29		17:35 (Rep 10)	06:15	18:33 (Oerzen 1)	05:17	04:51	
	16:36	17:35	30	16:51 (Oerzen 2)	18:27	17:58 (Rep 10)	20:23	19:40 (Rep 11)	21:15	21:49	
19	08:23	07:31	16:19 (Oerzen 2)	06:26		17:34 (Rep 10)	06:13	18:39 (Oerzen 1)	05:15	04:51	
	16:37	17:37	38	17:03 (Oerzen 3)	18:29	17:59 (Rep 10)	20:25	19:40 (Rep 11)	21:17	21:50	
20	08:22	07:29	16:18 (Oerzen 2)	06:24		17:33 (Rep 10)	06:11	19:13 (Rep 11)	05:14	04:51	
	16:39	17:39	48	17:07 (Oerzen 3)	18:31	17:59 (Rep 10)	20:27	19:39 (Rep 11)	21:19	21:50	
21	08:21	07:26	16:17 (Oerzen 2)	06:22		17:33 (Rep 10)	06:09	19:14 (Rep 11)	05:12	04:52	
	16:41	17:40	52	17:09 (Oerzen 3)	18:33	17:59 (Rep 10)	20:29	19:39 (Rep 11)	21:20	21:50	
22	08:19	07:24	16:16 (Oerzen 2)	06:19		17:33 (Rep 10)	06:07	19:15 (Rep 11)	05:11	04:52	
	16:43	17:42	55	17:11 (Oerzen 3)	18:35	17:59 (Rep 10)	20:30	19:38 (Rep 11)	21:22	21:50	
23	08:18	07:22	16:16 (Oerzen 2)	06:17		17:32 (Rep 10)	06:04	19:16 (Rep 11)	05:10	04:52	
	16:44	17:44	56	17:12 (Oerzen 3)	18:36	17:58 (Rep 10)	20:32	19:36 (Rep 11)	21:23	21:50	
24	08:17	07:20	16:14 (Oerzen 2)	06:14		17:32 (Rep 10)	06:02	19:17 (Rep 11)	05:08	04:52	
	16:46	17:46	58	17:12 (Oerzen 3)	18:38	17:58 (Rep 10)	20:34	19:35 (Rep 11)	21:24	21:51	
25	08:15	07:18	16:14 (Oerzen 2)	06:12		17:32 (Rep 10)	06:00	19:19 (Rep 11)	05:07	04:53	
	16:48	17:48	59	17:13 (Oerzen 3)	18:40	17:59 (Oerzen 1)	20:36	19:33 (Rep 11)	21:26	21:51	
26	08:14	07:16	16:14 (Oerzen 2)	06:10		17:33 (Rep 10)	05:58	19:22 (Rep 11)	05:06	04:53	
	16:50	17:50	59	17:13 (Oerzen 3)	18:42	18:01 (Oerzen 1)	20:38	19:30 (Rep 11)	21:27	21:51	
27	08:13	07:13	16:14 (Oerzen 2)	06:07		17:32 (Oerzen 1)	05:56		05:05	04:53	
	16:52	17:52	60	17:14 (Oerzen 3)	18:44	18:17 (Rep 9)	20:39		21:29	21:50	
28	08:11	07:11	16:13 (Oerzen 2)	06:05		17:31 (Oerzen 1)	05:54		05:04	04:54	
	16:54	17:54	60	17:13 (Oerzen 3)	18:45	18:19 (Rep 9)	20:41		21:30	21:50	
29	08:10			07:02		18:30 (Oerzen 1)	05:52		05:02	04:55	
	16:56			19:47	49	19:21 (Rep 9)	20:43		21:31	21:50	
30	08:08			07:00		18:28 (Oerzen 1)	05:50		05:01	04:55	
	16:58			19:49	55	19:23 (Rep 9)	20:45		21:33	21:50	
31	08:06			06:58		18:27 (Oerzen 1)			05:00		
	17:00			19:51	57	19:24 (Rep 9)			21:34		
Sonnenscheinstunden	253	275		367			419		491	506	
astr.max.mögl.Beschattung			655		1077		1212				

**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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s20 - Oerzen, Westerheide 28

### 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	04:56 21:50	05:35 21:16		06:27 20:11		18:23 (Oerzen 1) 19:39 (Rep 11)	07:19 18:58		17:05 (Oerzen 2) 17:19 (Oerzen 2)	07:16 16:49	08:09 16:06
2	04:57 21:49	05:36 21:14		06:29 20:08	61	18:23 (Oerzen 1) 19:38 (Rep 11)	07:21 18:56	14	17:01 (Oerzen 2) 17:22 (Oerzen 2)	07:18 16:47	08:11 16:06
3	04:57 21:49	05:38 21:12		06:31 20:06	59	18:21 (Oerzen 1) 19:35 (Rep 11)	07:23 18:54	21	16:59 (Oerzen 2) 17:25 (Oerzen 2)	07:20 16:45	08:12 16:05
4	04:58 21:48	05:39 21:10		06:32 20:04	68	18:21 (Oerzen 1) 19:33 (Rep 11)	07:24 18:51	26	16:56 (Oerzen 2) 17:25 (Oerzen 2)	07:21 16:44	08:14 16:04
5	04:59 21:48	05:41 21:08		06:34 20:01	68	18:20 (Oerzen 1) 19:28 (Rep 11)	07:26 18:49	29	16:54 (Oerzen 2) 17:37 (Oerzen 3)	07:23 16:42	08:15 16:04
6	05:00 21:47	05:43 21:07		06:36 19:59	59	18:19 (Oerzen 1) 19:17 (Rep 9)	07:28 18:46	37	16:53 (Oerzen 2) 17:41 (Oerzen 3)	07:25 16:40	08:16 16:03
7	05:01 21:47	05:44 21:05		06:38 19:56	58	18:19 (Oerzen 1) 19:18 (Rep 9)	07:30 18:44	47	16:51 (Oerzen 2) 17:43 (Oerzen 3)	07:27 16:38	08:18 16:03
8	05:02 21:46	05:46 21:03		06:39 19:54	59	18:19 (Oerzen 1) 19:18 (Rep 9)	07:31 18:42	52	16:50 (Oerzen 2) 17:45 (Oerzen 3)	07:29 16:36	08:19 16:02
9	05:03 21:45	05:48 21:01		06:41 19:52	59	18:18 (Oerzen 1) 19:17 (Rep 9)	07:33 18:39	55	16:50 (Oerzen 2) 17:46 (Oerzen 3)	07:31 16:35	08:20 16:02
10	05:04 21:44	05:49 20:59		06:43 19:49	59	18:18 (Oerzen 1) 19:17 (Rep 9)	07:35 18:37	56	16:48 (Oerzen 2) 17:45 (Oerzen 3)	07:33 16:33	08:21 16:02
11	05:05 21:44	05:51 20:57		06:44 19:47	57	18:19 (Oerzen 1) 19:17 (Rep 9)	07:37 18:35	57	16:47 (Oerzen 2) 17:46 (Oerzen 3)	07:35 16:31	08:23 16:02
12	05:06 21:43	05:53 20:55		06:46 19:44	58	18:18 (Oerzen 1) 19:16 (Rep 9)	07:39 18:32	59	16:47 (Oerzen 2) 17:46 (Oerzen 3)	07:37 16:29	08:24 16:01
13	05:07 21:42	05:55 20:53		06:48 19:42	58	18:19 (Oerzen 1) 19:14 (Rep 9)	07:40 18:30	59	16:47 (Oerzen 2) 17:46 (Oerzen 3)	07:38 16:28	08:25 16:01
14	05:08 21:41	05:56 20:51		06:50 19:40	55	18:20 (Oerzen 1) 19:12 (Rep 9)	07:42 18:28	59	16:46 (Oerzen 2) 17:46 (Oerzen 3)	07:40 16:26	08:26 16:01
15	05:10 21:40	05:58 20:49		06:51 19:37	50	18:20 (Oerzen 1) 19:09 (Rep 9)	07:44 18:25	60	16:46 (Oerzen 2) 17:46 (Oerzen 3)	07:42 16:25	08:27 16:01
16	05:11 21:39	06:00 20:46		06:53 19:35	45	18:21 (Oerzen 1) 19:07 (Rep 9)	07:46 18:23	60	16:46 (Oerzen 2) 17:45 (Oerzen 3)	07:44 16:23	08:28 16:01
17	05:12 21:38	06:01 20:44		06:55 19:32	38	18:21 (Rep 10) 18:50 (Oerzen 1)	07:48 18:21	59	16:47 (Oerzen 2) 17:45 (Oerzen 3)	07:46 16:22	08:28 16:02
18	05:14 21:36	06:03 20:42	9	06:56 19:24 (Rep 11)	29	18:20 (Rep 10) 18:47 (Oerzen 1)	07:50 18:19	58	16:47 (Oerzen 2) 17:44 (Oerzen 3)	07:48 16:20	08:29 16:02
19	05:15 21:35	06:05 20:40	15	06:58 19:22 (Rep 11)	27	18:19 (Rep 10) 18:44 (Rep 10)	07:51 18:16	57	16:47 (Oerzen 2) 17:43 (Oerzen 3)	07:49 16:19	08:30 16:02
20	05:16 21:34	06:07 20:38	19	07:00 19:21 (Rep 11)	25	18:18 (Rep 10) 18:45 (Rep 10)	07:53 18:14	56	16:48 (Oerzen 2) 17:41 (Oerzen 3)	07:51 16:18	08:31 16:02
21	05:18 21:33	06:08 20:36	21	07:02 19:19 (Rep 11)	27	18:18 (Rep 10) 18:45 (Rep 10)	07:55 18:12	53	16:47 (Oerzen 2) 17:39 (Oerzen 3)	07:53 16:16	08:31 16:03
22	05:19 21:31	06:10 20:33	23	07:03 19:19 (Rep 11)	27	18:17 (Rep 10) 18:44 (Rep 10)	07:57 18:10	52	16:48 (Oerzen 2) 17:36 (Oerzen 3)	07:55 16:15	08:32 16:03
23	05:21 21:30	06:12 20:31	24	07:05 19:17 (Rep 11)	27	18:17 (Rep 10) 18:43 (Rep 10)	07:59 18:08	46	16:49 (Oerzen 2) 17:22 (Oerzen 2)	07:56 16:14	08:32 16:04
24	05:22 21:28	06:13 20:29	26	07:07 19:43 (Rep 11)	26	18:18 (Rep 10) 18:43 (Rep 10)	08:01 18:06	33	16:50 (Oerzen 2) 17:20 (Oerzen 2)	07:58 16:13	08:33 16:04
25	05:24 21:27	06:15 20:27	35	07:09 18:37 (Oerzen 1)	25	18:17 (Rep 10) 18:41 (Rep 10)	07:03 17:03	30	15:52 (Oerzen 2) 16:18 (Oerzen 2)	08:00 16:12	08:33 16:05
26	05:25 21:25	06:17 20:24	44	07:10 19:44 (Rep 11)	24	18:18 (Rep 10) 18:40 (Rep 10)	07:04 17:01	26	15:54 (Oerzen 2) 16:16 (Oerzen 2)	08:01 16:11	08:33 16:06
27	05:27 21:24	06:19 20:22	50	07:12 19:43 (Rep 11)	22	18:19 (Rep 10) 18:39 (Rep 10)	07:06 16:59	22	15:56 (Oerzen 2) 16:14 (Oerzen 2)	08:03 16:10	08:34 16:06
28	05:28 21:22	06:20 20:20	54	07:14 18:29 (Oerzen 1)	20	18:21 (Rep 10) 18:37 (Rep 10)	07:08 16:57	18	16:01 (Oerzen 2) 16:10 (Oerzen 2)	08:05 16:09	08:34 16:07
29	05:30 21:21	06:22 20:18	56	07:16 18:27 (Oerzen 1)	16	18:22 (Rep 10) 18:33 (Rep 10)	07:10 16:55	9	16:10 (Oerzen 2) 16:10 (Oerzen 2)	08:06 16:08	08:34 16:08
30	05:31 21:19	06:24 20:15	59	07:17 19:42 (Rep 11)	11	18:26 (Oerzen 1) 19:41 (Rep 11)	07:12 16:53			08:08 16:07	08:34 16:09
31	05:33 21:17	06:26 20:13	59	07:14 18:25 (Oerzen 1)			07:14 16:51				08:34 16:10
Sonnenscheinstunden		509		382			329			261	237
astr.max.mögl.Beschattung			555		1219		1210				

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s21 - Oerzen, Zum Hasel 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 Sonneneinstrichtungsrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai		Juni	
1	08:34	08:05	07:09	06:55	05:48		05:00	20:22 (Oerzen 4)
	16:11	17:02	17:56	19:53	20:47		21:35	9 20:31 (Oerzen 4)
2	08:34	08:03	07:07	06:53	05:46		04:59	20:24 (Oerzen 4)
	16:13	17:03	17:58	19:55	20:48		21:36	6 20:30 (Oerzen 4)
3	08:34	08:01	07:04	06:50	05:44		04:58	
	16:14	17:05	18:00	19:56	20:50		21:37	
4	08:33	08:00	07:02	06:48	05:42		04:57	
	16:15	17:07	18:01	19:58	20:52		21:38	
5	08:33	07:58	07:00	06:46	05:40		04:56	
	16:16	17:09	18:03	20:00	20:54		21:40	
6	08:33	07:56	06:57	06:43	05:38		04:56	
	16:17	17:11	18:05	20:02	20:55		21:41	
7	08:32	07:54	06:55	06:41	05:36	20:22 (Oerzen 4)	04:55	
	16:19	17:13	18:07	20:04	20:57	5 20:27 (Oerzen 4)	21:42	
8	08:32	07:53	06:53	06:39	05:34	20:19 (Oerzen 4)	04:54	
	16:20	17:15	18:09	20:05	20:59	9 20:28 (Oerzen 4)	21:42	
9	08:31	07:51	06:50	06:36	05:32	20:17 (Oerzen 4)	04:54	
	16:22	17:17	18:11	20:07	21:00	13 20:30 (Oerzen 4)	21:43	
10	08:31	07:49	06:48	06:34	05:30	20:17 (Oerzen 4)	04:53	
	16:23	17:19	18:13	20:09	21:02	15 20:32 (Oerzen 4)	21:44	
11	08:30	07:47	06:46	06:32	05:29	20:15 (Oerzen 4)	04:53	
	16:24	17:21	18:15	20:11	21:04	18 20:33 (Oerzen 4)	21:45	
12	08:29	07:45	06:43	06:29	05:27	20:15 (Oerzen 4)	04:53	
	16:26	17:23	18:16	20:13	21:06	20 20:35 (Oerzen 4)	21:46	
13	08:28	07:43	06:41	06:27	05:25	20:14 (Oerzen 4)	04:52	
	16:28	17:25	18:18	20:14	21:07	22 20:36 (Oerzen 4)	21:46	
14	08:28	07:41	06:38	06:25	05:23	20:13 (Oerzen 4)	04:52	
	16:29	17:27	18:20	20:16	21:09	23 20:36 (Oerzen 4)	21:47	
15	08:27	07:39	06:36	06:22	05:22	20:14 (Oerzen 4)	04:52	
	16:31	17:29	18:22	20:18	21:11	23 20:37 (Oerzen 4)	21:48	
16	08:26	07:37	06:34	06:20	05:20	20:13 (Oerzen 4)	04:52	
	16:32	17:31	18:24	20:20	21:12	24 20:37 (Oerzen 4)	21:48	
17	08:25	07:35	06:31	06:18	05:19	20:13 (Oerzen 4)	04:52	
	16:34	17:33	18:26	20:22	21:14	24 20:37 (Oerzen 4)	21:49	
18	08:24	07:33	06:29	06:16	05:17	20:14 (Oerzen 4)	04:51	
	16:36	17:35	18:27	20:23	21:15	24 20:38 (Oerzen 4)	21:49	
19	08:23	07:31	06:27	06:13	05:15	20:13 (Oerzen 4)	04:51	
	16:37	17:37	18:29	20:25	21:17	24 20:37 (Oerzen 4)	21:49	
20	08:22	07:29	06:24	06:11	05:14	20:14 (Oerzen 4)	04:52	
	16:39	17:39	18:31	20:27	21:18	23 20:37 (Oerzen 4)	21:50	
21	08:20	07:26	06:22	06:09	05:13	20:14 (Oerzen 4)	04:52	
	16:41	17:40	18:33	20:29	21:20	23 20:37 (Oerzen 4)	21:50	
22	08:19	07:24	06:19	06:07	05:11	20:14 (Oerzen 4)	04:52	
	16:43	17:42	18:35	20:30	21:21	22 20:36 (Oerzen 4)	21:50	
23	08:18	07:22	06:17	06:04	05:10	20:14 (Oerzen 4)	04:52	
	16:45	17:44	18:36	20:32	21:23	22 20:36 (Oerzen 4)	21:50	
24	08:17	07:20	06:14	06:02	05:09	20:15 (Oerzen 4)	04:52	
	16:46	17:46	18:38	20:34	21:24	21 20:36 (Oerzen 4)	21:50	
25	08:15	07:18	06:12	06:00	05:07	20:16 (Oerzen 4)	04:53	
	16:48	17:48	18:40	20:36	21:26	20 20:36 (Oerzen 4)	21:51	
26	08:14	07:16	06:10	05:58	05:06	20:16 (Oerzen 4)	04:53	
	16:50	17:50	18:42	20:38	21:27	20 20:36 (Oerzen 4)	21:51	
27	08:13	07:13	06:07	05:56	05:05	20:17 (Oerzen 4)	04:54	
	16:52	17:52	18:44	20:39	21:29	18 20:35 (Oerzen 4)	21:50	
28	08:11	07:11	06:05	05:54	05:04	20:18 (Oerzen 4)	04:54	
	16:54	17:54	18:46	20:41	21:30	17 20:35 (Oerzen 4)	21:50	
29	08:10		07:02	05:52	05:03	20:19 (Oerzen 4)	04:55	
	16:56		19:47	20:43	21:31	15 20:34 (Oerzen 4)	21:50	
30	08:08		07:00	05:50	05:02	20:19 (Oerzen 4)	04:55	
	16:58		19:49	20:45	21:33	14 20:33 (Oerzen 4)	21:50	
31	08:06		06:58		05:01	20:20 (Oerzen 4)		
	17:00		19:51		21:34	12 20:32 (Oerzen 4)		
Sonnenscheinstunden	253	275	367	419	491		506	
astr.max.mögl.Beschattung					471		15	

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s21 - Oerzen, Zum Hasel 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	04:56	05:35	20:26 (Oerzen 4)	06:27	07:19	07:16	08:09
	21:50	21:16	19 20:45 (Oerzen 4)	20:11	18:58	16:49	16:06
2	04:57	05:36	20:26 (Oerzen 4)	06:29	07:21	07:18	08:11
	21:49	21:14	17 20:43 (Oerzen 4)	20:08	18:56	16:47	16:06
3	04:57	05:38	20:27 (Oerzen 4)	06:31	07:23	07:20	08:12
	21:49	21:12	15 20:42 (Oerzen 4)	20:06	18:54	16:45	16:05
4	04:58	05:39	20:28 (Oerzen 4)	06:32	07:24	07:21	08:14
	21:48	21:10	11 20:39 (Oerzen 4)	20:04	18:51	16:44	16:04
5	04:59	05:41	20:30 (Oerzen 4)	06:34	07:26	07:23	08:15
	21:48	21:08	8 20:38 (Oerzen 4)	20:01	18:49	16:42	16:04
6	05:00	05:43	20:33 (Oerzen 4)	06:36	07:28	07:25	08:16
	21:47	21:07	3 20:36 (Oerzen 4)	19:59	18:46	16:40	16:03
7	05:01	05:44		06:38	07:30	07:27	08:18
	21:47	21:05		19:56	18:44	16:38	16:03
8	05:02	05:46		06:39	07:31	07:29	08:19
	21:46	21:03		19:54	18:42	16:36	16:02
9	05:03	05:48		06:41	07:33	07:31	08:20
	21:45	21:01		19:52	18:39	16:35	16:02
10	05:04	05:50		06:43	07:35	07:33	08:21
	21:44	20:33 (Oerzen 4)	05:50				
	21:44	3 20:36 (Oerzen 4)	20:59	19:49	18:37	16:33	16:02
11	05:05	20:31 (Oerzen 4)	05:51	06:44	07:37	07:35	08:23
	21:44	7 20:38 (Oerzen 4)	20:57	19:47	18:35	16:31	16:02
12	05:06	20:29 (Oerzen 4)	05:53	06:46	07:39	07:36	08:24
	21:43	11 20:40 (Oerzen 4)	20:55	19:44	18:32	16:30	16:01
13	05:07	20:28 (Oerzen 4)	05:55	06:48	07:40	07:38	08:25
	21:42	13 20:41 (Oerzen 4)	20:53	19:42	18:30	16:28	16:01
14	05:09	20:27 (Oerzen 4)	05:56	06:50	07:42	07:40	08:26
	21:41	15 20:42 (Oerzen 4)	20:51	19:40	18:28	16:26	16:01
15	05:10	20:27 (Oerzen 4)	05:58	06:51	07:44	07:42	08:27
	21:40	16 20:43 (Oerzen 4)	20:49	19:37	18:26	16:25	16:01
16	05:11	20:27 (Oerzen 4)	06:00	06:53	07:46	07:44	08:27
	21:39	17 20:44 (Oerzen 4)	20:46	19:35	18:23	16:23	16:01
17	05:12	20:26 (Oerzen 4)	06:01	06:55	07:48	07:46	08:28
	21:37	19 20:45 (Oerzen 4)	20:44	19:32	18:21	16:22	16:02
18	05:14	20:25 (Oerzen 4)	06:03	06:56	07:50	07:47	08:29
	21:36	20 20:45 (Oerzen 4)	20:42	19:30	18:19	16:21	16:02
19	05:15	20:25 (Oerzen 4)	06:05	06:58	07:51	07:49	08:30
	21:35	20 20:45 (Oerzen 4)	20:40	19:27	18:17	16:19	16:02
20	05:16	20:25 (Oerzen 4)	06:07	07:00	07:53	07:51	08:30
	21:34	22 20:47 (Oerzen 4)	20:38	19:25	18:14	16:18	16:02
21	05:18	20:25 (Oerzen 4)	06:08	07:02	07:55	07:53	08:31
	21:33	22 20:47 (Oerzen 4)	20:36	19:23	18:12	16:17	16:03
22	05:19	20:24 (Oerzen 4)	06:10	07:03	07:57	07:55	08:32
	21:31	23 20:47 (Oerzen 4)	20:33	19:20	18:10	16:15	16:03
23	05:21	20:24 (Oerzen 4)	06:12	07:05	07:59	07:56	08:32
	21:30	24 20:48 (Oerzen 4)	20:31	19:18	18:08	16:14	16:04
24	05:22	20:24 (Oerzen 4)	06:13	07:07	08:01	07:58	08:33
	21:28	24 20:48 (Oerzen 4)	20:29	19:15	18:06	16:13	16:04
25	05:24	20:23 (Oerzen 4)	06:15	07:09	07:03	08:00	08:33
	21:27	24 20:47 (Oerzen 4)	20:27	19:13	17:04	16:12	16:05
26	05:25	20:24 (Oerzen 4)	06:17	07:10	07:04	08:01	08:33
	21:25	24 20:48 (Oerzen 4)	20:24	19:10	17:01	16:11	16:06
27	05:27	20:24 (Oerzen 4)	06:19	07:12	07:06	08:03	08:33
	21:24	23 20:47 (Oerzen 4)	20:22	19:08	16:59	16:10	16:07
28	05:28	20:24 (Oerzen 4)	06:20	07:14	07:08	08:05	08:34
	21:22	24 20:48 (Oerzen 4)	20:20	19:06	16:57	16:09	16:07
29	05:30	20:24 (Oerzen 4)	06:22	07:16	07:10	08:06	08:34
	21:21	23 20:47 (Oerzen 4)	20:18	19:03	16:55	16:08	16:08
30	05:31	20:25 (Oerzen 4)	06:24	07:17	07:12	08:08	08:34
	21:19	22 20:47 (Oerzen 4)	20:15	19:01	16:53	16:07	16:09
31	05:33	20:25 (Oerzen 4)	06:26		07:14		08:34
	21:17	21 20:46 (Oerzen 4)	20:13		16:51		16:10
Sonnenscheinstunden		509	458	382	329	262	237
astr.max.mögl.Beschattung		417	73				

**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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s22 - Oerzen, Zum Hasel 10

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlungsrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April		Mai		Juni	
1	08:34	08:05	07:09	06:55		05:48	19:45 (Oerzen 3)	05:00	20:25 (Rep 10)
	16:11	17:01	17:56	19:53		20:47	25 20:10 (Oerzen 3)	21:35	25 20:50 (Rep 10)
2	08:34	08:03	07:06	06:53		05:46	19:44 (Oerzen 3)	04:59	20:26 (Rep 10)
	16:13	17:03	17:58	19:55		20:48	27 20:11 (Oerzen 3)	21:36	24 20:50 (Rep 10)
3	08:34	08:01	07:04	06:50		05:44	19:43 (Oerzen 3)	04:58	20:26 (Rep 10)
	16:14	17:05	18:00	19:56		20:50	28 20:11 (Oerzen 3)	21:37	24 20:50 (Rep 10)
4	08:33	08:00	07:02	06:48		05:42	19:43 (Oerzen 3)	04:57	20:26 (Rep 10)
	16:15	17:07	18:01	19:58		20:52	28 20:11 (Oerzen 3)	21:38	24 20:50 (Rep 10)
5	08:33	07:58	07:00	06:46		05:40	19:42 (Oerzen 3)	04:56	20:27 (Rep 10)
	16:16	17:09	18:03	20:00		20:54	28 20:10 (Oerzen 3)	21:40	23 20:50 (Rep 10)
6	08:33	07:56	06:57	06:43		05:38	19:43 (Oerzen 3)	04:56	20:27 (Rep 10)
	16:17	17:11	18:05	20:02		20:55	28 20:11 (Oerzen 3)	21:41	23 20:50 (Rep 10)
7	08:32	07:54	06:55	06:41		05:36	19:43 (Oerzen 3)	04:55	20:28 (Rep 10)
	16:19	17:13	18:07	20:04		20:57	28 20:11 (Oerzen 3)	21:42	22 20:50 (Rep 10)
8	08:32	07:53	06:53	06:39		05:34	19:43 (Oerzen 3)	04:54	20:28 (Rep 10)
	16:20	17:15	18:09	20:05		20:59	27 20:10 (Oerzen 3)	21:42	22 20:50 (Rep 10)
9	08:31	07:51	06:50	06:36		05:32	19:43 (Oerzen 3)	04:54	20:29 (Rep 10)
	16:21	17:17	18:11	20:07		21:00	27 20:10 (Oerzen 3)	21:43	21 20:50 (Rep 10)
10	08:31	07:49	06:48	06:34		05:30	19:44 (Oerzen 3)	04:53	20:28 (Rep 10)
	16:23	17:19	18:13	20:09		21:02	26 20:10 (Oerzen 3)	21:44	22 20:50 (Rep 10)
11	08:30	07:47	06:46	06:32		05:29	19:44 (Oerzen 3)	04:53	20:29 (Rep 10)
	16:24	17:21	18:15	20:11		21:04	25 20:09 (Oerzen 3)	21:45	26 20:55 (Oerzen 2)
12	08:29	07:45	06:43	06:29		05:27	19:44 (Oerzen 3)	04:52	20:30 (Rep 10)
	16:26	17:23	18:16	20:13		21:06	24 20:08 (Oerzen 3)	21:46	27 20:57 (Oerzen 2)
13	08:28	07:43	06:41	06:27		05:25	19:45 (Oerzen 3)	04:52	20:30 (Rep 10)
	16:27	17:25	18:18	20:14		21:07	23 20:08 (Oerzen 3)	21:46	28 20:58 (Oerzen 2)
14	08:28	07:41	06:38	06:25		05:23	19:45 (Oerzen 3)	04:52	20:30 (Rep 10)
	16:29	17:27	18:20	20:16		21:09	22 20:07 (Oerzen 3)	21:47	28 20:58 (Oerzen 2)
15	08:27	07:39	06:36	06:22		05:22	19:47 (Oerzen 3)	04:52	20:30 (Rep 10)
	16:31	17:29	18:22	20:18		21:11	25 20:39 (Rep 10)	21:48	29 20:59 (Oerzen 2)
16	08:26	07:37	06:34	06:20		05:20	19:47 (Oerzen 3)	04:52	20:31 (Rep 10)
	16:32	17:31	18:24	20:20		21:12	28 20:40 (Rep 10)	21:48	29 21:00 (Oerzen 2)
17	08:25	07:35	06:31	06:18		05:19	19:49 (Oerzen 3)	04:51	20:31 (Rep 10)
	16:34	17:33	18:26	20:21		21:14	28 20:42 (Rep 10)	21:49	29 21:00 (Oerzen 2)
18	08:24	07:33	06:29	06:16		05:17	19:52 (Oerzen 3)	04:51	20:31 (Rep 10)
	16:36	17:35	18:27	20:23		21:15	26 20:44 (Rep 10)	21:49	30 21:01 (Oerzen 2)
19	08:23	07:31	06:26	06:13		05:15	19:55 (Oerzen 3)	04:51	20:31 (Rep 10)
	16:37	17:37	18:29	20:25		21:17	21 20:45 (Rep 10)	21:49	30 21:01 (Oerzen 2)
20	08:22	07:29	06:24	06:11		05:14	20:26 (Rep 10)	04:52	20:33 (Rep 10)
	16:39	17:39	18:31	20:27		21:18	20 20:46 (Rep 10)	21:50	29 21:02 (Oerzen 2)
21	08:20	07:26	06:22	06:09		05:13	20:26 (Rep 10)	04:52	20:33 (Rep 10)
	16:41	17:40	18:33	20:29		21:20	22 20:48 (Rep 10)	21:50	29 21:02 (Oerzen 2)
22	08:19	07:24	06:19	06:07		05:11	20:25 (Rep 10)	04:52	20:33 (Rep 10)
	16:43	17:42	18:35	20:30		21:22	22 20:47 (Rep 10)	21:50	29 21:02 (Oerzen 2)
23	08:18	07:22	06:17	06:04		05:10	20:25 (Rep 10)	04:52	20:33 (Rep 10)
	16:45	17:44	18:36	20:32		21:23	23 20:48 (Rep 10)	21:50	29 21:02 (Oerzen 2)
24	08:17	07:20	06:14	06:02		05:08	20:25 (Rep 10)	04:52	20:33 (Rep 10)
	16:46	17:46	18:38	20:34		21:24	23 20:48 (Rep 10)	21:50	30 21:03 (Oerzen 2)
25	08:15	07:18	06:12	06:00	19:55 (Oerzen 3)	05:07	20:25 (Rep 10)	04:53	20:33 (Rep 10)
	16:48	17:48	18:40	20:36	7 20:02 (Oerzen 3)	21:26	24 20:49 (Rep 10)	21:51	30 21:03 (Oerzen 2)
26	08:14	07:16	06:10	05:58	19:51 (Oerzen 3)	05:06	20:25 (Rep 10)	04:53	20:33 (Rep 10)
	16:50	17:50	18:42	20:38	14 20:05 (Oerzen 3)	21:27	24 20:49 (Rep 10)	21:51	29 21:02 (Oerzen 2)
27	08:13	07:13	06:07	05:56	19:49 (Oerzen 3)	05:05	20:25 (Rep 10)	04:54	20:33 (Rep 10)
	16:52	17:52	18:44	20:39	18 20:07 (Oerzen 3)	21:29	24 20:49 (Rep 10)	21:50	29 21:02 (Oerzen 2)
28	08:11	07:11	06:05	05:54	19:48 (Oerzen 3)	05:04	20:25 (Rep 10)	04:54	20:33 (Rep 10)
	16:54	17:54	18:45	20:41	20 20:08 (Oerzen 3)	21:30	25 20:50 (Rep 10)	21:50	28 21:01 (Oerzen 2)
29	08:10		07:02	05:52	19:46 (Oerzen 3)	05:03	20:25 (Rep 10)	04:55	20:33 (Rep 10)
	16:56		19:47	20:43	23 20:09 (Oerzen 3)	21:31	25 20:50 (Rep 10)	21:50	28 21:01 (Oerzen 2)
30	08:08		07:00	05:50	19:45 (Oerzen 3)	05:01	20:25 (Rep 10)	04:55	20:34 (Rep 10)
	16:58		19:49	20:45	25 20:10 (Oerzen 3)	21:33	25 20:50 (Rep 10)	21:50	27 21:01 (Oerzen 2)
31	08:06		06:58			05:00	20:25 (Rep 10)		
	17:00		19:51			21:34	25 20:50 (Rep 10)		
Sonnenscheinstunden	253	275	367	419		491		506	
astr.max.mögl.Beschattung				107		776		803	

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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s22 - Oerzen, Zum Hasel 10

### Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober	November	Dezember
1	04:56	20:33 (Rep 10)	05:35	19:55 (Oerzen 3)	06:27	07:19	07:16	08:09
	21:50	27	21:00 (Oerzen 2)	21:16	25	20:20 (Oerzen 3)	20:11	18:58
2	04:57	20:34 (Rep 10)	05:36	19:54 (Oerzen 3)	06:29	07:21	07:18	08:11
	21:49	24	20:58 (Oerzen 2)	21:14	26	20:20 (Oerzen 3)	20:08	18:56
3	04:57	20:34 (Rep 10)	05:38	19:54 (Oerzen 3)	06:31	07:23	07:20	08:12
	21:49	21	20:55 (Rep 10)	21:12	26	20:20 (Oerzen 3)	20:06	18:54
4	04:58	20:33 (Rep 10)	05:39	19:53 (Oerzen 3)	06:32	07:24	07:21	08:14
	21:48	22	20:55 (Rep 10)	21:10	27	20:20 (Oerzen 3)	20:04	18:51
5	04:59	20:33 (Rep 10)	05:41	19:53 (Oerzen 3)	06:34	07:26	07:23	08:15
	21:48	23	20:56 (Rep 10)	21:08	28	20:21 (Oerzen 3)	20:01	18:49
6	05:00	20:33 (Rep 10)	05:43	19:52 (Oerzen 3)	06:36	07:28	07:25	08:16
	21:47	23	20:56 (Rep 10)	21:07	28	20:20 (Oerzen 3)	19:59	18:46
7	05:01	20:33 (Rep 10)	05:44	19:53 (Oerzen 3)	06:38	07:30	07:27	08:18
	21:47	24	20:57 (Rep 10)	21:05	28	20:21 (Oerzen 3)	19:56	18:44
8	05:02	20:34 (Rep 10)	05:46	19:52 (Oerzen 3)	06:39	07:31	07:29	08:19
	21:46	23	20:57 (Rep 10)	21:03	28	20:20 (Oerzen 3)	19:54	18:42
9	05:03	20:34 (Rep 10)	05:48	19:52 (Oerzen 3)	06:41	07:33	07:31	08:20
	21:45	23	20:57 (Rep 10)	21:01	28	20:20 (Oerzen 3)	19:52	18:39
10	05:04	20:34 (Rep 10)	05:49	19:52 (Oerzen 3)	06:43	07:35	07:33	08:21
	21:44	24	20:58 (Rep 10)	20:59	27	20:19 (Oerzen 3)	19:49	18:37
11	05:05	20:34 (Rep 10)	05:51	19:52 (Oerzen 3)	06:44	07:37	07:35	08:23
	21:44	24	20:58 (Rep 10)	20:57	27	20:19 (Oerzen 3)	19:47	18:35
12	05:06	20:34 (Rep 10)	05:53	19:53 (Oerzen 3)	06:46	07:39	07:36	08:24
	21:43	24	20:58 (Rep 10)	20:55	26	20:19 (Oerzen 3)	19:44	18:32
13	05:07	20:34 (Rep 10)	05:55	19:53 (Oerzen 3)	06:48	07:40	07:38	08:25
	21:42	24	20:58 (Rep 10)	20:53	24	20:17 (Oerzen 3)	19:42	18:30
14	05:08	20:34 (Rep 10)	05:56	19:54 (Oerzen 3)	06:50	07:42	07:40	08:26
	21:41	24	20:58 (Rep 10)	20:51	23	20:17 (Oerzen 3)	19:40	18:28
15	05:10	20:34 (Rep 10)	05:58	19:55 (Oerzen 3)	06:51	07:44	07:42	08:27
	21:40	24	20:58 (Rep 10)	20:49	20	20:15 (Oerzen 3)	19:37	18:25
16	05:11	20:33 (Rep 10)	06:00	19:56 (Oerzen 3)	06:53	07:46	07:44	08:27
	21:39	25	20:58 (Rep 10)	20:46	17	20:13 (Oerzen 3)	19:35	18:23
17	05:12	20:34 (Rep 10)	06:01	19:59 (Oerzen 3)	06:55	07:48	07:46	08:28
	21:37	25	20:59 (Rep 10)	20:44	12	20:11 (Oerzen 3)	19:32	18:21
18	05:14	20:34 (Rep 10)	06:03	20:01 (Oerzen 3)	06:56	07:50	07:47	08:29
	21:36	25	20:59 (Rep 10)	20:42	6	20:07 (Oerzen 3)	19:30	18:19
19	05:15	20:34 (Rep 10)	06:05		06:58	07:51	07:49	08:30
	21:35	24	20:58 (Rep 10)	20:40		19:27	18:16	16:19
20	05:16	20:34 (Rep 10)	06:07		07:00	07:53	07:51	08:30
	21:34	24	20:58 (Rep 10)	20:38		19:25	18:14	16:18
21	05:18	20:36 (Rep 10)	06:08		07:02	07:55	07:53	08:31
	21:33	22	20:58 (Rep 10)	20:36		19:23	18:12	16:17
22	05:19	20:36 (Rep 10)	06:10		07:03	07:57	07:55	08:32
	21:31	22	20:58 (Rep 10)	20:33		19:20	18:10	16:15
23	05:21	20:36 (Rep 10)	06:12		07:05	07:59	07:56	08:32
	21:30	21	20:57 (Rep 10)	20:31		19:18	18:08	16:14
24	05:22	20:37 (Rep 10)	06:13		07:07	08:01	07:58	08:33
	21:28	19	20:56 (Rep 10)	20:29		19:15	18:06	16:13
25	05:24	20:03 (Oerzen 3)	06:15		07:09	07:03	08:00	08:33
	21:27	23	20:54 (Rep 10)	20:27		19:13	17:04	16:12
26	05:25	20:01 (Oerzen 3)	06:17		07:10	07:04	08:01	08:33
	21:25	27	20:54 (Rep 10)	20:24		19:10	17:01	16:11
27	05:27	19:59 (Oerzen 3)	06:19		07:12	07:06	08:03	08:33
	21:24	28	20:52 (Rep 10)	20:22		19:08	16:59	16:10
28	05:28	19:58 (Oerzen 3)	06:20		07:14	07:08	08:05	08:34
	21:22	28	20:51 (Rep 10)	20:20		19:06	16:57	16:09
29	05:30	19:57 (Oerzen 3)	06:22		07:16	07:10	08:06	08:34
	21:21	24	20:49 (Rep 10)	20:18		19:03	16:55	16:08
30	05:31	19:56 (Oerzen 3)	06:24		07:17	07:12	08:08	08:34
	21:19	22	20:18 (Oerzen 3)	20:15		19:01	16:53	16:07
31	05:33	19:55 (Oerzen 3)	06:26			07:14		08:34
	21:17	24	20:19 (Oerzen 3)	20:13			16:51	16:10
Sonnenscheinstunden		509	458		382	329	262	237
astr.max.mögl.Beschattung		737	426					

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s23 - Oerzen, Mühlenweg 10

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlungsrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März		April		Mai	Juni
1	08:34	08:05	07:09		17:13 (Oerzen 2)   06:55		18:51 (Oerzen 1)   05:48	04:59
	16:11	17:01	17:56	16	17:29 (Oerzen 3)   19:53	27	19:18 (Oerzen 1)   20:47	21:35
2	08:34	08:03	07:06		17:10 (Oerzen 2)   06:53		18:50 (Oerzen 1)   05:45	04:59
	16:12	17:03	17:58	21	17:31 (Oerzen 3)   19:54	28	19:18 (Oerzen 1)   20:48	21:36
3	08:34	08:01	07:04		17:07 (Oerzen 2)   06:50		18:50 (Oerzen 1)   05:43	04:58
	16:14	17:05	18:00	26	17:33 (Oerzen 3)   19:56	28	19:18 (Oerzen 1)   20:50	21:37
4	08:33	08:00	07:02		17:06 (Oerzen 2)   06:48		18:49 (Oerzen 1)   05:42	04:57
	16:15	17:07	18:01	28	17:34 (Oerzen 3)   19:58	29	19:18 (Oerzen 1)   20:52	21:38
5	08:33	07:58	07:00		17:04 (Oerzen 2)   06:46		18:49 (Oerzen 1)   05:40	04:56
	16:16	17:09	18:03	30	17:34 (Oerzen 3)   20:00	29	19:18 (Oerzen 1)   20:54	21:40
6	08:33	07:56	06:57		17:04 (Oerzen 2)   06:43		18:49 (Oerzen 1)   05:38	04:55
	16:17	17:11	18:05	31	17:35 (Oerzen 3)   20:02	28	19:17 (Oerzen 1)   20:55	21:41
7	08:32	07:54	06:55		17:03 (Oerzen 2)   06:41		18:49 (Oerzen 1)   05:36	04:55
	16:19	17:13	18:07	32	17:35 (Oerzen 3)   20:03	27	19:16 (Oerzen 1)   20:57	21:42
8	08:32	07:53	06:53		17:02 (Oerzen 2)   06:39		18:50 (Oerzen 1)   05:34	04:54
	16:20	17:15	18:09	32	17:34 (Oerzen 3)   20:05	26	19:16 (Oerzen 1)   20:59	21:42
9	08:31	07:51	06:50		17:02 (Oerzen 2)   06:36		18:50 (Oerzen 1)   05:32	04:54
	16:21	17:17	18:11	32	17:34 (Oerzen 3)   20:07	25	19:15 (Oerzen 1)   21:00	21:43
10	08:31	07:49	06:48		17:02 (Oerzen 2)   06:34		18:50 (Oerzen 1)   05:30	04:53
	16:23	17:19	18:13	32	17:34 (Oerzen 3)   20:09	23	19:13 (Oerzen 1)   21:02	21:44
11	08:30	07:47	06:46		17:01 (Oerzen 2)   06:32		18:52 (Oerzen 1)   05:28	04:53
	16:24	17:21	18:14	31	17:32 (Oerzen 3)   20:11	19	19:11 (Oerzen 1)   21:04	21:45
12	08:29	07:45	06:43		17:02 (Oerzen 2)   06:29		18:54 (Oerzen 1)   05:27	04:52
	16:26	17:23	18:16	29	17:31 (Oerzen 3)   20:12	16	19:10 (Oerzen 1)   21:06	21:46
13	08:28	07:43	06:41		17:01 (Oerzen 2)   06:27		18:56 (Oerzen 1)   05:25	04:52
	16:27	17:25	18:18	29	17:30 (Oerzen 2)   20:14	10	19:06 (Oerzen 1)   21:07	21:46
14	08:28	07:41	06:38		17:02 (Oerzen 2)   06:25		05:23	04:52
	16:29	17:27	18:20	27	17:29 (Oerzen 2)   20:16		21:09	21:47
15	08:27	07:39	06:36		17:02 (Oerzen 2)   06:22		05:22	04:52
	16:31	17:29	18:22	25	17:27 (Oerzen 2)   20:18		21:11	21:48
16	08:26	07:37	06:34		17:03 (Oerzen 2)   06:20		05:20	04:51
	16:32	17:31	18:24	23	17:26 (Oerzen 2)   20:20		21:12	21:48
17	08:25	07:35	06:31		17:05 (Oerzen 2)   06:18		05:18	04:51
	16:34	17:33	18:26	20	17:25 (Oerzen 2)   20:21		21:14	21:49
18	08:24	07:33	06:29		17:07 (Oerzen 2)   06:15		05:17	04:51
	16:36	17:35	18:27	15	17:22 (Oerzen 2)   20:23		21:15	21:49
19	08:23	07:31	06:26		17:10 (Oerzen 2)   06:13		05:15	04:51
	16:37	17:37	18:29	9	17:19 (Oerzen 2)   20:25		21:17	21:49
20	08:22	07:29	06:24		06:11		05:14	04:51
	16:39	17:38	18:31		20:27		21:18	21:50
21	08:20	07:26	06:22		06:09		05:12	04:52
	16:41	17:40	18:33		20:29		21:20	21:50
22	08:19	07:24	06:19		06:07		05:11	04:52
	16:43	17:42	18:35		20:30		21:22	21:50
23	08:18	07:22	06:17		06:04		05:10	04:52
	16:44	17:44	18:36		20:32		21:23	21:50
24	08:17	07:20	06:14		06:02		05:08	04:52
	16:46	17:46	18:38		20:34		21:24	21:51
25	08:15	07:18	06:12		06:00		05:07	04:53
	16:48	17:48	18:40		20:36		21:26	21:51
26	08:14	07:15	06:10		18:04 (Oerzen 1)   05:58		05:06	04:53
	16:50	17:50	18:42	5	18:09 (Oerzen 1)   20:38		21:27	21:51
27	08:13	07:13	06:07		17:59 (Oerzen 1)   05:56		05:05	04:53
	16:52	17:52	18:44	14	18:13 (Oerzen 1)   20:39		21:29	21:50
28	08:11	07:11	06:05		17:57 (Oerzen 1)   05:54		05:04	04:54
	16:54	17:54	18:45	18	18:15 (Oerzen 1)   20:41		21:30	21:50
29	08:10		07:02		18:55 (Oerzen 1)   05:52		05:02	04:55
	16:56		19:47	22	19:17 (Oerzen 1)   20:43		21:31	21:50
30	08:08		07:00		18:53 (Oerzen 1)   05:50		05:01	04:55
	16:58		19:49	24	19:17 (Oerzen 1)   20:45		21:33	21:50
31	08:06		06:58		18:52 (Oerzen 1)		05:00	
	16:59		19:51	26	19:18 (Oerzen 1)		21:34	
Sonnenscheinstunden	253	275	367		419		491	506
astr.max.mögl.Beschattung				597		315		

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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s23 - Oerzen, Mühlenweg 10**Annahmen für Schattenwurfberechnung**

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlungsrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember
1	04:56	05:34		06:27	18:51 (Oerzen 1)	07:19	17:41 (Oerzen 2)	07:16	08:09	
	21:50	21:16		20:11	19:10 (Oerzen 1)	18:58	18:10 (Oerzen 2)	16:49	16:06	
2	04:57	05:36		06:29	18:49 (Oerzen 1)	07:21	17:40 (Oerzen 2)	07:18	08:11	
	21:49	21:14		20:08	19:12 (Oerzen 1)	18:56	18:10 (Oerzen 3)	16:47	16:06	
3	04:57	05:38		06:31	18:47 (Oerzen 1)	07:23	17:40 (Oerzen 2)	07:20	08:12	
	21:49	21:12		20:06	19:12 (Oerzen 1)	18:53	18:11 (Oerzen 3)	16:45	16:05	
4	04:58	05:39		06:32	18:47 (Oerzen 1)	07:24	17:39 (Oerzen 2)	07:21	08:14	
	21:48	21:10		20:03	19:13 (Oerzen 1)	18:51	18:11 (Oerzen 3)	16:43	16:04	
5	04:59	05:41		06:34	18:46 (Oerzen 1)	07:26	17:39 (Oerzen 2)	07:23	08:15	
	21:48	21:08		20:01	19:13 (Oerzen 1)	18:49	18:11 (Oerzen 3)	16:42	16:04	
6	05:00	05:43		06:36	18:45 (Oerzen 1)	07:28	17:39 (Oerzen 2)	07:25	08:16	
	21:47	21:07		19:59	19:13 (Oerzen 1)	18:46	18:11 (Oerzen 3)	16:40	16:03	
7	05:01	05:44		06:38	18:44 (Oerzen 1)	07:30	17:39 (Oerzen 2)	07:27	08:18	
	21:47	21:05		19:56	19:13 (Oerzen 1)	18:44	18:11 (Oerzen 3)	16:38	16:03	
8	05:02	05:46		06:39	18:44 (Oerzen 1)	07:31	17:40 (Oerzen 2)	07:29	08:19	
	21:46	21:03		19:54	19:13 (Oerzen 1)	18:42	18:11 (Oerzen 3)	16:36	16:02	
9	05:03	05:48		06:41	18:43 (Oerzen 1)	07:33	17:41 (Oerzen 2)	07:31	08:20	
	21:45	21:01		19:52	19:12 (Oerzen 1)	18:39	18:10 (Oerzen 3)	16:34	16:02	
10	05:04	05:49		06:43	18:43 (Oerzen 1)	07:35	17:41 (Oerzen 2)	07:33	08:21	
	21:44	20:59		19:49	19:11 (Oerzen 1)	18:37	18:08 (Oerzen 3)	16:33	16:02	
11	05:05	05:51		06:44	18:44 (Oerzen 1)	07:37	17:42 (Oerzen 2)	07:35	08:23	
	21:44	20:57		19:47	19:11 (Oerzen 1)	18:35	18:06 (Oerzen 3)	16:31	16:01	
12	05:06	05:53		06:46	18:43 (Oerzen 1)	07:39	17:44 (Oerzen 2)	07:36	08:24	
	21:43	20:55		19:44	19:09 (Oerzen 1)	18:32	18:03 (Oerzen 3)	16:29	16:01	
13	05:07	05:55		06:48	18:44 (Oerzen 1)	07:40	17:48 (Oerzen 2)	07:38	08:25	
	21:42	20:53		19:42	19:08 (Oerzen 1)	18:30	18:01 (Oerzen 3)	16:28	16:01	
14	05:08	05:56		06:50	18:45 (Oerzen 1)	07:42		07:40	08:26	
	21:41	20:51		19:39	19:07 (Oerzen 1)	18:28		16:26	16:01	
15	05:10	05:58		06:51	18:46 (Oerzen 1)	07:44		07:42	08:27	
	21:40	20:49		19:37	19:05 (Oerzen 1)	18:25		16:25	16:01	
16	05:11	06:00		06:53	18:48 (Oerzen 1)	07:46		07:44	08:27	
	21:39	20:46		19:35	19:02 (Oerzen 1)	18:23		16:23	16:01	
17	05:12	06:01		06:55	18:51 (Oerzen 1)	07:48		07:46	08:28	
	21:38	20:44		19:32	18:59 (Oerzen 1)	18:21		16:22	16:01	
18	05:14	06:03		06:56		07:50		07:48	08:29	
	21:36	20:42		19:30		18:19		16:20	16:02	
19	05:15	06:05		06:58		07:51		07:49	08:30	
	21:35	20:40		19:27		18:16		16:19	16:02	
20	05:16	06:07		07:00		07:53		07:51	08:30	
	21:34	20:38		19:25		18:14		16:18	16:02	
21	05:18	06:08		07:02		07:55		07:53	08:31	
	21:33	20:36		19:22		18:12		16:16	16:03	
22	05:19	06:10		07:03		07:57		07:55	08:32	
	21:31	20:33		19:20		18:10		16:15	16:03	
23	05:21	06:12		07:05		07:59		07:56	08:32	
	21:30	20:31		19:18		18:08		16:14	16:04	
24	05:22	06:13		07:07	17:56 (Oerzen 2)	08:01		07:58	08:33	
	21:28	20:29		19:15	18:00 (Oerzen 2)	18:06		16:13	16:04	
25	05:24	06:15		07:09	17:50 (Oerzen 2)	07:03		08:00	08:33	
	21:27	20:27		19:13	18:04 (Oerzen 2)	17:03		16:12	16:05	
26	05:25	06:17		07:10	17:48 (Oerzen 2)	07:04		08:01	08:33	
	21:25	20:24		19:10	18:06 (Oerzen 2)	17:01		16:11	16:06	
27	05:27	06:19		07:12	17:46 (Oerzen 2)	07:06		08:03	08:34	
	21:24	20:22		19:08	18:08 (Oerzen 2)	16:59		16:10	16:06	
28	05:28	06:20		07:14	17:44 (Oerzen 2)	07:08		08:05	08:34	
	21:22	20:20		19:06	18:09 (Oerzen 2)	16:57		16:09	16:07	
29	05:30	06:22		07:15	17:42 (Oerzen 2)	07:10		08:06	08:34	
	21:21	20:18		19:03	18:09 (Oerzen 2)	16:55		16:08	16:08	
30	05:31	06:24	18:56 (Oerzen 1)	07:17	17:41 (Oerzen 2)	07:12		08:08	08:34	
	21:19	20:15	19:07 (Oerzen 1)	19:01	18:09 (Oerzen 2)	16:53		16:07	16:09	
31	05:33	06:25	18:54 (Oerzen 1)			07:14			08:34	
	21:17	20:13	19:10 (Oerzen 1)			16:51			16:10	
Sonnenscheinstunden		509	458	382		329		261	237	
astr.max.mögl.Beschattung			27		541		360			

**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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s24 - Oerzen, Mühlenweg 18**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	08:34	08:05		07:09	16:54 (Oerzen 2)	06:55	18:41 (Oerzen 1)	05:48	04:59		
	16:11	17:01		17:56	33 17:27 (Oerzen 3)	19:53	30 19:11 (Oerzen 1)	20:47	21:35		
2	08:34	08:03		07:06	16:53 (Oerzen 2)	06:53	18:41 (Oerzen 1)	05:45	04:59		
	16:12	17:03		17:58	35 17:28 (Oerzen 3)	19:54	30 19:11 (Oerzen 1)	20:48	21:36		
3	08:34	08:01		07:04	16:52 (Oerzen 2)	06:50	18:41 (Oerzen 1)	05:43	04:58		
	16:14	17:05		18:00	36 17:28 (Oerzen 3)	19:56	30 19:11 (Oerzen 1)	20:50	21:37		
4	08:33	08:00		07:02	16:52 (Oerzen 2)	06:48	18:41 (Oerzen 1)	05:42	04:57		
	16:15	17:07		18:01	36 17:28 (Oerzen 3)	19:58	29 19:10 (Oerzen 1)	20:52	21:39		
5	08:33	07:58		07:00	16:51 (Oerzen 2)	06:46	18:41 (Oerzen 1)	05:40	04:56		
	16:16	17:09		18:03	38 17:29 (Oerzen 3)	20:00	38 19:33 (Rep 11)	20:54	21:40		
6	08:33	07:56		06:57	16:51 (Oerzen 2)	06:43	18:42 (Oerzen 1)	05:38	04:55		
	16:17	17:11		18:05	37 17:28 (Oerzen 3)	20:02	40 19:35 (Rep 11)	20:55	21:41		
7	08:32	07:54		06:55	16:51 (Oerzen 2)	06:41	18:42 (Oerzen 1)	05:36	04:55		
	16:19	17:13		18:07	36 17:27 (Oerzen 3)	20:03	42 19:36 (Rep 11)	20:57	21:42		
8	08:32	07:53		06:53	16:50 (Oerzen 2)	06:39	18:43 (Oerzen 1)	05:34	04:54		
	16:20	17:15		18:09	36 17:26 (Oerzen 3)	20:05	43 19:38 (Rep 11)	20:59	21:42		
9	08:31	07:51		06:50	16:51 (Oerzen 2)	06:36	18:44 (Oerzen 1)	05:32	04:54		
	16:21	17:17		18:11	34 17:25 (Oerzen 3)	20:07	42 19:39 (Rep 11)	21:01	21:43		
10	08:31	07:49		06:48	16:51 (Oerzen 2)	06:34	18:45 (Oerzen 1)	05:30	04:53		
	16:23	17:19		18:13	32 17:23 (Oerzen 3)	20:09	39 19:38 (Rep 11)	21:02	21:44		
11	08:30	07:47		06:46	16:51 (Oerzen 2)	06:32	18:48 (Oerzen 1)	05:28	04:53		
	16:24	17:21		18:14	29 17:20 (Oerzen 3)	20:11	33 19:38 (Rep 11)	21:04	21:45		
12	08:29	07:45		06:43	16:52 (Oerzen 2)	06:29	19:16 (Rep 11)	05:27	04:52		
	16:26	17:23		18:16	26 17:18 (Oerzen 3)	20:13	22 19:38 (Rep 11)	21:06	21:46		
13	08:28	07:43		06:41	16:53 (Oerzen 2)	06:27	19:15 (Rep 11)	05:25	04:52		
	16:27	17:25		18:18	23 17:16 (Oerzen 2)	20:14	22 19:37 (Rep 11)	21:07	21:46		
14	08:28	07:41		06:38	16:55 (Oerzen 2)	06:25	19:16 (Rep 11)	05:23	04:52		
	16:29	17:27		18:20	20 17:15 (Oerzen 2)	20:16	21 19:37 (Rep 11)	21:09	21:47		
15	08:27	07:39		06:36	16:56 (Oerzen 2)	06:22	19:16 (Rep 11)	05:22	04:52		
	16:31	17:29		18:22	15 17:11 (Oerzen 2)	20:18	20 19:36 (Rep 11)	21:11	21:48		
16	08:26	07:37		06:34	17:01 (Oerzen 2)	06:20	19:17 (Rep 11)	05:20	04:51		
	16:32	17:31		18:24	12 17:58 (Rep 10)	20:20	18 19:35 (Rep 11)	21:12	21:48		
17	08:25	07:35		06:31	17:49 (Rep 10)	06:18	19:19 (Rep 11)	05:18	04:51		
	16:34	17:33		18:26	11 18:00 (Rep 10)	20:21	15 19:34 (Rep 11)	21:14	21:49		
18	08:24	07:33		06:29	17:47 (Rep 10)	06:15	19:19 (Rep 11)	05:17	04:51		
	16:36	17:35		18:27	14 18:01 (Rep 10)	20:23	12 19:31 (Rep 11)	21:15	21:49		
19	08:23	07:31		06:26	17:46 (Rep 10)	06:13	19:23 (Rep 11)	05:15	04:51		
	16:37	17:37		18:29	17 18:03 (Rep 10)	20:25	4 19:27 (Rep 11)	21:17	21:49		
20	08:22	07:29		06:24	17:44 (Rep 10)	06:11		05:14	04:51		
	16:39	17:38		18:31	20 18:04 (Rep 10)	20:27		21:18	21:50		
21	08:20	07:26		06:22	17:44 (Rep 10)	06:09		05:12	04:52		
	16:41	17:40		18:33	21 18:05 (Rep 10)	20:29		21:20	21:50		
22	08:19	07:24		06:19	17:44 (Rep 10)	06:07		05:11	04:52		
	16:43	17:42		18:35	21 18:05 (Rep 10)	20:30		21:22	21:50		
23	08:18	07:22		06:17	17:43 (Rep 10)	06:04		05:10	04:52		
	16:44	17:44		18:36	21 18:04 (Rep 10)	20:32		21:23	21:50		
24	08:17	07:20		06:14	17:43 (Rep 10)	06:02		05:08	04:52		
	16:46	17:46		18:38	22 18:05 (Oerzen 1)	20:34		21:24	21:51		
25	08:15	07:18	17:01 (Oerzen 2)	06:12	17:43 (Rep 10)	06:00		05:07	04:53		
	16:48	17:48	13 17:14 (Oerzen 2)	18:40	24 18:07 (Oerzen 1)	20:36		21:26	21:51		
26	08:14	07:16	16:59 (Oerzen 2)	06:10	17:44 (Rep 10)	05:58		05:06	04:53		
	16:50	17:50	24 17:23 (Oerzen 3)	18:42	25 18:09 (Oerzen 1)	20:38		21:27	21:51		
27	08:13	07:13	16:57 (Oerzen 2)	06:07	17:44 (Rep 10)	05:56		05:05	04:53		
	16:52	17:52	28 17:25 (Oerzen 3)	18:44	26 18:10 (Oerzen 1)	20:39		21:29	21:50		
28	08:11	07:11	16:55 (Oerzen 2)	06:05	17:45 (Oerzen 1)	05:54		05:04	04:54		
	16:54	17:54	31 17:26 (Oerzen 3)	18:45	26 18:11 (Oerzen 1)	20:41		21:30	21:50		
29	08:10			07:02	18:44 (Oerzen 1)	05:52		05:02	04:55		
	16:56			19:47	28 19:12 (Oerzen 1)	20:43		21:31	21:50		
30	08:08			07:00	18:43 (Oerzen 1)	05:50		05:01	04:55		
	16:58			19:49	28 19:11 (Oerzen 1)	20:45		21:33	21:50		
31	08:06			06:58	18:42 (Oerzen 1)			05:00			
	16:59			19:51	30 19:12 (Oerzen 1)			21:34			
Sonnenscheinstunden		253		367		419		491		506	
astr.max.mögl.Beschattung			96		812		530				

**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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s24 - Oerzen, Mühlenweg 18

### 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	04:56 21:50	05:34 21:16		06:27 20:11		18:47 (Oerzen 1) 19:37 (Rep 11)	07:19 18:58		17:32 (Oerzen 2) 17:57 (Oerzen 2)	07:16 16:49	08:09 16:06
2	04:57 21:49	05:36 21:14		06:29 20:08	34	18:44 (Oerzen 1) 19:37 (Rep 11)	07:21 18:56	25	17:31 (Oerzen 2) 17:57 (Oerzen 3)	07:18 16:47	08:11 16:06
3	04:57 21:49	05:38 21:12		06:31 20:06	39	18:41 (Oerzen 1) 19:36 (Rep 11)	07:23 18:54	26	17:30 (Oerzen 2) 18:00 (Oerzen 3)	07:20 16:45	08:12 16:05
4	04:58 21:48	05:39 21:10		06:32 20:04	42	18:40 (Oerzen 1) 19:35 (Rep 11)	07:24 18:51	30	17:28 (Oerzen 2) 18:01 (Oerzen 3)	07:21 16:43	08:14 16:04
5	04:59 21:48	05:41 21:08		06:34 20:01	43	18:39 (Oerzen 1) 19:34 (Rep 11)	07:26 18:49	33	17:27 (Oerzen 2) 18:02 (Oerzen 3)	07:23 16:42	08:15 16:04
6	05:00 21:47	05:43 21:07		06:36 19:59	41	18:37 (Oerzen 1) 19:31 (Rep 11)	07:28 18:46	35	17:27 (Oerzen 2) 18:03 (Oerzen 3)	07:25 16:40	08:16 16:03
7	05:01 21:47	05:44 21:05		06:38 19:56	39	18:36 (Oerzen 1) 19:29 (Rep 11)	07:30 18:44	36	17:27 (Oerzen 2) 18:03 (Oerzen 3)	07:27 16:38	08:18 16:03
8	05:02 21:46	05:46 21:03		06:39 19:54	39	18:36 (Oerzen 1) 19:05 (Oerzen 1)	07:31 18:42	36	17:27 (Oerzen 2) 18:04 (Oerzen 3)	07:29 16:36	08:19 16:02
9	05:03 21:45	05:48 21:01		06:41 19:52	29	18:35 (Oerzen 1) 19:04 (Oerzen 1)	07:33 18:39	37	17:27 (Oerzen 2) 18:04 (Oerzen 3)	07:31 16:34	08:20 16:02
10	05:04 21:44	05:49 20:59		06:43 19:49	29	18:34 (Oerzen 1) 19:05 (Oerzen 1)	07:35 18:37	37	17:26 (Oerzen 2) 18:02 (Oerzen 3)	07:33 16:33	08:21 16:02
11	05:05 21:44	05:51 20:57		06:44 19:47	31	18:34 (Oerzen 1) 19:04 (Oerzen 1)	07:37 18:35	36	17:26 (Oerzen 2) 18:02 (Oerzen 3)	07:35 16:31	08:23 16:01
12	05:06 21:43	05:53 20:55		06:46 19:44	30	18:34 (Oerzen 1) 19:03 (Oerzen 1)	07:39 18:32	36	17:27 (Oerzen 2) 18:01 (Oerzen 3)	07:36 16:29	08:24 16:01
13	05:07 21:42	05:55 20:53		06:48 19:42	29	18:34 (Oerzen 1) 19:03 (Oerzen 1)	07:40 18:30	34	17:28 (Oerzen 2) 18:00 (Oerzen 3)	07:38 16:28	08:25 16:01
14	05:08 21:41	05:56 20:51		06:50 19:39	29	18:34 (Oerzen 1) 19:02 (Oerzen 1)	07:42 18:28	32	17:29 (Oerzen 2) 17:59 (Oerzen 3)	07:40 16:26	08:26 16:01
15	05:10 21:40	05:58 20:49		06:51 19:37	28	18:34 (Oerzen 1) 19:00 (Oerzen 1)	07:44 18:25	30	17:30 (Oerzen 2) 17:57 (Oerzen 3)	07:42 16:25	08:27 16:01
16	05:11 21:39	06:00 20:46		06:53 19:35	26	18:34 (Rep 10) 18:59 (Oerzen 1)	07:46 18:23	27	17:32 (Oerzen 2) 17:53 (Oerzen 3)	07:44 16:23	08:28 16:01
17	05:12 21:38	06:01 20:44		06:55 19:32	25	18:32 (Rep 10) 18:58 (Oerzen 1)	07:48 18:21	21	17:35 (Oerzen 2) 17:45 (Oerzen 2)	07:46 16:22	08:28 16:01
18	05:14 21:36	06:03 20:42		06:56 19:30	26	18:30 (Rep 10) 18:55 (Oerzen 1)	07:50 18:19	10	17:48 (Oerzen 2)	16:20	08:29 16:02
19	05:15 21:35	06:05 20:40		06:58 19:27	25	18:30 (Rep 10) 18:53 (Oerzen 1)	07:51 18:16		16:19	16:02	08:30 16:02
20	05:16 21:34	06:07 20:38		07:00 19:25	23	18:29 (Rep 10) 18:51 (Rep 10)	07:53 18:14		16:18	16:02	08:30 16:02
21	05:18 21:33	06:08 20:36		07:02 19:22	22	18:29 (Rep 10) 18:51 (Rep 10)	07:55 18:12		16:16	16:03	08:31 16:03
22	05:19 21:31	06:10 20:33		07:03 19:20	22	18:28 (Rep 10) 18:49 (Rep 10)	07:57 18:10		16:15	16:03	08:32 16:03
23	05:21 21:30	06:12 20:31		07:05 19:18	21	18:29 (Rep 10) 18:49 (Rep 10)	07:59 18:08		16:14	16:04	08:32 16:04
24	05:22 21:28	06:13 20:29		07:07 19:15	20	18:29 (Rep 10) 18:48 (Rep 10)	08:01 18:06		16:13	16:04	08:33 16:04
25	05:24 21:27	06:15 20:27	6	19:23 (Rep 11) 19:35 (Rep 11)	19	18:29 (Rep 10) 18:44 (Rep 10)	07:03 17:03		08:00	16:05	08:33 16:05
26	05:25 21:25	06:17 20:24	12	19:20 (Rep 11) 19:36 (Rep 11)	15	18:30 (Rep 10) 18:42 (Rep 10)	07:04 17:01		16:12	16:06	08:33 16:06
27	05:27 21:24	06:19 20:22	16	19:19 (Rep 11) 19:37 (Rep 11)	12	18:33 (Rep 10) 18:40 (Rep 10)	07:06 16:59		16:11	16:06	08:34 16:06
28	05:28 21:22	06:20 20:20	18	19:18 (Rep 11) 19:38 (Rep 11)	7	17:39 (Oerzen 2) 17:52 (Oerzen 2)	07:08 16:57		16:10	16:07	08:34 16:07
29	05:30 21:21	06:22 20:18	20	19:17 (Rep 11) 19:38 (Rep 11)	13	17:35 (Oerzen 2) 17:54 (Oerzen 2)	07:10 16:55		16:09	16:08	08:34 16:08
30	05:31 21:19	06:24 20:15	21	19:16 (Rep 11) 19:38 (Rep 11)	19	17:33 (Oerzen 2) 17:55 (Oerzen 2)	07:12 16:53		16:08	16:09	08:34 16:09
31	05:33 21:17	06:25 20:13	22	19:16 (Rep 11) 19:38 (Rep 11)	22	17:14 (Rep 11) 16:51	07:14 16:51		16:07	16:10	08:34 16:10
Sonnenscheinstunden		509	458	382	803	329	521	261	237		
astr.max.mögl.Beschattung			137								

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s25 - Südergellersen, Auf dem Brink 6

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlungsrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11	08:05 17:01	07:09 17:56	06:55 19:53	05:48 20:47	05:00 21:35	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	07:16 16:49	08:10 16:06
2	08:34 16:12	08:03 17:03	07:07 17:58	06:53 19:55	05:46 20:48	04:59 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	07:18 16:47	08:11 16:06
3	08:34 16:14	08:02 17:05	07:04 18:00	06:51 19:56	05:44 20:50	04:58 21:38	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	07:20 16:45	08:12 16:05
4	08:34 16:15	08:00 17:07	07:02 18:02	06:48 19:58	05:42 20:52	04:57 21:39	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	07:22 16:44	08:14 16:04
5	08:33 16:16	07:58 17:09	07:00 18:03	06:46 20:00	05:40 20:54	04:56 21:40	04:59 21:48	05:41 21:09	06:34 20:01	07:26 18:49	07:23 16:42	08:15 16:04
6	08:33 16:17	07:56 17:11	06:57 18:05	06:43 20:02	05:38 20:55	04:56 21:41	05:00 21:47	05:43 21:07	06:36 19:59	07:28 18:46	07:25 16:40	08:17 16:03
7	08:32 16:19	07:55 17:13	06:55 18:07	06:41 20:04	05:36 20:57	04:55 21:42	05:01 21:47	05:44 21:05	06:38 19:56	07:30 18:44	07:27 16:38	08:18 16:03
8	08:32 16:20	07:53 17:15	06:53 18:09	06:39 20:05	05:34 20:59	04:54 21:43	05:02 21:46	05:46 21:03	06:39 19:54	07:32 18:42	07:29 16:36	08:19 16:02
9	08:31 16:21	07:51 17:17	06:50 18:11	06:36 20:07	05:32 21:01	04:54 21:44	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	07:31 16:35	08:20 16:02
10	08:31 16:23	07:49 17:19	06:48 18:13	06:34 20:09	05:30 21:02	04:53 21:44	05:04 21:45	05:50 20:59	06:43 19:49	07:35 18:37	07:33 16:33	08:22 16:02
11	08:30 16:24	07:47 17:21	06:46 18:15	06:32 20:11	05:29 21:04	04:53 21:45	05:05 21:44	05:51 20:57	06:44 19:47	07:37 18:35	07:35 16:31	08:23 16:02
12	08:29 16:26	07:45 17:23	06:43 18:16	06:29 20:13	05:27 21:06	04:52 21:46	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	07:37 16:30	08:24 16:01
13	08:29 16:27	07:43 17:25	06:41 18:18	06:27 20:14	05:25 21:07	04:52 21:47	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	07:39 16:28	08:25 16:01
14	08:28 16:29	07:41 17:27	06:39 18:20	06:25 20:16	05:23 21:09	04:52 21:47	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	07:40 16:26	08:26 16:01
15	08:27 16:31	07:39 17:29	06:36 18:22	06:22 20:18	05:22 21:11	04:52 21:48	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	07:42 16:25	08:27 16:01
16	08:26 16:32	07:37 17:31	06:34 18:24	06:20 20:20	05:20 21:12	04:52 21:48	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	07:44 16:23	08:28 16:01
17	08:25 16:34	07:35 17:33	06:31 18:26	06:18 20:22	05:18 21:14	04:51 21:49	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	07:46 16:22	08:29 16:02
18	08:24 16:36	07:33 17:35	06:29 18:27	06:16 20:23	05:17 21:16	04:51 21:49	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	07:48 16:20	08:29 16:02
19	08:23 16:37	07:31 17:37	06:27 18:29	06:13 20:25	05:15 21:17	04:51 21:50	05:15 21:35	06:05 20:40	06:58 19:27	07:52 18:17	07:49 16:19	08:30 16:02
20	08:22 16:39	07:29 17:39	06:24 18:31	06:11 20:27	05:14 21:19	04:51 21:50	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	07:51 16:18	08:31 16:02
21	08:21 16:41	07:27 17:41	06:22 18:33	06:09 20:29	05:13 21:20	04:52 21:50	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	07:53 16:17	08:31 16:03
22	08:19 16:43	07:24 17:42	06:19 18:35	06:07 20:31	05:11 21:22	04:52 21:50	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	07:55 16:15	08:32 16:03
23	08:18 16:45	07:22 17:44	06:17 18:37	06:04 20:32	05:10 21:23	04:52 21:51	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	07:57 16:14	08:32 16:04
24	08:17 16:46	07:20 17:46	06:15 18:38	06:02 20:34	05:08 21:25	04:52 21:51	05:22 21:29	06:13 20:29	07:07 19:15	08:01 18:06	07:58 16:13	08:33 16:04
25	08:16 16:48	07:18 17:48	06:12 18:40	06:00 20:36	05:07 21:26	04:53 21:51	05:24 21:27	06:15 20:27	07:09 19:13	07:03 17:04	08:00 16:12	08:33 16:05
26	08:14 16:50	07:16 17:50	06:10 18:42	05:58 20:38	05:06 21:27	04:53 21:51	05:25 21:26	06:17 20:25	07:10 19:10	07:05 17:01	08:02 16:11	08:33 16:06
27	08:13 16:52	07:13 17:52	06:07 18:44	05:56 20:40	05:05 21:29	04:54 21:51	05:27 21:24	06:19 20:22	07:12 19:08	07:06 16:59	08:03 16:10	08:34 16:06
28	08:11 16:54	07:11 17:54	06:05 18:46	05:54 20:41	05:04 21:30	04:54 21:51	05:28 21:22	06:20 20:20	07:14 19:06	07:08 16:57	08:05 16:09	08:34 16:07
29	08:10 16:56		07:03 19:47	05:52 20:43	05:03 21:32	04:55 21:50	05:30 21:21	06:22 20:18	07:16 19:03	07:10 16:55	08:06 16:08	08:34 16:08
30	08:08 16:58		07:00 19:49	05:50 20:45	05:01 21:33	04:55 21:50	05:31 21:19	06:24 20:15	07:17 19:01	07:12 16:53	08:08 16:07	08:34 16:09
31	08:07 17:00		06:58 19:51		05:00 21:34		05:33 21:17	06:26 20:13		07:14 16:51		08:34 16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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

## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s26 - Südergellersen, Auf dem Brink 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	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11	08:05 17:01	07:09 17:56	06:55 19:53	05:48 20:47	05:00 21:35	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	07:16 16:49	08:10 16:06
2	08:34 16:12	08:03 17:03	07:07 17:58	06:53 19:55	05:46 20:48	04:59 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	07:18 16:47	08:11 16:06
3	08:34 16:14	08:02 17:05	07:04 18:00	06:51 19:56	05:44 20:50	04:58 21:38	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	07:20 16:45	08:12 16:05
4	08:34 16:15	08:00 17:07	07:02 18:02	06:48 19:58	05:42 20:52	04:57 21:39	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	07:22 16:44	08:14 16:04
5	08:33 16:16	07:58 17:09	07:00 18:03	06:46 20:00	05:40 20:54	04:56 21:40	04:59 21:48	05:41 21:09	06:34 20:01	07:26 18:49	07:23 16:42	08:15 16:04
6	08:33 16:17	07:56 17:11	06:57 18:05	06:43 20:02	05:38 20:55	04:56 21:41	05:00 21:47	05:43 21:07	06:36 19:59	07:28 18:46	07:25 16:40	08:17 16:03
7	08:32 16:19	07:55 17:13	06:55 18:07	06:41 20:04	05:36 20:57	04:55 21:42	05:01 21:47	05:44 21:05	06:38 19:56	07:30 18:44	07:27 16:38	08:18 16:03
8	08:32 16:20	07:53 17:15	06:53 18:09	06:39 20:05	05:34 20:59	04:54 21:43	05:02 21:46	05:46 21:03	06:39 19:54	07:32 18:42	07:29 16:36	08:19 16:02
9	08:31 16:21	07:51 17:17	06:50 18:11	06:36 20:07	05:32 21:01	04:54 21:44	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	07:31 16:35	08:20 16:02
10	08:31 16:23	07:49 17:19	06:48 18:13	06:34 20:09	05:30 21:02	04:53 21:44	05:04 21:45	05:50 20:59	06:43 19:49	07:35 18:37	07:33 16:33	08:22 16:02
11	08:30 16:24	07:47 17:21	06:46 18:15	06:32 20:11	05:29 21:04	04:53 21:45	05:05 21:44	05:51 20:57	06:44 19:47	07:37 18:35	07:35 16:31	08:23 16:02
12	08:29 16:26	07:45 17:23	06:43 18:16	06:29 20:13	05:27 21:06	04:52 21:46	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	07:37 16:30	08:24 16:01
13	08:29 16:27	07:43 17:25	06:41 18:18	06:27 20:14	05:25 21:07	04:52 21:47	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	07:39 16:28	08:25 16:01
14	08:28 16:29	07:41 17:27	06:39 18:20	06:25 20:16	05:23 21:09	04:52 21:47	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	07:40 16:26	08:26 16:01
15	08:27 16:31	07:39 17:29	06:36 18:22	06:22 20:18	05:22 21:11	04:52 21:48	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	07:42 16:25	08:27 16:01
16	08:26 16:32	07:37 17:31	06:34 18:24	06:20 20:20	05:20 21:12	04:52 21:48	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	07:44 16:23	08:28 16:01
17	08:25 16:34	07:35 17:33	06:31 18:26	06:18 20:22	05:19 21:14	04:51 21:49	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	07:46 16:22	08:29 16:02
18	08:24 16:36	07:33 17:35	06:29 18:27	06:16 20:23	05:17 21:16	04:51 21:49	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	07:48 16:20	08:29 16:02
19	08:23 16:37	07:31 17:37	06:27 18:29	06:13 20:25	05:15 21:17	04:51 21:50	05:15 21:35	06:05 20:40	06:58 19:27	07:52 18:17	07:49 16:19	08:30 16:02
20	08:22 16:39	07:29 17:39	06:24 18:31	06:11 20:27	05:14 21:19	04:51 21:50	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	07:51 16:18	08:31 16:02
21	08:21 16:41	07:27 17:41	06:22 18:33	06:09 20:29	05:13 21:20	04:52 21:50	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	07:53 16:17	08:31 16:03
22	08:19 16:43	07:24 17:42	06:19 18:35	06:07 20:31	05:11 21:22	04:52 21:50	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	07:55 16:15	08:32 16:03
23	08:18 16:45	07:22 17:44	06:17 18:37	06:04 20:32	05:10 21:23	04:52 21:51	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	07:57 16:14	08:32 16:04
24	08:17 16:46	07:20 17:46	06:15 18:38	06:02 20:34	05:08 21:25	04:52 21:51	05:22 21:29	06:13 20:29	07:07 19:15	08:01 18:06	07:58 16:13	08:33 16:04
25	08:16 16:48	07:18 17:48	06:12 18:40	06:00 20:36	05:07 21:26	04:53 21:51	05:24 21:27	06:15 20:27	07:09 19:13	07:03 17:04	08:00 16:12	08:33 16:05
26	08:14 16:50	07:16 17:50	06:10 18:42	05:58 20:38	05:06 21:27	04:53 21:51	05:25 21:26	06:17 20:25	07:10 19:10	07:05 17:01	08:02 16:11	08:33 16:06
27	08:13 16:52	07:13 17:52	06:07 18:44	05:56 20:40	05:05 21:29	04:54 21:51	05:27 21:24	06:19 20:22	07:12 19:08	07:06 16:59	08:03 16:10	08:34 16:06
28	08:11 16:54	07:11 17:54	06:05 18:46	05:54 20:41	05:04 21:30	04:54 21:51	05:28 21:22	06:20 20:20	07:14 19:06	07:08 16:57	08:05 16:09	08:34 16:07
29	08:10 16:56		07:03 19:47	05:52 20:43	05:03 21:32	04:55 21:50	05:30 21:21	06:22 20:18	07:16 19:03	07:10 16:55	08:06 16:08	08:34 16:08
30	08:08 16:58		07:00 19:49	05:50 20:45	05:01 21:33	04:55 21:50	05:31 21:19	06:24 20:15	07:17 19:01	07:12 16:53	08:08 16:07	08:34 16:09
31	08:07 17:00		06:58 19:51		05:00 21:34		05:33 21:17	06:26 20:13		07:14 16:51		08:34 16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s27 - Südergellersen, Birkenweg 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	Juli	August	September	Oktober	November	Dezember
1	08:34	08:05	07:09	06:55	05:48	04:59	04:56	05:35	06:27	07:19	07:16	08:10
	16:11	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06
2	08:34	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11
	16:12	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06
3	08:34	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12
	16:14	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05
4	08:34	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14
	16:15	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04
5	08:33	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15
	16:16	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04
6	08:33	07:56	06:57	06:43	05:38	04:55	05:00	05:43	06:36	07:28	07:25	08:17
	16:17	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03
7	08:32	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18
	16:19	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03
8	08:32	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19
	16:20	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02
9	08:31	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20
	16:21	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02
10	08:31	07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	07:33	08:22
	16:23	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02
11	08:30	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35	08:23
	16:24	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02
12	08:29	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24
	16:26	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01
13	08:29	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25
	16:27	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01
14	08:28	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26
	16:29	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01
15	08:27	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27
	16:31	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01
16	08:26	07:37	06:34	06:20	05:20	04:51	05:11	06:00	06:53	07:46	07:44	08:28
	16:32	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01
17	08:25	07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46	08:29
	16:34	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02
18	08:24	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29
	16:36	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02
19	08:23	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30
	16:37	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02
20	08:22	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31
	16:39	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02
21	08:21	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31
	16:41	17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16	16:03
22	08:19	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32
	16:43	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03
23	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32
	16:45	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04
24	08:17	07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	08:33
	16:46	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04
25	08:16	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	08:03	08:00	08:33
	16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	18:04	16:12	16:05
26	08:14	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	08:05	08:02	08:33
	16:50	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	18:01	16:11	16:06
27	08:13	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	08:06	08:03	08:34
	16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	18:00	16:10	16:06
28	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	08:08	08:05	08:34
	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	18:00	16:09	16:07
29	08:10		07:03	05:52	05:02	04:55	05:30	06:22	07:16	08:10	08:06	08:34
	16:56		19:47	20:43	21:32	21:50	21:21	20:18	19:03	18:00	16:08	16:08
30	08:08		07:00	05:50	05:01	04:55	05:31	06:24	07:17	08:12	08:08	08:34
	16:58		19:49	20:45	21:33	21:50	21:19	20:15	19:01	18:00	16:07	16:09
31	08:07		06:58		05:00		05:33	06:26		07:14		08:34
	17:00		19:51		21:34		21:17	20:13		18:01		16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s28 - Südergellersen, Forstweg 4

### Annahmen für Schattenwurfberechnung

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

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

	Januar		Februar		März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	09:59 (Oerzen 1)	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10	
	16:11	10	10:09 (Oerzen 1)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06
2	08:34		10:01 (Oerzen 1)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11
	16:13	8	10:09 (Oerzen 1)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06
3	08:34		10:03 (Oerzen 1)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12
	16:14	5	10:08 (Oerzen 1)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05
4	08:34			08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14
	16:15			17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04
5	08:33			07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15
	16:16			17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04
6	08:33			07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17
	16:17			17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03
7	08:32			07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18
	16:19			17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:57	18:44	16:38	16:03
8	08:32			07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19
	16:20			17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02
9	08:31			07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20
	16:21			17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02
10	08:31			07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33	08:22
	16:23			17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02
11	08:30			07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:45	07:37	07:35	08:23
	16:24			17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02
12	08:29			07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24
	16:26			17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01
13	08:29			07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25
	16:27			17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01
14	08:28			07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26
	16:29			17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01
15	08:27			07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27
	16:31			17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01
16	08:26			07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28
	16:32			17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01
17	08:25			07:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	07:46	08:29
	16:34			17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02
18	08:24			07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29
	16:36			17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02
19	08:23			07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30
	16:37			17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02
20	08:22			07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31
	16:39			17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02
21	08:21			07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31
	16:41			17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17	16:03
22	08:19			07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32
	16:43			17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03
23	08:18			07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32
	16:45			17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04
24	08:17			07:20	06:15	06:02	05:08	04:52	05:22	06:14	07:07	08:01	07:58	08:33
	16:46			17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04
25	08:16			07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33
	16:48			17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	16:05
26	08:14			07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:33
	16:50			17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11	16:06
27	08:13			07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:34
	16:52			17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	16:06
28	08:11			07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34
	16:54			17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	16:07
29	08:10				07:03	05:52	05:03	04:55	05:30	06:22	07:16	07:10	08:06	08:34
	16:56				19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	16:08
30	08:08				07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	08:34
	16:58				19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	16:09
31	08:07				06:58		05:00		05:33	06:26		07:14		08:34
	17:00				19:51		21:34		21:17	20:13		16:51		16:10
Sonnenscheinstunden	253				275	367	419	491	506	509	458	382	329	261
astr.max.mögl.Beschattung		23												327

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

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





## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s30 - Südergellersen, Forstweg 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	Juli	August	September	Oktober	November	Dezember
1	08:34	09:34 (Oerzen 1)	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16
16:11	45	10:49 (Rep 11)	17:02	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49
2	08:34	09:35 (Oerzen 1)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18
16:13	44	10:49 (Rep 11)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47
3	08:34	09:36 (Oerzen 1)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20
16:14	41	10:49 (Rep 11)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45
4	08:34	09:36 (Oerzen 1)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22
16:15	40	10:48 (Rep 11)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44
5	08:33	09:38 (Oerzen 1)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23
16:16	36	10:48 (Rep 11)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42
6	08:33	09:38 (Oerzen 1)	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25
16:17	34	10:47 (Rep 11)	17:11	18:05	20:02	20:56	21:41	21:48	21:07	19:59	18:46	16:40
7	08:32	09:39 (Oerzen 1)	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27
16:19	29	10:45 (Rep 11)	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:57	18:44	16:38
8	08:32	09:40 (Oerzen 1)	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29
16:20	24	10:44 (Rep 11)	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36
9	08:31	09:41 (Oerzen 1)	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31
16:21	17	09:58 (Oerzen 1)	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35
10	08:31	09:42 (Oerzen 1)	07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33
16:23	15	09:57 (Oerzen 1)	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33
11	08:30	09:43 (Oerzen 1)	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:45	07:37	07:35
16:24	13	09:56 (Oerzen 1)	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31
12	08:29	09:46 (Oerzen 1)	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37
16:26	10	09:56 (Oerzen 1)	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30
13	08:29	09:49 (Oerzen 1)	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39
16:27	5	09:54 (Oerzen 1)	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28
14	08:28		07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40
16:29		17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	
15	08:27		07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42
16:31		17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	
16	08:26		07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44
16:32		17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	
17	08:25		07:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	07:46
16:34		17:33	18:26	20:22	21:14	21:49	21:38	20:45	19:32	18:21	16:22	
18	08:24		07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48
16:36		17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:21	
19	08:23		07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49
16:37		17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	
20	08:22		07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51
16:39		17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	
21	08:21		07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53
16:41		17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17	
22	08:19		07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55
16:43		17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	
23	08:18		07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57
16:45		17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	
24	08:17		07:20	06:15	06:02	05:08	04:52	05:22	06:14	07:07	08:01	07:58
16:46		17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	
25	08:16		07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	08:03	08:00
16:48		17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	18:04	16:12	
26	08:14		07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	08:05	08:02
16:50		17:50	18:42	20:38	21:28	21:51	21:26	20:25	19:10	18:01	16:11	
27	08:13		07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	08:06	08:03
16:52		17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	
28	08:11		07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	08:08	08:05
16:54		17:54		18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09
29	08:10			07:03	05:52	05:03	04:55	05:30	06:22	07:16	08:10	08:06
16:56				19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08
30	08:08			07:00	05:50	05:01	04:55	05:31	06:24	07:17	08:12	08:08
16:58				19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07
31	08:07			06:58		05:00		05:33	06:26		07:14	
17:00				19:51		21:34		21:17	20:13		16:51	
Sonnenscheinstunden	253											
astr.max.mögl.Beschattung	353	275	367	419	491	506	509	458	382	329	261	15
												1317

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

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



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s31 - Südergellersen, Forstweg 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 Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar		Februar		März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:34	09:34 (Oerzen 1)	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10	09:28 (Oerzen 1)		
	16:11	10:40 (Rep 11)	17:02	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06	5	09:33 (Oerzen 1)	
2	08:34	09:35 (Oerzen 1)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11	09:27 (Oerzen 1)		
	16:13	10:40 (Rep 11)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06	9	09:36 (Oerzen 1)	
3	08:34	09:36 (Oerzen 1)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:13	09:26 (Oerzen 1)		
	16:14	10:39 (Rep 11)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05	12	09:38 (Oerzen 1)	
4	08:34	09:37 (Oerzen 1)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14	09:25 (Oerzen 1)		
	16:15	10:38 (Rep 11)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04	14	09:39 (Oerzen 1)	
5	08:33	09:38 (Oerzen 1)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15	09:25 (Oerzen 1)		
	16:16	09:56 (Oerzen 1)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04	16	09:41 (Oerzen 1)	
6	08:33	09:38 (Oerzen 1)	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17	09:25 (Oerzen 1)		
	16:17	09:55 (Oerzen 1)	17:11	18:05	20:02	20:56	21:41	21:48	21:07	19:59	18:46	16:40	16:03	16	09:41 (Oerzen 1)	
7	08:32	09:40 (Oerzen 1)	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18	09:24 (Oerzen 1)		
	16:19	09:56 (Oerzen 1)	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:57	18:44	16:38	16:03	18	09:42 (Oerzen 1)	
8	08:32	09:41 (Oerzen 1)	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19	09:25 (Oerzen 1)		
	16:20	09:55 (Oerzen 1)	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02	24	10:25 (Rep 11)	
9	08:31	09:42 (Oerzen 1)	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20	09:24 (Oerzen 1)		
	16:21	09:54 (Oerzen 1)	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	30	10:27 (Rep 11)	
10	08:31	09:44 (Oerzen 1)	07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33	08:22	09:24 (Oerzen 1)		
	16:23	9	09:53 (Oerzen 1)	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02	33	10:29 (Rep 11)
11	08:30	09:46 (Oerzen 1)	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:45	07:37	07:35	08:23	09:24 (Oerzen 1)		
	16:24	5	09:51 (Oerzen 1)	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	35	10:30 (Rep 11)
12	08:29		07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24	09:25 (Oerzen 1)		
	16:26		17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	37	10:32 (Rep 11)	
13	08:29		07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25	09:26 (Oerzen 1)		
	16:27		17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	38	10:33 (Rep 11)	
14	08:28		07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26	09:26 (Oerzen 1)		
	16:29		17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	40	10:34 (Rep 11)	
15	08:27		07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27	09:26 (Oerzen 1)		
	16:31		17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	41	10:35 (Rep 11)	
16	08:26		07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28	09:26 (Oerzen 1)		
	16:32		17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	42	10:35 (Rep 11)	
17	08:25		07:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	07:46	08:29	09:26 (Oerzen 1)		
	16:34		17:33	18:26	20:22	21:14	21:49	21:38	20:45	19:32	18:21	16:22	16:02	43	10:36 (Rep 11)	
18	08:24		07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29	09:27 (Oerzen 1)		
	16:36		17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:21	16:02	43	10:37 (Rep 11)	
19	08:23		07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30	09:28 (Oerzen 1)		
	16:37		17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02	43	10:38 (Rep 11)	
20	08:22		07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31	09:27 (Oerzen 1)		
	16:39		17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02	43	10:37 (Rep 11)	
21	08:21		07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31	09:28 (Oerzen 1)		
	16:41		17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17	16:03	43	10:38 (Rep 11)	
22	08:19		07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32	09:28 (Oerzen 1)		
	16:43		17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03	43	10:38 (Rep 11)	
23	08:18		07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32	09:29 (Oerzen 1)		
	16:45		17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04	43	10:39 (Rep 11)	
24	08:17		07:20	06:15	06:02	05:08	04:52	05:22	06:14	07:07	08:01	07:58	08:33	09:30 (Oerzen 1)		
	16:46		17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04	43	10:40 (Rep 11)	
25	08:16		07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33	09:30 (Oerzen 1)		
	16:48		17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	16:05	43	10:40 (Rep 11)	
26	08:14		07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:33	09:31 (Oerzen 1)		
	16:50		17:50	18:42	20:38	21:28	21:51	21:26	20:25	19:10	17:01	16:11	16:06	43	10:41 (Rep 11)	
27	08:13		07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:34	09:32 (Oerzen 1)		
	16:52		17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	16:06	42	10:41 (Rep 11)	
28	08:11		07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34	09:32 (Oerzen 1)		
	16:54		17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	16:07	41	10:41 (Rep 11)	
29	08:10			07:03	05:52	05:03	04:55	05:30	06:22	07:16	07:10	08:06	08:34	09:33 (Oerzen 1)		
	16:56			19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	16:08	39	10:41 (Rep 11)	
30	08:08			07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	08:34	09:33 (Oerzen 1)		
	16:58			19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	16:09	39	10:41 (Rep 11)	
31	08:07			06:58			05:00				07:14		08:34			
	17:00			19:51			21:34				16:51		16:10	37	10:41 (Rep 11)	
Sonnenscheinstunden	253		275	367	419	491	506	509	458	382	329	261	237			
astr.max.mögl.Beschattung		214												1038		

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s32 - Südergellersen, Forstweg 17

### Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlungsrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	09:28 (Oerzen 1)	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16
16:11	48	10:39 (Rep 11)	17:02	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49
2	08:34	09:29 (Oerzen 1)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18
16:13	46	10:39 (Rep 11)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47
3	08:34	09:30 (Oerzen 1)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20
16:14	45	10:39 (Rep 11)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45
4	08:34	09:30 (Oerzen 1)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22
16:15	43	10:39 (Rep 11)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44
5	08:33	09:31 (Oerzen 1)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23
16:16	42	10:39 (Rep 11)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42
6	08:33	09:31 (Oerzen 1)	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25
16:17	40	10:38 (Rep 11)	17:11	18:05	20:02	20:56	21:41	21:48	21:07	19:59	18:46	16:40
7	08:32	09:33 (Oerzen 1)	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27
16:19	36	10:38 (Rep 11)	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:57	18:44	16:38
8	08:32	09:33 (Oerzen 1)	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29
16:20	33	10:37 (Rep 11)	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36
9	08:31	09:34 (Oerzen 1)	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31
16:21	28	10:35 (Rep 11)	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35
10	08:31	09:35 (Oerzen 1)	07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33
16:23	18	10:31 (Rep 11)	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33
11	08:30	09:36 (Oerzen 1)	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:45	07:37	07:35
16:24	16	09:52 (Oerzen 1)	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31
12	08:29	09:38 (Oerzen 1)	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37
16:26	14	09:52 (Oerzen 1)	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30
13	08:29	09:40 (Oerzen 1)	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39
16:27	11	09:51 (Oerzen 1)	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28
14	08:28	09:42 (Oerzen 1)	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40
16:29	8	09:50 (Oerzen 1)	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26
15	08:27		07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42
16:31			17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25
16	08:26		07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44
16:32			17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23
17	08:25		07:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	07:46
16:34			17:33	18:26	20:22	21:14	21:49	21:38	20:45	19:32	18:21	16:22
18	08:24		07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48
16:36			17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:21
19	08:23		07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49
16:37			17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19
20	08:22		07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51
16:39			17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18
21	08:21		07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53
16:41			17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17
22	08:19		07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55
16:43			17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15
23	08:18		07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57
16:45			17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14
24	08:17		07:20	06:15	06:02	05:08	04:52	05:22	06:14	07:07	08:01	07:58
16:46			17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13
25	08:16		07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	08:03	08:00
16:48			17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	18:04	16:12
26	08:14		07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	08:05	08:02
16:50			17:50	18:42	20:38	21:28	21:51	21:26	20:20	19:06	16:57	16:11
27	08:13		07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	08:06	08:03
16:52			17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10
28	08:11		07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	08:08	08:05
16:54			17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:10
29	08:10			07:03	05:52	05:03	04:55	05:30	06:22	07:16	08:10	08:06
16:56				19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08
30	08:08			07:00	05:50	05:01	04:55	05:31	06:24	07:17	08:12	08:08
16:58				19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07
31	08:07			06:58		05:00		05:33	06:26		07:14	
17:00				19:51		21:34		21:17	20:13		16:51	
Sonnenscheinstunden	253											
astr.max.mögl.Beschattung	428	275	367	419	491	506	509	458	382	329	261	237
										33	1402	

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s33 - Südergellersen, Gewerbegebiet

## 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	08:34	10:27 (Oerzen 2)	08:05	10:38 (Oerzen 1)	07:09	10:16 (Oerzen 1)	06:55	17:28 (Rep 11)	05:48	16:51 (Rep 11)	05:00
2	16:11	130 15:18 (Oerzen 2)	17:01	135 16:20 (B 02)	17:56	184 17:14 (Rep 8)	19:53	77 19:27 (B 01)	20:47	102 18:33 (Rep 11)	21:35
3	08:34	10:28 (Oerzen 2)	08:03	10:36 (Oerzen 1)	07:07	10:16 (Oerzen 1)	06:53	77 17:24 (Rep 11)	05:46	102 16:50 (Rep 11)	04:59
4	16:13	130 15:19 (Oerzen 2)	17:03	141 16:20 (B 02)	17:58	183 17:14 (Rep 8)	19:55	81 19:27 (B 01)	20:48	103 18:33 (Rep 11)	21:36
5	08:33	10:29 (Oerzen 2)	08:00	10:34 (Oerzen 1)	07:02	10:15 (Oerzen 1)	06:48	81 17:21 (Rep 11)	05:44	103 16:50 (Rep 11)	04:58
6	16:14	131 15:19 (Oerzen 2)	17:05	144 16:20 (B 02)	18:00	181 17:14 (Rep 8)	19:56	85 19:28 (B 01)	20:50	103 18:33 (Rep 11)	21:38
7	08:33	10:29 (Oerzen 2)	07:58	10:34 (Oerzen 1)	07:00	10:15 (Oerzen 1)	06:48	85 17:17 (Rep 11)	05:42	103 16:50 (Rep 11)	04:57
8	16:15	131 15:20 (Oerzen 2)	17:07	155 16:37 (Rep 5)	18:02	177 17:14 (Rep 8)	19:58	89 19:28 (B 01)	20:52	102 18:32 (Rep 11)	21:39
9	08:33	10:29 (Oerzen 2)	07:58	10:33 (Oerzen 1)	07:00	10:16 (Oerzen 1)	06:46	89 17:15 (Rep 11)	05:40	102 16:50 (Rep 11)	04:56
10	16:16	132 15:21 (Oerzen 2)	17:09	163 16:39 (Rep 5)	18:03	172 17:15 (Rep 8)	20:00	93 19:28 (B 01)	20:54	102 18:32 (Rep 11)	21:40
11	08:33	10:29 (Oerzen 2)	07:56	10:32 (Oerzen 1)	06:57	10:15 (Oerzen 1)	06:43	93 17:13 (Rep 11)	05:38	102 16:51 (Rep 11)	04:56
12	16:17	134 15:22 (Oerzen 2)	17:11	169 16:41 (Rep 5)	18:05	167 17:14 (Rep 8)	20:02	99 19:29 (B 01)	20:55	102 18:33 (Rep 11)	21:41
13	08:32	10:29 (Oerzen 2)	07:55	10:31 (Oerzen 1)	06:55	10:15 (Oerzen 1)	06:41	99 17:10 (Rep 11)	05:36	102 16:51 (Rep 11)	04:55
14	16:19	133 15:22 (Oerzen 2)	17:13	172 16:43 (B 03)	18:07	158 17:14 (Rep 8)	20:04	103 19:28 (B 01)	20:57	102 18:33 (Rep 11)	21:42
15	08:32	10:30 (Oerzen 2)	07:53	10:29 (Oerzen 1)	06:53	10:15 (Oerzen 1)	06:39	103 17:08 (Rep 11)	05:34	102 16:51 (Rep 11)	04:54
16	16:20	133 15:23 (Oerzen 2)	17:15	176 16:45 (B 03)	18:09	146 17:15 (Rep 8)	20:05	107 19:28 (B 01)	20:59	101 18:32 (Rep 11)	21:43
17	08:31	10:30 (Oerzen 2)	07:51	10:28 (Oerzen 1)	06:50	10:15 (Oerzen 1)	06:36	107 17:07 (Rep 11)	05:32	101 16:51 (Rep 11)	04:54
18	16:21	132 15:23 (Oerzen 2)	17:17	178 16:47 (B 03)	18:11	138 17:18 (Rep 9)	20:07	109 19:28 (B 01)	21:01	101 18:32 (Rep 11)	21:43
19	08:31	10:31 (Oerzen 2)	07:49	10:28 (Oerzen 1)	06:48	10:15 (Oerzen 1)	06:34	109 17:04 (Rep 11)	05:30	101 16:52 (Rep 11)	04:53
20	16:23	132 15:24 (Oerzen 2)	17:19	173 16:49 (B 03)	18:13	139 17:21 (Rep 9)	20:09	113 19:27 (B 01)	21:02	100 18:32 (Rep 11)	21:44
21	08:30	10:31 (Oerzen 2)	07:47	10:27 (Oerzen 1)	06:46	10:15 (Oerzen 1)	06:32	113 17:03 (Rep 11)	05:29	100 16:52 (Rep 11)	04:53
22	16:24	133 15:24 (Oerzen 2)	17:21	174 16:48 (B 03)	18:15	139 17:22 (Rep 9)	20:11	114 19:27 (B 01)	21:04	100 18:32 (Rep 11)	21:45
23	08:29	10:31 (Oerzen 2)	07:45	10:26 (Oerzen 1)	06:43	10:15 (Oerzen 1)	06:29	114 17:02 (Rep 11)	05:27	100 16:53 (Rep 11)	04:52
24	16:26	132 15:24 (Oerzen 2)	17:23	176 16:47 (B 03)	18:16	138 17:23 (Rep 9)	20:13	115 19:26 (B 01)	21:06	99 18:32 (Rep 11)	21:46
25	08:29	10:32 (Oerzen 2)	07:43	10:25 (Oerzen 1)	06:41	10:15 (Oerzen 1)	06:27	99 17:01 (Rep 11)	05:25	99 16:54 (Rep 11)	04:52
26	16:27	131 15:25 (Oerzen 2)	17:25	177 16:45 (Rep 5)	18:18	137 17:24 (Rep 9)	20:14	98 19:25 (B 01)	21:07	98 18:32 (Rep 11)	21:47
27	08:28	10:32 (Oerzen 2)	07:41	10:25 (Oerzen 1)	06:39	10:16 (Oerzen 1)	06:25	98 16:59 (Rep 11)	05:23	98 16:54 (Rep 11)	04:52
28	16:28	132 15:25 (Oerzen 2)	17:27	178 16:45 (Rep 5)	18:20	138 17:25 (Rep 9)	20:16	97 19:24 (B 01)	21:09	97 18:31 (Rep 11)	21:47
29	08:27	10:32 (Oerzen 2)	07:39	10:23 (Oerzen 1)	06:36	10:17 (Oerzen 1)	06:22	97 16:58 (Rep 11)	05:22	97 16:55 (Rep 11)	04:52
30	16:31	131 15:26 (Oerzen 2)	17:29	179 16:44 (Rep 5)	18:22	138 17:26 (Rep 9)	20:18	97 19:23 (B 01)	21:11	97 18:32 (Rep 11)	21:48
31	08:26	10:33 (Oerzen 2)	07:37	10:22 (Oerzen 1)	06:34	10:16 (Oerzen 1)	06:20	97 16:57 (Rep 11)	05:20	97 16:55 (Rep 11)	04:52
32	16:32	129 15:26 (Oerzen 2)	17:31	181 16:44 (Rep 5)	18:24	138 17:26 (Rep 9)	20:20	96 19:21 (B 01)	21:12	96 18:31 (Rep 11)	21:48
33	08:25	10:34 (Oerzen 2)	07:35	10:22 (Oerzen 1)	06:31	10:17 (Oerzen 1)	06:18	96 16:57 (Rep 11)	05:19	96 16:56 (Rep 11)	04:51
34	16:34	127 15:26 (Oerzen 2)	17:33	179 16:43 (Rep 5)	18:26	137 17:27 (Rep 9)	20:22	95 19:20 (B 01)	21:14	95 18:31 (Rep 11)	21:49
35	08:24	10:34 (Oerzen 2)	07:33	10:21 (Oerzen 1)	06:29	10:17 (Oerzen 1)	06:16	95 16:55 (Rep 11)	05:17	95 16:56 (Rep 11)	04:51
36	16:36	126 15:27 (Oerzen 2)	17:35	179 16:42 (Rep 5)	18:27	136 17:27 (Rep 9)	20:23	95 19:16 (B 01)	21:15	95 18:31 (Rep 11)	21:49
37	08:23	10:35 (Oerzen 2)	07:31	10:21 (Oerzen 1)	06:27	10:18 (Oerzen 1)	06:13	95 16:54 (Rep 11)	05:15	95 16:56 (Rep 11)	04:51
38	16:37	124 15:27 (Oerzen 2)	17:37	176 16:41 (Rep 5)	18:29	134 17:27 (Rep 9)	20:25	95 19:13 (B 01)	21:17	95 18:31 (Rep 11)	21:50
39	08:22	10:35 (Oerzen 2)	07:29	10:21 (Oerzen 1)	06:24	10:19 (Oerzen 1)	06:11	95 16:54 (Rep 11)	05:14	95 16:57 (Rep 11)	04:52
40	16:39	120 15:26 (Oerzen 2)	17:39	173 16:39 (Rep 5)	18:31	131 17:27 (Rep 9)	20:27	94 18:31 (Rep 11)	21:19	94 18:31 (Rep 11)	21:50
41	08:21	10:36 (Oerzen 2)	07:27	10:19 (Oerzen 1)	06:22	10:20 (Oerzen 1)	06:09	94 16:53 (Rep 11)	05:13	94 16:58 (Rep 11)	04:52
42	16:41	121 16:08 (B 02)	17:41	162 15:44 (Rep 10)	18:33	128 17:27 (Rep 9)	20:29	93 18:31 (Rep 11)	21:20	93 18:31 (Rep 11)	21:50
43	08:19	10:36 (Oerzen 2)	07:24	10:19 (Oerzen 1)	06:19	10:22 (Oerzen 1)	06:07	93 16:53 (Rep 11)	05:11	93 16:58 (Rep 11)	04:52
44	16:43	124 16:09 (B 02)	17:42	162 15:43 (Rep 10)	18:35	124 17:27 (Rep 9)	20:31	92 18:31 (Rep 11)	21:22	92 18:30 (Rep 11)	21:50
45	08:18	10:37 (Oerzen 2)	07:22	10:19 (Oerzen 1)	06:17	10:22 (Oerzen 1)	06:04	92 16:52 (Rep 11)	05:10	92 16:59 (Rep 11)	04:52
46	16:45	125 16:11 (B 02)	17:44	172 17:05 (Rep 8)	18:37	121 17:27 (Rep 9)	20:32	91 18:32 (Rep 11)	21:23	91 18:30 (Rep 11)	21:51
47	08:17	10:37 (Oerzen 2)	07:20	10:18 (Oerzen 1)	06:15	10:24 (Oerzen 1)	06:02	91 16:52 (Rep 11)	05:08	91 17:00 (Rep 11)	04:52
48	16:46	126 16:13 (B 02)	17:46	179 17:08 (Rep 8)	18:38	121 17:27 (Rep 9)	20:34	90 18:32 (Rep 11)	21:25	90 18:30 (Rep 11)	21:51
49	08:15	10:38 (Oerzen 2)	07:18	10:17 (Oerzen 1)	06:12	10:25 (Oerzen 1)	06:00	90 16:52 (Rep 11)	05:07	90 17:01 (Rep 11)	04:53
50	16:48	130 16:16 (B 02)	17:48	181 17:09 (Rep 8)	18:40	110 17:26 (Rep 9)	20:36	89 18:32 (Rep 11)	21:26	89 18:30 (Rep 11)	21:51
51	08:14	10:39 (Oerzen 2)	07:16	10:17 (Oerzen 1)	06:10	10:28 (Oerzen 1)	05:58	89 16:51 (Rep 11)	05:06	89 17:01 (Rep 11)	04:53
52	16:50	129 16:17 (B 02)	17:50	185 17:11 (Rep 8)	18:42	102 17:25 (Rep 9)	20:38	89 18:33 (Rep 11)	21:27	89 18:30 (Rep 11)	21:51
53	08:13	10:40 (Oerzen 2)	07:13	10:17 (Oerzen 1)	06:07	10:31 (Oerzen 1)	05:56	88 16:51 (Rep 11)	05:05	88 17:02 (Rep 11)	04:54
54	16:52	128 16:18 (B 02)	17:52	186 17:13 (Rep 8)	18:44	94 17:25 (Rep 9)	20:40	88 18:33 (Rep 11)	21:29	88 18:30 (Rep 11)	21:51
55	08:11	10:41 (Oerzen 2)	07:11	10:16 (Oerzen 1)	06:05	10:34 (Oerzen 1)	05:54	88 16:51 (Rep 11)	05:04	88 17:03 (Rep 11)	04:54
56	16:54	124 16:18 (B 02)	17:54	185 17:13 (Rep 8)	18:46	84 17:24 (Rep 9)	20:41	87 18:33 (Rep 11)	21:30	87 18:30 (Rep 11)	21:50
57	08:10	10:41 (Oerzen 2)			07:02	11:41 (Oerzen 1)	05:52	87 16:51 (Rep 11)	05:03	87 17:03 (Rep 11)	04:55
58	16:56	119 16:19 (B 02)			19:47	77 19:20 (B 01)	20:43	86 18:33 (Rep 11)	21:31	86 18:29 (Rep 11)	21:50
59	08:08	10:41 (Oerzen 1)			07:00	77 17:36 (Rep 9)	05:50	86 16:51 (Rep 11)	05:01	86 17:04 (Rep 11)	04:55
60	16:58	125 16:20 (B 02)			19:49	63 19:23 (B 01)	20:45	85 18:33 (Rep 11)	21:33	85 18:29 (Rep 11)	21:50
61	08:07	10:39 (Oerzen 1)			06:50	70 17:33 (Rep 11)		85 17:04 (Rep 11)	05:00		
62	17:00	130 16:20 (B 02)			19:51	70 19:25 (B 01)		85 21:34			
Sonnenscheinstunden		253		275		367		419		491	
astr.max.mögl.Beschattung		3984		4790		4101		3077		2959	
											2312

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s33 - Südergellersen, Gewerbegebiet

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember	
1	04:56	17:16 (Rep 11)	05:35	17:04 (Rep 11)	06:27	17:02 (Rep 11)	07:19	10:55 (Oerzen 1)	07:16	09:57 (Oerzen 1)	08:09
2	21:50	17:16 (Rep 11)	21:16	18:43 (Rep 11)	20:11	19:26 (B 01)	18:58	18:03 (Rep 9)	16:49	16:19 (B 03)	16:06
3	04:57	17:16 (Rep 11)	05:36	17:03 (Rep 11)	06:29	17:03 (Rep 11)	07:21	10:54 (Oerzen 1)	07:18	09:58 (Oerzen 1)	08:11
4	21:49	17:16 (Rep 11)	21:14	18:42 (Rep 11)	20:08	19:26 (B 01)	18:56	18:01 (Rep 9)	16:47	16:17 (B 03)	16:06
5	04:57	17:16 (Rep 11)	05:38	17:03 (Rep 11)	06:31	17:05 (Rep 11)	07:23	10:53 (Oerzen 1)	07:20	09:59 (Oerzen 1)	08:12
6	21:49	17:16 (Rep 11)	21:12	18:43 (Rep 11)	20:06	19:26 (B 01)	18:54	17:59 (Rep 9)	16:45	16:15 (B 03)	16:05
7	04:58	17:15 (Rep 11)	05:39	17:02 (Rep 11)	06:32	17:05 (Rep 11)	07:24	10:52 (Oerzen 1)	07:22	10:00 (Oerzen 1)	08:14
8	21:48	17:15 (Rep 11)	21:10	18:42 (Rep 11)	20:04	19:25 (B 01)	18:51	17:56 (Rep 9)	16:44	16:13 (B 03)	16:04
9	04:59	17:15 (Rep 11)	05:41	17:02 (Rep 11)	06:34	17:07 (Rep 11)	07:26	10:52 (Oerzen 1)	07:23	10:02 (Oerzen 1)	08:15
10	21:48	17:14 (Rep 11)	21:08	18:43 (Rep 11)	20:01	19:25 (B 01)	18:49	17:53 (Rep 9)	16:42	16:11 (B 03)	16:04
11	05:00	17:15 (Rep 11)	05:43	17:01 (Rep 11)	06:36	17:08 (Rep 11)	07:28	10:51 (Oerzen 1)	07:25	10:03 (Oerzen 1)	08:17
12	21:47	18:35 (Rep 11)	21:07	18:42 (Rep 11)	19:59	19:24 (B 01)	18:46	17:50 (Rep 9)	16:40	16:08 (Rep 5)	16:03
13	05:01	17:15 (Rep 11)	05:44	17:01 (Rep 11)	06:38	17:10 (Rep 11)	07:30	10:51 (Oerzen 1)	07:27	10:04 (Oerzen 1)	08:18
14	21:47	18:35 (Rep 11)	21:05	18:42 (Rep 11)	19:56	19:23 (B 01)	18:44	17:50 (Rep 8)	16:38	16:06 (Rep 5)	16:03
15	05:02	17:15 (Rep 11)	05:46	17:00 (Rep 11)	06:39	17:12 (Rep 11)	07:32	10:51 (Oerzen 1)	07:29	10:05 (Oerzen 1)	08:19
16	21:46	18:36 (Rep 11)	21:03	18:42 (Rep 11)	19:54	19:23 (B 01)	18:42	17:50 (Rep 8)	16:36	15:50 (B 02)	16:02
17	05:03	17:14 (Rep 11)	05:48	17:00 (Rep 11)	06:41	17:14 (Rep 11)	07:33	10:51 (Oerzen 1)	07:31	10:07 (Oerzen 1)	08:20
18	21:45	18:36 (Rep 11)	21:01	18:42 (Rep 11)	19:52	19:21 (B 01)	18:39	17:50 (Rep 8)	16:35	15:51 (B 02)	16:02
19	05:04	17:14 (Rep 11)	05:50	17:00 (Rep 11)	06:43	17:16 (Rep 11)	07:35	10:49 (Oerzen 1)	07:33	10:08 (Oerzen 1)	08:22
20	21:45	18:36 (Rep 11)	20:59	18:42 (Rep 11)	19:49	19:20 (B 01)	18:37	17:48 (Rep 8)	16:33	15:51 (B 02)	16:02
21	05:05	17:14 (Rep 11)	05:51	16:59 (Rep 11)	06:44	17:20 (Rep 11)	07:37	10:49 (Oerzen 1)	07:35	10:10 (Oerzen 1)	08:23
22	21:44	18:37 (Rep 11)	20:57	18:41 (Rep 11)	19:47	19:19 (B 01)	18:35	17:48 (Rep 8)	16:31	15:51 (B 02)	16:02
23	05:06	17:13 (Rep 11)	05:53	16:59 (Rep 11)	06:46	17:23 (Rep 11)	07:39	10:49 (Oerzen 1)	07:37	10:12 (Oerzen 1)	08:24
24	21:43	18:37 (Rep 11)	20:55	18:41 (Rep 11)	19:44	19:16 (B 01)	18:32	17:47 (Rep 8)	16:30	15:51 (B 02)	16:01
25	05:07	17:13 (Rep 11)	05:55	16:58 (Rep 11)	06:48	17:28 (Rep 9)	07:41	10:49 (Oerzen 1)	07:38	10:13 (Oerzen 1)	08:25
26	21:42	18:37 (Rep 11)	20:53	18:40 (Rep 11)	19:42	19:14 (B 01)	18:30	17:46 (Rep 8)	16:28	15:50 (B 02)	16:01
27	05:08	17:12 (Rep 11)	05:56	16:58 (Rep 11)	06:50	11:33 (Oerzen 1)	07:42	10:49 (Oerzen 1)	07:40	10:12 (Oerzen 1)	08:26
28	21:41	18:38 (Rep 11)	20:51	18:40 (Rep 11)	19:40	19:11 (B 01)	18:28	17:45 (Rep 8)	16:26	15:50 (B 02)	16:01
29	05:10	17:12 (Rep 11)	05:58	16:59 (Rep 11)	06:51	11:24 (Oerzen 1)	07:44	10:49 (Oerzen 1)	07:42	10:12 (Oerzen 1)	08:27
30	21:40	18:38 (Rep 11)	20:49	18:40 (Rep 11)	19:37	18:13 (Rep 9)	07:46	17:44 (Rep 8)	16:25	15:50 (B 02)	16:01
31	05:11	17:11 (Rep 11)	06:00	16:58 (Rep 11)	06:53	11:20 (Oerzen 1)	07:46	10:49 (Oerzen 1)	07:44	10:11 (Oerzen 1)	08:28
1	21:39	18:37 (Rep 11)	20:47	18:39 (Rep 11)	19:35	18:14 (Rep 9)	07:48	17:43 (Rep 8)	16:23	15:49 (B 02)	16:01
2	05:12	17:11 (Rep 11)	06:01	16:58 (Rep 11)	06:55	11:17 (Oerzen 1)	07:48	10:50 (Oerzen 1)	07:46	10:11 (Oerzen 1)	08:28
3	21:38	18:39 (Rep 11)	20:44	18:39 (Rep 11)	19:32	18:14 (Rep 9)	07:50	17:41 (Rep 8)	16:22	15:49 (B 02)	16:02
4	05:14	17:10 (Rep 11)	06:03	16:57 (Rep 11)	06:57	11:14 (Oerzen 1)	07:50	10:50 (Oerzen 1)	07:48	10:11 (Oerzen 1)	08:29
5	21:36	18:39 (Rep 11)	20:42	18:38 (Rep 11)	19:30	18:14 (Rep 9)	07:51	17:38 (Rep 8)	16:20	15:47 (B 02)	16:02
6	05:15	17:10 (Rep 11)	06:05	16:58 (Rep 11)	06:58	11:11 (Oerzen 1)	07:51	10:50 (Oerzen 1)	07:49	10:11 (Oerzen 1)	08:30
7	21:35	18:39 (Rep 11)	20:40	18:38 (Rep 11)	19:27	18:13 (Rep 9)	07:53	17:34 (Rep 8)	16:19	15:45 (B 02)	16:02
8	05:16	17:10 (Rep 11)	06:07	16:58 (Rep 11)	07:00	11:09 (Oerzen 1)	07:53	10:50 (Oerzen 1)	07:51	10:11 (Oerzen 1)	08:31
9	21:34	18:41 (Rep 11)	20:38	18:37 (Rep 11)	19:25	18:13 (Rep 9)	07:54	16:15 (Rep 10)	16:18	15:44 (B 02)	16:02
10	05:18	17:09 (Rep 11)	06:08	16:58 (Rep 11)	07:02	11:07 (Oerzen 1)	07:55	10:51 (Oerzen 1)	07:53	10:11 (Oerzen 1)	08:31
11	21:33	18:41 (Rep 11)	20:36	18:36 (Rep 11)	19:23	18:13 (Rep 9)	07:57	17:07 (Rep 5)	16:17	15:43 (B 02)	16:03
12	05:19	17:08 (Rep 11)	06:10	16:58 (Rep 11)	07:03	11:05 (Oerzen 1)	07:57	10:51 (Oerzen 1)	07:55	10:11 (Oerzen 1)	08:32
13	21:31	18:40 (Rep 11)	20:34	18:36 (Rep 11)	19:20	18:12 (Rep 9)	07:58	17:10 (Rep 5)	16:15	15:02 (Oerzen 1)	16:03
14	05:21	17:08 (Rep 11)	06:12	16:58 (Rep 11)	07:05	11:04 (Oerzen 1)	07:59	10:51 (Oerzen 1)	07:56	10:11 (Oerzen 1)	08:32
15	21:30	18:41 (Rep 11)	20:31	18:34 (Rep 11)	19:18	18:11 (Rep 9)	08:00	17:12 (Rep 5)	16:14	15:03 (Oerzen 1)	16:04
16	05:22	17:08 (Rep 11)	06:13	16:58 (Rep 11)	07:07	11:02 (Oerzen 1)	08:01	10:52 (Oerzen 1)	07:58	10:11 (Oerzen 1)	08:33
17	21:28	18:41 (Rep 11)	20:29	19:17 (B 01)	19:15	18:11 (Rep 9)	08:06	17:13 (Rep 5)	16:13	15:04 (Oerzen 1)	16:04
18	05:24	17:07 (Rep 11)	06:15	16:59 (Rep 11)	07:09	11:01 (Oerzen 1)	08:03	09:52 (Oerzen 1)	08:00	10:12 (Oerzen 1)	08:33
19	21:27	18:41 (Rep 11)	20:27	19:21 (B 01)	19:13	18:10 (Rep 9)	08:04	16:14 (Rep 5)	16:12	15:04 (Oerzen 1)	16:05
20	05:25	17:07 (Rep 11)	06:17	16:58 (Rep 11)	07:10	10:59 (Oerzen 1)	08:05	09:53 (Oerzen 1)	08:02	10:12 (Oerzen 1)	08:33
21	21:25	18:42 (Rep 11)	20:25	19:22 (B 01)	19:10	18:09 (Rep 9)	08:06	16:14 (Rep 5)	16:11	15:05 (Oerzen 1)	16:06
22	05:27	17:06 (Rep 11)	06:19	16:59 (Rep 11)	07:12	10:58 (Oerzen 1)	08:06	09:54 (Oerzen 1)	08:03	10:11 (Oerzen 1)	08:34
23	21:24	18:42 (Rep 11)	20:22	19:23 (B 01)	19:08	18:08 (Rep 9)	08:07	16:15 (Rep 5)	16:10	15:05 (Oerzen 1)	16:06
24	05:28	17:06 (Rep 11)	06:20	17:00 (Rep 11)	07:14	10:58 (Oerzen 1)	08:08	09:54 (Oerzen 1)	08:05	10:12 (Oerzen 1)	08:34
25	21:22	18:42 (Rep 11)	20:20	19:25 (B 01)	19:06	18:07 (Rep 9)	08:09	16:15 (Rep 5)	16:09	15:05 (Oerzen 1)	16:07
26	05:30	17:05 (Rep 11)	06:22	17:00 (Rep 11)	07:16	10:57 (Oerzen 1)	08:10	09:55 (Oerzen 1)	08:06	10:13 (Oerzen 1)	08:34
27	21:21	18:42 (Rep 11)	20:18	19:25 (B 01)	19:03	18:06 (Rep 9)	08:11	16:15 (Rep 5)	16:08	15:06 (Oerzen 1)	16:08
28	05:31	17:05 (Rep 11)	06:24	17:01 (Rep 11)	07:17	10:55 (Oerzen 1)	08:12	09:56 (Oerzen 1)	08:08	10:13 (Oerzen 1)	08:34
29	21:19	18:43 (Rep 11)	20:15	19:25 (B 01)	19:01	18:04 (Rep 9)	08:13	16:17 (B 03)	16:07	15:06 (Oerzen 1)	16:09
30	05:33	17:04 (Rep 11)	06:26	17:02 (Rep 11)		17:14		09:56 (Oerzen 1)		16:10	16:10
31	21:17	18:42 (Rep 11)	20:13	19:26 (B 01)		16:51		16:18 (B 03)		237	4010
Sonnenscheinstunden		509	458	382	3231	329	5267	261	4132		
astr.max.mögl.Beschattung		2705	3217	3231							

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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s34 - Südergellersen, Heidberg 2

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar		Februar		März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	09:46 (Oerzen 1)	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10	
	16:11	14	10:00 (Oerzen 1)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06
2	08:34	09:47 (Oerzen 1)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11	
	16:13	13	10:00 (Oerzen 1)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06
3	08:34	09:49 (Oerzen 1)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:13	
	16:14	11	10:00 (Oerzen 1)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05
4	08:34	09:49 (Oerzen 1)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14	
	16:15	10	09:59 (Oerzen 1)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04
5	08:33	09:52 (Oerzen 1)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15	
	16:16	7	09:59 (Oerzen 1)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04
6	08:33	09:55 (Oerzen 1)	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17	
	16:17	1	09:56 (Oerzen 1)	17:11	18:05	20:02	20:56	21:41	21:48	21:07	19:59	18:46	16:40	16:03
7	08:32		07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18	09:38 (Oerzen 1)
	16:19		17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:57	18:44	16:38	16:03	7 09:45 (Oerzen 1)
8	08:32		07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19	09:38 (Oerzen 1)
	16:20		17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02	9 09:47 (Oerzen 1)
9	08:31		07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20	09:37 (Oerzen 1)
	16:21		17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	11 09:48 (Oerzen 1)
10	08:31		07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33	08:22	09:36 (Oerzen 1)
	16:23		17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02	13 09:49 (Oerzen 1)
11	08:30		07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:45	07:37	07:35	08:23	09:36 (Oerzen 1)
	16:24		17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	14 09:50 (Oerzen 1)
12	08:29		07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24	09:37 (Oerzen 1)
	16:26		17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	15 09:52 (Oerzen 1)
13	08:29		07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25	09:37 (Oerzen 1)
	16:27		17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	16 09:53 (Oerzen 1)
14	08:28		07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26	09:37 (Oerzen 1)
	16:29		17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	16 09:53 (Oerzen 1)
15	08:27		07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27	09:37 (Oerzen 1)
	16:31		17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	17 09:54 (Oerzen 1)
16	08:26		07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28	09:36 (Oerzen 1)
	16:32		17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	18 09:54 (Oerzen 1)
17	08:25		07:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	07:46	08:29	09:37 (Oerzen 1)
	16:34		17:33	18:26	20:22	21:14	21:49	21:38	20:45	19:32	18:21	16:22	16:02	18 09:55 (Oerzen 1)
18	08:24		07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29	09:37 (Oerzen 1)
	16:36		17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:21	16:02	19 09:56 (Oerzen 1)
19	08:23		07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30	09:38 (Oerzen 1)
	16:37		17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02	19 09:57 (Oerzen 1)
20	08:22		07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31	09:38 (Oerzen 1)
	16:39		17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02	19 09:57 (Oerzen 1)
21	08:21		07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31	09:39 (Oerzen 1)
	16:41		17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17	16:03	19 09:58 (Oerzen 1)
22	08:19		07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32	09:39 (Oerzen 1)
	16:43		17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03	19 09:58 (Oerzen 1)
23	08:18		07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32	09:40 (Oerzen 1)
	16:45		17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04	19 09:59 (Oerzen 1)
24	08:17		07:20	06:15	06:02	05:08	04:52	05:22	06:14	07:07	08:01	07:58	08:33	09:40 (Oerzen 1)
	16:46		17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04	19 09:59 (Oerzen 1)
25	08:16		07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33	09:40 (Oerzen 1)
	16:48		17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	16:05	19 09:59 (Oerzen 1)
26	08:14		07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:33	09:42 (Oerzen 1)
	16:50		17:50	18:42	20:38	21:28	21:51	21:26	20:25	19:10	17:01	16:11	16:06	18 10:00 (Oerzen 1)
27	08:13		07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:34	09:42 (Oerzen 1)
	16:52		17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	16:06	18 10:00 (Oerzen 1)
28	08:11		07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34	09:43 (Oerzen 1)
	16:54		17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	16:07	17 10:00 (Oerzen 1)
29	08:10			07:03	05:52	05:03	04:55	05:30	06:22	07:16	07:10	08:06	08:34	09:43 (Oerzen 1)
	16:56			19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	16:08	17 10:00 (Oerzen 1)
30	08:08			07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	08:34	09:44 (Oerzen 1)
	16:58			19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	16:09	17 10:01 (Oerzen 1)
31	08:07				06:58			05:33	06:26		07:14		08:34	09:45 (Oerzen 1)
	17:00				19:51		21:34	21:17	20:13		16:51		16:10	16 10:01 (Oerzen 1)
Sonnenscheinstunden	253				275	367	419	491	506	509	458	382	329	261
astr.max.mögl.Beschattung	56													237
														409

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s35 - Südergellersen, Heidberg 3

### Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar		Februar		März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	10	09:48 (Oerzen 1)	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10
	16:11		09:58 (Oerzen 1)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06
2	08:34	9	09:49 (Oerzen 1)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11
	16:13		09:58 (Oerzen 1)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06
3	08:34	7	09:51 (Oerzen 1)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:13
	16:14		09:58 (Oerzen 1)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05
4	08:34	1	09:54 (Oerzen 1)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14
	16:15		09:55 (Oerzen 1)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04
5	08:33			07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15
	16:16			17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04
6	08:33			07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17
	16:17			17:11	18:05	20:02	20:56	21:41	21:48	21:07	19:59	18:46	16:40	16:03
7	08:32			07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18
	16:19			17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:57	18:44	16:38	16:03
8	08:32			07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19
	16:20			17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02
9	08:31			07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20
	16:21			17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02
10	08:31			07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33	08:22
	16:23			17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02
11	08:30			07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:45	07:37	07:35	08:23
	16:24			17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02
12	08:29			07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24
	16:26			17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01
13	08:29			07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25
	16:27			17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01
14	08:28			07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26
	16:29			17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01
15	08:27			07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27
	16:31			17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01
16	08:26			07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28
	16:32			17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01
17	08:25			07:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	07:46	08:29
	16:34			17:33	18:26	20:22	21:14	21:49	21:38	20:45	19:32	18:21	16:22	16:02
18	08:24			07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29
	16:36			17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:21	16:02
19	08:23			07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30
	16:37			17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02
20	08:22			07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31
	16:39			17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02
21	08:21			07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31
	16:41			17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17	16:03
22	08:19			07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32
	16:43			17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03
23	08:18			07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32
	16:45			17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04
24	08:17			07:20	06:15	06:02	05:08	04:52	05:22	06:14	07:07	08:01	07:58	08:33
	16:46			17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04
25	08:16			07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33
	16:48			17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	16:05
26	08:14			07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:33
	16:50			17:50	18:42	20:38	21:28	21:51	21:26	20:25	19:10	17:01	16:11	16:06
27	08:13			07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:34
	16:52			17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	16:06
28	08:11			07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34
	16:54			17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	16:07
29	08:10				07:03	05:52	05:03	04:55	05:30	06:22	07:16	07:10	08:06	08:34
	16:56				19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	16:08
30	08:08				07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	08:34
	16:58				19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	16:09
31	08:07				06:58		05:00		05:33	06:26		07:14		08:34
	17:00				19:51		21:34		21:17	20:13		16:51		16:10
Sonnenscheinstunden	253			275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung		27												329

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s36 - Südergellersen, Heiligenthaler Weg 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	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11	14:40 (Rep 8) 15:34 (B 01)	08:05 17:01	07:09 17:56	06:55 19:53	05:48 20:47	04:59 21:35	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	08:10 16:06
2	08:34 16:12	14:42 (Rep 8) 15:35 (B 01)	08:03 17:03	07:07 17:58	06:53 19:55	05:46 20:48	04:59 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	08:11 16:06
3	08:34 16:14	14:45 (Rep 8) 15:36 (B 01)	08:02 17:05	07:04 18:00	06:51 19:56	05:44 20:50	04:58 21:38	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	08:12 16:05
4	08:33 16:15	15:09 (B 01) 15:36 (B 01)	08:00 17:07	07:02 18:01	06:48 19:58	05:42 20:52	04:57 21:39	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	08:14 16:04
5	08:33 16:16	15:10 (B 01) 15:37 (B 01)	07:58 17:09	07:00 18:03	06:46 20:00	05:40 20:54	04:56 21:40	04:59 21:48	05:41 21:09	06:34 20:01	07:26 18:49	08:15 16:04
6	08:33 16:17	15:10 (B 01) 15:37 (B 01)	07:56 17:11	06:57 18:05	06:43 20:02	05:38 20:55	04:55 21:41	05:00 21:07	05:43 19:59	06:36 18:46	07:28 16:40	08:17 16:03
7	08:32 16:19	15:10 (B 01) 15:37 (B 01)	07:55 17:13	06:55 18:07	06:41 20:04	05:36 20:57	04:55 21:42	05:01 21:47	05:44 19:56	06:38 18:44	07:30 16:38	08:18 16:03
8	08:32 16:20	15:11 (B 01) 15:38 (B 01)	07:53 17:15	06:53 18:09	06:39 20:05	05:34 20:59	04:54 21:43	05:02 21:46	05:46 19:54	06:39 18:42	07:32 16:36	08:19 16:02
9	08:31 16:21	15:12 (B 01) 15:38 (B 01)	07:51 17:17	06:50 18:11	06:36 20:07	05:32 21:01	04:54 21:44	05:03 21:45	05:48 21:01	06:41 18:39	07:33 16:35	08:20 16:02
10	08:31 16:23	15:12 (B 01) 15:38 (B 01)	07:49 17:19	06:48 18:13	06:34 20:09	05:30 21:02	04:53 21:44	05:04 21:45	05:49 20:59	06:43 18:37	07:35 16:33	08:22 16:02
11	08:30 16:24	15:12 (B 01) 15:38 (B 01)	07:47 17:21	06:46 18:15	06:32 20:11	05:29 21:04	04:53 21:45	05:05 21:44	05:51 20:57	06:44 18:35	07:37 16:31	08:23 16:02
12	08:29 16:26	15:13 (B 01) 15:38 (B 01)	07:45 17:23	06:43 18:16	06:29 20:13	05:27 21:06	04:52 21:46	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	08:24 16:01
13	08:29 16:27	15:14 (B 01) 15:38 (B 01)	07:43 17:25	06:41 18:18	06:27 20:14	05:25 21:07	04:52 21:47	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	08:25 16:01
14	08:28 16:29	15:14 (B 01) 15:38 (B 01)	07:41 17:27	06:39 18:20	06:25 20:16	05:23 21:09	04:52 21:47	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	08:26 16:01
15	08:27 16:31	15:15 (B 01) 15:38 (B 01)	07:39 17:28	06:36 18:22	06:22 20:18	05:22 21:11	04:52 21:48	05:10 20:49	05:58 20:49	06:51 18:26	07:44 16:25	08:27 16:01
16	08:26 16:32	15:16 (B 01) 15:39 (B 01)	07:37 17:31	06:34 18:24	06:20 20:20	05:20 21:12	04:51 21:48	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	08:28 16:01
17	08:25 16:34	15:17 (B 01) 15:38 (B 01)	07:35 17:33	06:31 18:26	06:18 20:22	05:18 21:14	04:51 21:49	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	08:28 16:02
18	08:24 16:36	15:18 (B 01) 15:38 (B 01)	07:33 17:35	06:29 18:27	06:16 20:23	05:17 21:16	04:51 21:49	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	08:29 16:02
19	08:23 16:37	15:20 (B 01) 15:38 (B 01)	07:31 17:37	06:27 18:29	06:13 20:25	05:15 21:17	04:51 21:50	05:15 21:35	06:05 20:40	06:58 19:27	07:52 18:17	08:30 16:02
20	08:22 16:39	15:21 (B 01) 15:37 (B 01)	07:29 17:39	06:24 18:31	06:11 20:27	05:14 21:19	04:51 21:50	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	08:31 16:02
21	08:21 16:41	15:23 (B 01) 15:36 (B 01)	07:27 17:40	06:22 18:33	06:09 20:29	05:12 21:20	04:52 21:50	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	08:31 16:03
22	08:19 16:43	15:24 (B 01) 15:34 (B 01)	07:24 17:42	06:19 18:35	06:07 20:31	05:11 21:22	04:52 21:50	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	08:32 16:03
23	08:18 16:45	15:25 (B 01) 17:02	07:22 18:37	06:17 20:32	06:04 21:23	05:10 21:51	04:52 21:30	05:21 20:31	06:12 19:18	07:05 18:08	07:59 16:14	08:32 16:04
24	08:17 16:46	15:26 (B 01) 17:04	07:20 18:38	06:15 20:34	06:02 21:25	05:08 21:51	04:52 21:29	05:22 20:29	06:13 19:15	07:07 18:06	07:58 16:13	08:33 16:04
25	08:16 16:48	15:27 (B 01) 17:06	07:18 18:40	06:12 20:36	06:00 21:26	05:07 21:51	04:53 21:27	05:24 20:27	06:15 19:13	07:09 18:04	07:59 16:12	08:33 16:05
26	08:14 16:50	15:28 (B 01) 17:07	07:16 18:42	06:10 20:38	05:58 21:27	05:06 21:51	04:53 21:26	05:25 20:25	06:17 19:10	07:10 18:01	07:05 16:11	08:33 16:06
27	08:13 16:52	15:29 (B 01) 17:08	07:13 18:44	06:07 20:40	05:56 21:29	05:05 21:51	04:53 21:24	05:27 20:22	06:19 19:08	07:12 18:00	07:06 16:10	08:34 16:07
28	08:11 16:54	15:30 (B 01) 17:10	07:11 18:46	06:05 20:41	05:54 21:30	05:04 21:51	04:54 21:22	05:28 20:20	06:20 19:06	07:14 18:00	07:08 16:09	08:34 16:07
29	08:10 16:56	15:31 (B 01) 17:11	07:10 18:47	06:04 20:42	05:53 21:31	05:03 21:52	04:54 21:23	05:29 20:21	06:21 19:05	07:15 18:00	07:09 16:08	08:34 16:08
30	08:08 16:58	15:32 (B 01) 17:12	07:09 18:48	06:03 20:43	05:52 21:32	05:02 21:53	04:53 21:24	05:30 20:20	06:22 19:03	07:16 18:00	07:10 16:09	08:34 16:09
31	08:07 17:00	15:33 (B 01) 17:13	07:08 18:49	06:02 20:44	05:51 21:33	05:01 21:54	04:53 21:25	05:31 20:21	06:24 19:01	07:17 18:00	07:12 16:07	08:34 16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr. max. mögl. Beschattung	525									219		1139

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

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

## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s37 - Südergellersen, Heiligenthaler Weg 3

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	14:56 (B 01)	08:05	07:09	06:55	05:48	04:59	04:56	05:35	06:27	07:19	07:16
2	16:11	15:22 (B 01)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49
3	08:34	14:57 (B 01)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18
4	16:12	15:22 (B 01)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47
5	08:34	14:58 (B 01)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20
6	16:14	15:23 (B 01)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45
7	08:33	14:58 (B 01)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22
8	16:15	15:23 (B 01)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44
9	08:33	14:59 (B 01)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23
10	16:16	15:23 (B 01)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42
11	08:33	14:59 (B 01)	07:56	06:57	06:43	05:38	04:55	05:00	05:43	06:36	07:28	07:25
12	16:17	15:23 (B 01)	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40
13	08:32	14:59 (B 01)	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27
14	16:19	15:23 (B 01)	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38
15	08:32	15:01 (B 01)	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29
16	16:20	15:24 (B 01)	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36
17	08:31	15:01 (B 01)	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31
18	16:21	15:23 (B 01)	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35
19	08:31	15:02 (B 01)	07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	07:33
20	16:23	15:23 (B 01)	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33
21	08:30	15:03 (B 01)	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35
22	16:24	15:23 (B 01)	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31
23	08:29	15:04 (B 01)	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37
24	16:26	15:22 (B 01)	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30
25	08:29	15:06 (B 01)	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:38
26	16:27	15:23 (B 01)	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28
27	08:28	15:07 (B 01)	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40
28	16:29	15:21 (B 01)	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26
29	08:27	15:08 (B 01)	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42
30	16:31	15:20 (B 01)	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25
31	08:26	15:11 (B 01)	07:37	06:34	06:20	05:20	04:51	05:11	06:00	06:53	07:46	07:44
32	16:32	15:18 (B 01)	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23
33	08:25	15:18 (B 01)	07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46
34	16:34	15:18 (B 01)	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22
35	08:24	15:18 (B 01)	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48
36	16:36	15:18 (B 01)	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20
37	08:23	15:18 (B 01)	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49
38	16:37	15:17 (B 01)	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19
39	08:22	15:19 (B 01)	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51
40	16:39	15:19 (B 01)	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18
41	08:21	15:20 (B 01)	07:27	06:22	06:09	05:12	04:52	05:18	06:08	07:02	07:55	07:53
42	16:41	15:20 (B 01)	17:40	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16
43	08:19	15:21 (B 01)	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55
44	16:43	15:21 (B 01)	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15
45	08:18	15:22 (B 01)	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:56
46	16:45	15:22 (B 01)	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14
47	08:17	15:23 (B 01)	07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58
48	16:46	15:23 (B 01)	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13
49	08:16	15:24 (B 01)	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00
50	16:48	15:24 (B 01)	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	18:04	16:12
51	08:14	15:25 (B 01)	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02
52	16:50	15:25 (B 01)	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	18:01	16:11
53	08:13	15:26 (B 01)	07:13	06:07	05:56	05:05	04:53	05:27	06:19	07:12	07:06	08:03
54	16:52	15:26 (B 01)	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	18:00	16:10
55	08:11	15:27 (B 01)	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05
56	16:54	15:27 (B 01)	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	18:00	16:09
57	08:10	15:28 (B 01)	07:10	06:04	05:53	05:03	04:55	05:30	06:22	07:16	07:10	08:06
58	16:56	15:28 (B 01)	17:56	18:48	20:43	21:32	21:50	21:21	20:18	19:03	18:00	16:08
59	08:08	15:29 (B 01)	07:08	06:02	05:51	05:01	04:55	05:31	06:24	07:17	07:12	08:08
60	16:58	15:29 (B 01)	17:58	18:50	20:45	21:33	21:50	21:19	20:15	19:01	18:00	16:07
61	08:07	15:30 (B 01)	07:07	06:01	05:50	05:00	04:55	05:33	06:26	07:19	07:14	08:09
62	17:00	15:30 (B 01)	19:51	19:43	21:34	21:51	21:17	20:13	09:00	16:51	16:51	16:51
Sonnenscheinstunden	273	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung	327									67		787

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

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



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s38 - Südergellersen, Heiligenthaler Weg 3c

## 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	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11	14:59 (8 01) 15:24 (8 01)	08:05 17:01	07:09 17:56	06:55 19:53	05:48 20:47	04:59 21:35	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	08:10 16:49
2	08:34 16:12	15:00 (8 01) 15:25 (8 01)	08:03 17:03	07:07 17:58	06:53 19:55	05:46 20:48	04:59 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	08:11 16:47
3	08:34 16:14	15:01 (8 01) 15:25 (8 01)	08:02 17:05	07:04 18:00	06:51 19:56	05:44 20:50	04:58 21:38	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	08:12 16:45
4	08:33 16:15	15:01 (8 01) 15:25 (8 01)	08:00 17:07	07:02 18:01	06:48 19:58	05:42 20:52	04:57 21:39	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	08:14 16:44
5	08:33 16:16	15:02 (8 01) 15:26 (8 01)	07:58 17:09	07:00 18:03	06:46 20:00	05:40 20:54	04:56 21:40	04:56 21:48	05:41 21:09	06:34 20:01	07:26 18:49	08:15 16:42
6	08:33 16:17	15:02 (8 01) 15:26 (8 01)	07:56 17:11	06:57 18:05	06:43 20:02	05:38 20:55	04:55 21:41	05:00 21:47	05:43 21:07	06:36 19:59	07:28 18:46	08:17 16:40
7	08:32 16:19	15:02 (8 01) 15:25 (8 01)	07:55 17:13	06:55 18:07	06:41 20:04	05:36 20:57	04:55 21:42	05:01 21:47	05:44 21:05	06:38 19:56	07:30 18:44	08:18 16:38
8	08:32 16:20	15:04 (8 01) 15:26 (8 01)	07:53 17:15	06:53 18:09	06:39 20:05	05:34 20:59	04:54 21:43	05:02 21:46	05:46 21:03	06:39 19:54	07:32 18:42	08:19 16:36
9	08:31 16:21	15:04 (8 01) 15:26 (8 01)	07:51 17:17	06:50 18:11	06:36 20:07	05:32 21:01	04:54 21:44	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	08:20 16:35
10	08:31 16:23	15:05 (8 01) 15:26 (8 01)	07:49 17:19	06:48 18:13	06:34 20:09	05:30 21:02	04:53 21:44	05:04 21:45	05:49 20:59	06:43 19:49	07:35 18:37	08:22 16:33
11	08:30 16:24	15:06 (8 01) 15:25 (8 01)	07:47 17:21	06:46 18:15	06:32 20:11	05:29 21:04	04:53 21:45	05:05 21:44	05:51 20:57	06:44 19:47	07:37 18:35	08:23 16:31
12	08:29 16:26	15:07 (8 01) 15:25 (8 01)	07:45 17:23	06:43 18:16	06:29 20:13	05:27 21:06	04:52 21:43	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	08:24 16:30
13	08:29 16:27	15:09 (8 01) 15:26 (8 01)	07:43 17:25	06:41 18:18	06:27 20:14	05:25 21:07	04:52 21:47	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	08:25 16:28
14	08:28 16:29	15:09 (8 01) 15:24 (8 01)	07:41 17:27	06:39 18:20	06:25 20:16	05:23 21:09	04:52 21:47	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	08:26 16:26
15	08:27 16:31	15:11 (8 01) 15:23 (8 01)	07:39 17:29	06:36 18:22	06:22 20:18	05:22 21:11	04:52 21:48	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	08:27 16:25
16	08:26 16:32	15:13 (8 01) 15:22 (8 01)	07:37 17:31	06:34 18:24	06:20 20:20	05:20 21:12	04:51 21:48	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	08:28 16:23
17	08:25 16:34	15:13 (8 01) 17:33	07:35 18:26	06:31 20:22	06:18 21:14	05:18 21:49	04:51 21:38	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	08:29 16:22
18	08:24 16:36	15:13 (8 01) 17:35	07:33 18:27	06:29 20:23	06:16 21:16	05:17 21:49	04:51 21:37	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	08:29 16:20
19	08:23 16:37	15:13 (8 01) 17:37	07:31 18:29	06:27 20:25	06:13 21:17	05:15 21:50	04:51 21:35	05:15 21:35	06:05 20:40	06:58 19:27	07:52 18:17	08:30 16:19
20	08:22 16:39	15:13 (8 01) 17:39	07:29 18:31	06:24 20:27	06:11 21:19	05:14 21:50	04:51 21:34	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	08:31 16:18
21	08:21 16:41	15:13 (8 01) 17:40	07:27 18:33	06:22 20:29	06:09 21:20	05:12 21:50	04:52 21:33	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	08:31 16:16
22	08:19 16:43	15:13 (8 01) 17:42	07:24 18:35	06:19 20:31	06:07 21:22	05:11 21:50	04:52 21:31	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	08:32 16:15
23	08:18 16:45	15:13 (8 01) 17:44	07:22 18:37	06:17 20:32	06:04 21:23	05:10 21:51	04:52 21:30	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	08:32 16:14
24	08:17 16:46	15:13 (8 01) 17:46	07:20 18:38	06:15 20:34	06:02 21:25	05:08 21:51	04:52 21:29	05:22 21:29	06:13 20:29	07:07 19:15	08:01 18:06	08:33 16:13
25	08:16 16:48	15:13 (8 01) 17:48	07:18 18:40	06:12 20:36	06:00 21:26	05:07 21:51	04:53 21:27	05:24 21:27	06:15 20:27	07:09 19:13	08:00 17:04	08:33 16:12
26	08:14 16:50	15:13 (8 01) 17:50	07:16 18:42	06:10 20:38	05:58 21:27	05:06 21:51	04:53 21:26	05:25 21:26	06:17 20:25	07:10 19:10	08:05 17:01	08:33 16:11
27	08:13 16:52	15:13 (8 01) 17:52	07:13 18:44	06:07 20:40	05:56 21:29	05:05 21:51	04:53 21:24	05:27 21:24	06:19 20:22	07:12 19:08	08:03 16:59	08:34 16:10
28	08:11 16:54	15:13 (8 01) 17:54	07:11 18:46	06:05 20:41	05:54 21:30	05:04 21:51	04:54 21:22	05:28 21:22	06:20 20:20	07:14 19:06	08:05 16:57	08:34 16:09
29	08:10 16:56	15:13 (8 01) 17:54	07:10 18:47	06:04 20:43	05:53 21:32	05:03 21:50	04:53 21:21	05:30 21:21	06:22 20:18	07:16 19:03	08:06 16:55	08:34 16:08
30	08:08 16:58	15:13 (8 01) 17:54	07:00 18:49	05:50 20:45	05:01 21:33	05:01 21:50	04:55 21:19	05:31 21:19	06:24 20:15	07:17 19:01	08:08 16:53	08:34 16:07
31	08:07 17:00	15:13 (8 01) 17:54	06:58 19:51	05:50 21:31	05:00 21:41	05:00 21:50	05:33 21:17	06:26 20:13	07:14 19:01	08:08 16:51	16:07 16:51	08:34 16:10
Sonnenscheinstunden astr. max. mögl. Beschattung	250 324	275	367	419	491	506	509	458	382	329	261	237

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s39 - Südergellersen, Heiligenthaler Weg 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	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11	15:06 (8 01) 15:31 (8 01)	08:05 17:01	07:09 17:56	06:55 19:53	05:48 20:47	04:59 21:35	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	08:10 16:06
2	08:34 16:12	15:07 (8 01) 15:32 (8 01)	08:03 17:03	07:07 17:58	06:53 19:55	05:46 20:48	04:59 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	08:11 16:06
3	08:34 16:14	15:08 (8 01) 15:33 (8 01)	08:02 17:05	07:04 18:00	06:50 19:56	05:44 20:50	04:58 21:38	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	08:12 16:05
4	08:33 16:15	15:08 (8 01) 15:33 (8 01)	08:00 17:07	07:02 18:01	06:48 19:58	05:42 20:52	04:57 21:39	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	08:14 16:04
5	08:33 16:16	15:09 (8 01) 15:34 (8 01)	07:58 17:09	07:00 18:03	06:46 20:00	05:40 20:54	04:56 21:40	04:56 21:48	05:41 21:09	06:34 20:01	07:26 18:49	08:15 16:04
6	08:33 16:17	15:09 (8 01) 15:33 (8 01)	07:56 17:11	06:57 18:05	06:43 20:02	05:38 20:55	04:55 21:41	05:00 21:47	05:43 21:07	06:36 19:59	07:28 18:46	08:17 16:03
7	08:32 16:19	15:09 (8 01) 15:33 (8 01)	07:55 17:13	06:55 18:07	06:41 20:04	05:36 20:57	04:55 21:42	05:01 21:47	05:44 21:05	06:38 19:56	07:30 18:44	08:18 16:03
8	08:32 16:20	15:10 (8 01) 15:34 (8 01)	07:53 17:15	06:53 18:09	06:39 20:05	05:34 20:59	04:54 21:43	05:02 21:46	05:46 21:03	06:39 19:54	07:32 18:42	08:19 16:02
9	08:31 16:21	15:11 (8 01) 15:34 (8 01)	07:51 17:17	06:50 18:11	06:36 20:07	05:32 21:01	04:54 21:44	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	08:20 16:02
10	08:31 16:23	15:11 (8 01) 15:34 (8 01)	07:49 17:19	06:48 18:13	06:34 20:09	05:30 21:02	04:53 21:44	05:04 21:45	05:49 20:59	06:43 19:49	07:35 18:37	08:22 16:02
11	08:30 16:24	15:12 (8 01) 15:34 (8 01)	07:47 17:21	06:46 18:15	06:32 20:11	05:29 21:04	04:53 21:45	05:05 21:44	05:51 20:57	06:44 19:47	07:37 18:35	08:23 16:02
12	08:29 16:26	15:12 (8 01) 15:34 (8 01)	07:45 17:23	06:43 18:16	06:29 20:13	05:27 21:06	04:52 21:46	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	08:24 16:01
13	08:29 16:27	15:13 (8 01) 15:34 (8 01)	07:43 17:25	06:41 18:18	06:27 20:14	05:25 21:07	04:52 21:47	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	08:25 16:01
14	08:28 16:29	15:14 (8 01) 15:34 (8 01)	07:41 17:27	06:39 18:20	06:25 20:16	05:23 21:09	04:52 21:47	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	08:26 16:01
15	08:27 16:31	15:15 (8 01) 15:34 (8 01)	07:39 17:29	06:36 18:22	06:22 20:18	05:22 21:11	04:52 21:48	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	08:27 16:01
16	08:26 16:32	15:16 (8 01) 15:34 (8 01)	07:37 17:31	06:34 18:24	06:20 20:20	05:20 21:12	04:51 21:48	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	08:28 16:01
17	08:25 16:34	15:18 (8 01) 15:33 (8 01)	07:35 17:33	06:31 18:26	06:18 20:22	05:18 21:14	04:51 21:49	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	08:28 16:02
18	08:24 16:36	15:19 (8 01) 15:33 (8 01)	07:33 17:35	06:29 18:27	06:16 20:23	05:17 21:16	04:51 21:49	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	08:29 16:02
19	08:23 16:37	15:22 (8 01) 15:31 (8 01)	07:31 17:37	06:27 18:29	06:13 20:25	05:15 21:17	04:51 21:50	05:15 21:35	06:05 20:40	06:58 19:27	07:51 18:17	08:30 16:02
20	08:22 16:39	15:25 (8 01) 15:28 (8 01)	07:29 17:39	06:24 18:31	06:11 20:27	05:14 21:19	04:51 21:50	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	08:31 16:02
21	08:21 16:41	15:28 (8 01) 17:00	07:27 17:40	06:22 18:33	06:09 20:29	05:12 21:20	04:52 21:50	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	08:31 16:03
22	08:19 16:43	15:29 (8 01) 17:02	07:24 17:42	06:19 18:35	06:07 20:31	05:11 21:22	04:52 21:50	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	15:01 (8 01) 15:03 (8 01)
23	08:18 16:45	15:30 (8 01) 17:04	07:22 17:44	06:17 18:37	06:04 20:32	05:10 21:23	04:52 21:51	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	14:58 (8 01) 15:07 (8 01)
24	08:17 16:46	15:31 (8 01) 17:06	07:20 17:46	06:15 18:38	06:02 20:34	05:08 21:25	04:52 21:51	05:22 21:29	06:13 20:29	07:07 19:15	07:58 18:06	14:57 (8 01) 15:07 (8 01)
25	08:16 16:48	15:32 (8 01) 17:08	07:18 17:48	06:12 18:40	06:00 20:36	05:07 21:26	04:53 21:51	05:24 21:27	06:15 20:27	07:09 19:13	07:03 17:04	14:56 (8 01) 15:11 (8 01)
26	08:14 16:50	15:33 (8 01) 17:10	07:16 17:50	06:10 18:42	05:58 20:38	05:06 21:27	04:53 21:51	05:25 21:26	06:17 20:25	07:10 19:10	07:05 17:01	14:55 (8 01) 15:13 (8 01)
27	08:13 16:52	15:34 (8 01) 17:12	07:13 18:00	06:07 18:44	05:56 20:40	05:05 21:29	04:53 21:51	05:27 21:24	06:19 20:22	07:12 19:08	07:06 16:59	14:55 (8 01) 15:14 (8 01)
28	08:11 16:54	15:35 (8 01) 17:14	07:11 18:04	06:05 18:46	05:54 20:41	05:04 21:30	04:54 21:51	05:28 21:22	06:20 20:20	07:14 19:06	07:08 16:57	14:54 (8 01) 15:14 (8 01)
29	08:10 16:56	15:36 (8 01) 17:16	07:10 18:08	06:04 18:48	05:53 20:43	05:03 21:32	04:53 21:50	05:30 21:21	06:22 20:18	07:16 19:03	07:10 16:55	14:54 (8 01) 15:15 (8 01)
30	08:08 16:58	15:37 (8 01) 17:18	07:09 18:10	06:03 18:51	05:50 20:45	05:01 21:33	04:55 21:50	05:31 21:19	06:24 20:15	07:17 19:01	07:12 16:53	14:54 (8 01) 15:16 (8 01)
31	08:07 17:00	15:38 (8 01) 17:20	07:08 18:12	06:02 18:54	05:59 20:46	05:00 21:34	04:56 21:51	05:33 21:17	06:26 20:13	07:14 16:51	07:11 16:51	14:54 (8 01) 15:17 (8 01)
Sonnenscheinstunden astr. max. mögl. Beschattung	250 406	275	367	419	491	506	509	458	382	329	261	139 758

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s40 - Südergellersen, Im Alten Dorfe 2

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember	
1	08:34	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10	
	16:11	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06	
2	08:34	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11	
	16:13	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06	
3	08:34	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12	
	16:14	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05	
4	08:34	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14	
	16:15	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04	
5	08:33	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15	
	16:16	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04	
6	08:33	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17	
	16:17	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03	
7	08:32	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18	
	16:19	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03	
8	08:32	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19	
	16:20	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02	
9	08:31	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20	
	16:21	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	
10	08:31	07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33	08:22	
	16:23	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02	
11	08:30	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:45	07:37	07:35	08:23	
	16:24	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	
12	08:29	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24	10:03 (Oerzen 1)
	16:26	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	5 10:08 (Oerzen 1)
13	08:29	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25	10:02 (Oerzen 1)
	16:27	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	8 10:10 (Oerzen 1)
14	08:28	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26	10:02 (Oerzen 1)
	16:29	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	9 10:11 (Oerzen 1)
15	08:27	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27	10:01 (Oerzen 1)
	16:31	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	11 10:12 (Oerzen 1)
16	08:26	07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28	10:01 (Oerzen 1)
	16:32	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	11 10:12 (Oerzen 1)
17	08:25	07:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	07:46	08:29	10:01 (Oerzen 1)
	16:34	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02	12 10:13 (Oerzen 1)
18	08:24	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29	10:01 (Oerzen 1)
	16:36	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02	13 10:14 (Oerzen 1)
19	08:23	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30	10:02 (Oerzen 1)
	16:37	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02	13 10:15 (Oerzen 1)
20	08:22	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31	10:02 (Oerzen 1)
	16:39	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02	13 10:15 (Oerzen 1)
21	08:21	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31	10:02 (Oerzen 1)
	16:41	17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17	16:03	14 10:16 (Oerzen 1)
22	08:19	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32	10:02 (Oerzen 1)
	16:43	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03	14 10:16 (Oerzen 1)
23	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32	10:03 (Oerzen 1)
	16:45	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04	14 10:17 (Oerzen 1)
24	08:17	07:20	06:15	06:02	05:08	04:52	05:22	06:14	07:07	08:01	07:58	08:33	10:04 (Oerzen 1)
	16:46	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04	13 10:17 (Oerzen 1)
25	08:16	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	08:03	08:00	08:33	10:04 (Oerzen 1)
	16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	18:04	16:12	16:05	13 10:17 (Oerzen 1)
26	08:14	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	08:05	08:02	08:33	10:06 (Oerzen 1)
	16:50	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	18:01	16:11	16:06	12 10:18 (Oerzen 1)
27	08:13	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	08:06	08:03	08:34	10:06 (Oerzen 1)
	16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	18:00	16:10	16:06	12 10:18 (Oerzen 1)
28	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	08:08	08:05	08:34	10:07 (Oerzen 1)
	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	18:00	16:09	16:07	11 10:18 (Oerzen 1)
29	08:10		07:03	05:52	05:03	04:55	05:30	06:22	07:16	08:10	08:06	08:34	10:08 (Oerzen 1)
	16:56		19:47	20:43	21:32	21:50	21:21	20:18	19:03	18:00	16:08	16:08	10 10:18 (Oerzen 1)
30	08:08		07:00	05:50	05:01	04:55	05:31	06:24	07:17	08:12	08:08	08:34	10:09 (Oerzen 1)
	16:58		19:49	20:45	21:33	21:50	21:19	20:15	19:01	18:00	16:07	16:09	9 10:18 (Oerzen 1)
31	08:07		06:58		05:00		05:33	06:26		07:14		08:34	10:11 (Oerzen 1)
	17:00		19:51		21:34		21:17	20:13		16:51		16:10	6 10:17 (Oerzen 1)
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237	223
astr.max.mögl.Beschattung													

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

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

## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s41 - Südergellersen, Im Alten Dorfe 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	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11	08:05 17:01	07:09 17:56	06:55 19:53	05:48 20:47	05:00 21:35	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	07:16 16:49	08:10 16:06
2	08:34 16:13	08:03 17:03	07:07 17:58	06:53 19:55	05:46 20:48	04:59 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	07:18 16:47	08:11 16:06
3	08:34 16:14	08:02 17:05	07:04 18:00	06:51 19:56	05:44 20:50	04:58 21:38	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	07:20 16:45	08:12 16:05
4	08:34 16:15	08:00 17:07	07:02 18:02	06:48 19:58	05:42 20:52	04:57 21:39	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	07:22 16:44	08:14 16:04
5	08:33 16:16	07:58 17:09	07:00 18:03	06:46 20:00	05:40 20:54	04:56 21:40	04:59 21:48	05:41 21:09	06:34 20:01	07:26 18:49	07:23 16:42	08:15 16:04
6	08:33 16:17	07:56 17:11	06:57 18:05	06:43 20:02	05:38 20:55	04:56 21:41	05:00 21:47	05:43 21:07	06:36 19:59	07:28 18:46	07:25 16:40	08:17 16:03
7	08:32 16:19	07:55 17:13	06:55 18:07	06:41 20:04	05:36 20:57	04:55 21:42	05:01 21:47	05:44 21:05	06:38 19:56	07:30 18:44	07:27 16:38	08:18 16:03
8	08:32 16:20	07:53 17:15	06:53 18:09	06:39 20:05	05:34 20:59	04:54 21:43	05:02 21:46	05:46 21:03	06:39 19:54	07:32 18:42	07:29 16:36	08:19 16:02
9	08:31 16:21	07:51 17:17	06:50 18:11	06:36 20:07	05:32 21:01	04:54 21:44	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	07:31 16:35	08:20 16:02
10	08:31 16:23	07:49 17:19	06:48 18:13	06:34 20:09	05:30 21:02	04:53 21:44	05:04 21:45	05:50 20:59	06:43 19:49	07:35 18:37	07:33 16:33	08:22 16:02
11	08:30 16:24	07:47 17:21	06:46 18:15	06:32 20:11	05:29 21:04	04:53 21:45	05:05 21:44	05:51 20:57	06:45 19:47	07:37 18:35	07:35 16:31	08:23 16:02
12	08:29 16:26	07:45 17:23	06:43 18:16	06:29 20:13	05:27 21:06	04:52 21:46	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	07:37 16:30	08:24 16:01
13	08:29 16:27	07:43 17:25	06:41 18:18	06:27 20:14	05:25 21:07	04:52 21:47	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	07:39 16:28	08:25 16:01
14	08:28 16:29	07:41 17:27	06:39 18:20	06:25 20:16	05:23 21:09	04:52 21:47	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	07:40 16:26	08:26 16:01
15	08:27 16:31	07:39 17:29	06:36 18:22	06:22 20:18	05:22 21:11	04:52 21:48	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	07:42 16:25	08:27 16:01
16	08:26 16:32	07:37 17:31	06:34 18:24	06:20 20:20	05:20 21:12	04:52 21:48	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	07:44 16:23	08:28 16:01
17	08:25 16:34	07:35 17:33	06:31 18:26	06:18 20:22	05:19 21:14	04:51 21:49	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	07:46 16:22	08:29 16:02
18	08:24 16:36	07:33 17:35	06:29 18:27	06:16 20:23	05:17 21:16	04:51 21:49	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	07:48 16:20	08:29 16:02
19	08:23 16:37	07:31 17:37	06:27 18:29	06:13 20:25	05:15 21:17	04:51 21:50	05:15 21:35	06:05 20:40	06:58 19:27	07:52 18:17	07:49 16:19	08:30 16:02
20	08:22 16:39	07:29 17:39	06:24 18:31	06:11 20:27	05:14 21:19	04:51 21:50	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	07:51 16:18	08:31 16:02
21	08:21 16:41	07:27 17:41	06:22 18:33	06:09 20:29	05:13 21:20	04:52 21:50	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	07:53 16:17	08:31 16:03
22	08:19 16:43	07:24 17:42	06:19 18:35	06:07 20:31	05:11 21:22	04:52 21:50	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	07:55 16:15	08:32 16:03
23	08:18 16:45	07:22 17:44	06:17 18:37	06:04 20:32	05:10 21:23	04:52 21:51	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	07:57 16:14	08:32 16:04
24	08:17 16:46	07:20 17:46	06:15 18:38	06:02 20:34	05:08 21:25	04:52 21:51	05:22 21:29	06:14 20:29	07:07 19:15	08:01 18:06	07:58 16:13	08:33 16:04
25	08:16 16:48	07:18 17:48	06:12 18:40	06:00 20:36	05:07 21:26	04:53 21:51	05:24 21:27	06:15 20:27	07:09 19:13	07:03 17:04	08:00 16:12	08:33 16:05
26	08:14 16:50	07:16 17:50	06:10 18:42	05:58 20:38	05:06 21:27	04:53 21:51	05:25 21:26	06:17 20:25	07:10 19:10	07:05 17:01	08:02 16:11	08:33 16:06
27	08:13 16:52	07:13 17:52	06:07 18:44	05:56 20:40	05:05 21:29	04:54 21:51	05:27 21:24	06:19 20:22	07:12 19:08	07:06 16:59	08:03 16:10	08:34 16:06
28	08:11 16:54	07:11 17:54	06:05 18:46	05:54 20:41	05:04 21:30	04:54 21:51	05:28 21:22	06:20 20:20	07:14 19:06	07:08 16:57	08:05 16:09	08:34 16:07
29	08:10 16:56		07:03 19:47	05:52 20:43	05:03 21:32	04:55 21:50	05:30 21:21	06:22 20:18	07:16 19:03	07:10 16:55	08:06 16:08	08:34 16:08
30	08:08 16:58		07:00 19:49	05:50 20:45	05:01 21:33	04:55 21:50	05:31 21:19	06:24 20:15	07:17 19:01	07:12 16:53	08:08 16:07	08:34 16:09
31	08:07 17:00		06:58 19:51		05:00 21:34		05:33 21:17	06:26 20:13		07:14 16:51		08:34 16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s42 - Südergellersen, Im Alten Dorfe 4

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
1	08:34	10:16 (Oerzen 1)	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10	14:17 (B 01)										
	16:11	45	14:47 (B 01)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06	6									
2	08:34	10:19 (Oerzen 1)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11	14:15 (B 01)										
	16:13	36	14:47 (B 01)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06	11									
3	08:34	14:23 (B 01)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12	14:14 (B 01)										
	16:14	24	14:47 (B 01)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05	15									
4	08:33	14:23 (B 01)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14	14:13 (B 01)										
	16:15	24	14:47 (B 01)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04	17									
5	08:33	14:25 (B 01)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15	14:13 (B 01)										
	16:16	22	14:47 (B 01)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04	19									
6	08:33	14:26 (B 01)	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17	14:12 (B 01)										
	16:17	20	14:46 (B 01)	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03	20									
7	08:32	14:26 (B 01)	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18	14:11 (B 01)										
	16:19	20	14:46 (B 01)	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03	22									
8	08:32	14:28 (B 01)	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19	14:12 (B 01)										
	16:20	18	14:46 (B 01)	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02	23									
9	08:31	14:30 (B 01)	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20	14:11 (B 01)										
	16:21	15	14:45 (B 01)	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	24									
10	08:31	14:32 (B 01)	07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33	08:22	10:08 (Oerzen 1)										
	16:23	11	14:43 (B 01)	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02	36									
11	08:30	14:34 (B 01)	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:45	07:37	07:35	08:23	10:07 (Oerzen 1)										
	16:24	7	14:41 (B 01)	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	44									
12	08:29	17:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	07:37	08:24	10:07 (Oerzen 1)										
	16:26	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	16:01	49										
13	08:29	17:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25	14:38 (B 01)											
	16:27	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	16:01	53										
14	08:28	17:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26	10:06 (Oerzen 1)											
	16:29	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	16:01	58										
15	08:27	17:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27	10:07 (Oerzen 1)											
	16:31	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	16:01	59										
16	08:26	17:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28	10:06 (Oerzen 1)											
	16:32	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	16:01	61										
17	08:25	17:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	07:46	08:29	10:06 (Oerzen 1)											
	16:34	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02	16:02	64										
18	08:24	17:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29	10:07 (Oerzen 1)											
	16:36	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02	16:02	64										
19	08:23	17:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30	10:07 (Oerzen 1)											
	16:37	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02	16:02	65										
20	08:22	17:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31	10:07 (Oerzen 1)											
	16:39	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02	16:02	66										
21	08:21	17:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31	10:08 (Oerzen 1)											
	16:41	17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17	16:03	16:03	66										
22	08:19	17:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32	10:08 (Oerzen 1)											
	16:43	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03	16:03	66										
23	08:18	17:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32	10:09 (Oerzen 1)											
	16:45	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04	16:04	66										
24	08:17	17:20	06:15	06:02	05:08	04:52	05:22	06:14	07:07	08:01	07:58	08:33	10:09 (Oerzen 1)											
	16:46	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04	16:04	65										
25	08:16	17:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33	10:09 (Oerzen 1)											
	16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	16:05	16:05	66										
26	08:14	17:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:33	10:11 (Oerzen 1)											
	16:50	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11	16:06	16:06	64										
27	08:13	17:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:34	10:11 (Oerzen 1)											
	16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	16:06	16:06	62										
28	08:11	17:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34	10:12 (Oerzen 1)											
	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	16:07	16:07	61										
29	08:10	17:03	05:52	05:03	04:55	05:30	06:22	07:16	07:10	07:00	08:06	08:34	10:13 (Oerzen 1)											
	16:56	19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	16:08	16:08	16:08	58										
30	08:08	17:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	07:02	08:08	08:34	10:14 (Oerzen 1)											
	16:58	19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	16:09	16:09	16:09	54										
31	08:07	17:00	06:58	06:00	05:00	04:53	05:33	06:26	07:14	07:08	08:14	08:34	10:15 (Oerzen 1)											
	17:00	19:51	20:47	21:34	21:51	21:17	20:13	19:01	16:51	16:05	16:07	16:10	16:10	52										
Sonnenscheinstunden	253		275	367	419	491	506	509	458	382	329	261	237											
astr.max.mögl.Beschattung		242												1456										

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

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

## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s43 - Südergellersen, Im Alten Dorfe 5

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember	
1	08:34	14:33 (B 01)	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10
2	16:11	6 14:39 (B 01)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06
3	08:34	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11	
4	16:12	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06	
5	08:34	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12	
6	16:14	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05	
7	08:34	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14	
8	16:15	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04	
9	08:33	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15	
10	16:16	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04	
11	08:33	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17	
12	16:17	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03	
13	08:32	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18	
14	16:19	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03	
15	08:32	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19	
16	16:20	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02	
17	08:31	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20	
18	16:21	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	
19	08:31	07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	07:33	08:22	
20	16:23	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02	
21	08:30	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35	08:23	14:23 (B 01)
22	16:24	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	6 14:29 (B 01)
23	08:29	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24	14:23 (B 01)
24	16:26	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	9 14:32 (B 01)
25	08:29	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25	14:23 (B 01)
26	16:27	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	10 14:33 (B 01)
27	08:28	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26	14:22 (B 01)
28	16:29	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	12 14:34 (B 01)
29	08:27	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27	14:22 (B 01)
30	16:31	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	13 14:35 (B 01)
31	08:26	07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28	14:21 (B 01)
1	16:32	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	14 14:35 (B 01)
2	08:25	07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46	08:29	14:22 (B 01)
3	16:34	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02	14 14:36 (B 01)
4	08:24	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29	14:22 (B 01)
5	16:36	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02	15 14:37 (B 01)
6	08:23	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30	14:23 (B 01)
7	16:37	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02	15 14:38 (B 01)
8	08:22	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31	14:23 (B 01)
9	16:39	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02	15 14:38 (B 01)
10	08:21	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31	14:23 (B 01)
11	16:41	17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17	16:03	16 14:39 (B 01)
12	08:19	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32	14:23 (B 01)
13	16:43	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03	16 14:39 (B 01)
14	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32	14:24 (B 01)
15	16:45	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04	16 14:40 (B 01)
16	08:17	07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	08:33	14:25 (B 01)
17	16:46	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04	15 14:40 (B 01)
18	08:16	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	08:03	08:00	08:33	14:25 (B 01)
19	16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	18:04	16:12	16:05	15 14:40 (B 01)
20	08:14	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	08:05	08:02	08:33	14:27 (B 01)
21	16:50	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	18:01	16:11	16:06	14 14:41 (B 01)
22	08:13	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	08:06	08:03	08:34	14:27 (B 01)
23	16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	18:00	16:10	16:06	14 14:41 (B 01)
24	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	08:08	08:05	08:34	14:28 (B 01)
25	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	18:00	16:09	16:07	13 14:41 (B 01)
26	08:10	07:03	05:52	05:03	04:55	05:30	06:22	07:16	08:10	09:04	08:06	08:34	14:29 (B 01)
27	16:56	19:47	20:43	21:32	21:50	21:21	20:18	19:03	18:00	17:00	16:08	16:08	12 14:41 (B 01)
28	08:08	07:00	05:50	05:01	04:55	05:31	06:24	07:17	08:12	09:08	08:08	08:34	14:30 (B 01)
29	16:58	19:49	20:45	21:33	21:50	21:19	20:15	19:01	18:00	17:00	16:09	16:09	11 14:41 (B 01)
30	08:07	06:58	05:50	05:00	04:55	05:33	06:26	07:19	08:14	09:10	08:04	08:34	14:32 (B 01)
31	17:00	19:51	20:47	21:34	21:50	21:17	20:13	19:00	18:00	17:00	16:10	16:10	9 14:41 (B 01)
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237	274
astr.max.mögl.Beschattung	6												

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s44 - Südergellersen, Im Alten Dorfe 7

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

			Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	14:38 (B 01)	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10	
	16:11	8 14:46 (B 01)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06	
2	08:34	14:40 (B 01)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11	
	16:12	5 14:45 (B 01)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06	
3	08:34		08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12	
	16:14		17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05	
4	08:33		08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14	
	16:15		17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04	
5	08:33		07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15	
	16:16		17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04	
6	08:33		07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17	
	16:17		17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03	
7	08:32		07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18	
	16:19		17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03	
8	08:32		07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19	
	16:20		17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02	
9	08:31		07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20	
	16:21		17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	
10	08:31		07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	07:33	08:22	14:29 (B 01)
	16:23		17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02	5 14:34 (B 01)
11	08:30		07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35	08:23	14:28 (B 01)
	16:24		17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	8 14:36 (B 01)
12	08:29		07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24	14:28 (B 01)
	16:26		17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	10 14:38 (B 01)
13	08:29		07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25	14:28 (B 01)
	16:27		17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	12 14:40 (B 01)
14	08:28		07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26	14:28 (B 01)
	16:29		17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	13 14:41 (B 01)
15	08:27		07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27	14:28 (B 01)
	16:31		17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	14 14:42 (B 01)
16	08:26		07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28	14:27 (B 01)
	16:32		17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	15 14:42 (B 01)
17	08:25		07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46	08:29	14:27 (B 01)
	16:34		17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02	15 14:42 (B 01)
18	08:24		07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29	14:28 (B 01)
	16:36		17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02	15 14:43 (B 01)
19	08:23		07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30	14:28 (B 01)
	16:37		17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02	16 14:44 (B 01)
20	08:22		07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31	14:28 (B 01)
	16:39		17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02	16 14:44 (B 01)
21	08:21		07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31	14:29 (B 01)
	16:41		17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16	16:03	16 14:45 (B 01)
22	08:19		07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32	14:29 (B 01)
	16:43		17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03	16 14:45 (B 01)
23	08:18		07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32	14:30 (B 01)
	16:45		17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04	16 14:46 (B 01)
24	08:17		07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	08:33	14:30 (B 01)
	16:46		17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04	16 14:46 (B 01)
25	08:16		07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	08:03	08:00	08:33	14:30 (B 01)
	16:48		17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	18:04	16:12	16:05	16 14:46 (B 01)
26	08:14		07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	08:05	08:02	08:33	14:32 (B 01)
	16:50		17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	18:01	16:11	16:06	15 14:47 (B 01)
27	08:13		07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	08:06	08:03	08:34	14:32 (B 01)
	16:52		17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	18:00	16:10	16:06	16 14:48 (B 01)
28	08:11		07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	08:08	08:05	08:34	14:33 (B 01)
	16:54		17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	18:00	16:09	16:07	15 14:48 (B 01)
29	08:10			07:02	05:52	05:03	04:55	05:30	06:22	07:16	08:10	08:06	08:34	14:34 (B 01)
	16:56			19:47	20:43	21:32	21:50	21:21	20:18	19:03	18:00	16:08	16:08	14 14:48 (B 01)
30	08:08			07:00	05:50	05:01	04:55	05:31	06:24	07:17	08:12	08:08	08:34	14:35 (B 01)
	16:58			19:49	20:45	21:33	21:50	21:19	20:15	19:01	18:00	16:07	16:09	13 14:48 (B 01)
31	08:07			06:58		05:00		05:33	06:26		07:14		08:34	14:37 (B 01)
	17:00			19:51		21:34		21:17	20:13		16:51		16:10	10 14:47 (B 01)
Sonnenscheinstunden	253			275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung	13													302

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

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

## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s45 - Südergellersen, Im Alten Dorfe 8

## 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	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11	14:32 (B 01) 17:01	08:05 17:56	06:55 19:53	05:48 20:47	05:00 21:35	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	07:16 16:49	08:10 16:06
2	08:34 16:12	14:33 (B 01) 17:03	08:03 17:58	06:53 19:55	05:46 20:48	04:59 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	07:18 16:47	08:11 16:06
3	08:34 16:14	14:34 (B 01) 17:05	08:02 18:00	06:51 19:56	05:44 20:50	04:58 21:38	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	07:20 16:45	08:12 16:05
4	08:33 16:15	14:34 (B 01) 17:07	08:00 18:02	06:48 19:58	05:42 20:52	04:57 21:39	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	07:22 16:44	08:14 16:04
5	08:33 16:16	14:35 (B 01) 17:09	07:58 18:03	06:46 20:00	05:40 20:54	04:56 21:40	04:56 21:48	05:41 21:09	06:34 20:01	07:26 18:49	07:23 16:42	08:15 16:04
6	08:33 16:17	14:36 (B 01) 17:11	07:56 18:05	06:43 20:02	05:38 20:55	04:56 21:41	05:00 21:47	05:43 21:07	06:36 19:59	07:28 18:46	07:25 16:40	08:17 16:03
7	08:32 16:19	14:37 (B 01) 17:13	07:55 18:07	06:41 20:04	05:36 20:57	04:55 21:42	05:01 21:47	05:44 21:05	06:38 19:56	07:30 18:44	07:27 16:38	08:18 16:03
8	08:32 16:20	14:39 (B 01) 17:15	07:53 18:09	06:39 20:05	05:34 20:59	04:54 21:43	05:02 21:46	05:46 21:03	06:39 19:54	07:32 18:42	07:29 16:36	08:19 16:02
9	08:31 16:21	14:40 (B 01) 17:17	07:51 18:11	06:36 20:07	05:32 21:01	04:54 21:44	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	07:31 16:35	08:20 16:02
10	08:31 16:23	14:41 (B 01) 17:19	07:49 18:13	06:34 20:09	05:30 21:02	04:53 21:44	05:04 21:45	05:50 20:59	06:43 19:49	07:35 18:37	07:33 16:33	08:22 16:02
11	08:30 16:24	14:43 (B 01) 17:21	07:47 18:15	06:32 20:11	05:29 21:04	04:53 21:45	05:05 21:44	05:51 20:57	06:44 19:47	07:37 18:35	07:35 16:31	08:23 16:02
12	08:29 16:26	14:45 (B 01) 17:23	07:45 18:16	06:31 20:13	05:27 21:06	04:52 21:46	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	07:37 16:30	08:24 16:01
13	08:29 16:27	14:46 (B 01) 17:25	07:43 18:18	06:27 20:14	05:25 21:07	04:52 21:47	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	07:39 16:28	08:25 16:01
14	08:28 16:29	14:48 (B 01) 17:27	07:41 18:20	06:25 20:16	05:23 21:09	04:52 21:47	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	07:40 16:26	08:26 16:01
15	08:27 16:31	14:49 (B 01) 17:29	07:39 18:22	06:22 20:18	05:22 21:11	04:52 21:48	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	07:42 16:25	08:27 16:01
16	08:26 16:32	14:50 (B 01) 17:31	07:37 18:24	06:20 20:20	05:20 21:12	04:52 21:48	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	07:44 16:23	08:28 16:01
17	08:25 16:34	14:51 (B 01) 17:33	07:35 18:26	06:18 20:22	05:19 21:14	04:51 21:49	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	07:46 16:22	08:29 16:02
18	08:24 16:36	14:52 (B 01) 17:35	07:33 18:27	06:16 20:23	05:17 21:16	04:51 21:49	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	07:48 16:20	08:29 16:02
19	08:23 16:37	14:53 (B 01) 17:37	07:31 18:29	06:13 20:25	05:15 21:17	04:51 21:50	05:15 21:35	06:05 20:40	06:58 19:27	07:52 18:17	07:49 16:19	08:30 16:02
20	08:22 16:39	14:54 (B 01) 17:39	07:29 18:31	06:11 20:27	05:14 21:19	04:51 21:50	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	07:51 16:18	08:31 16:02
21	08:21 16:41	14:55 (B 01) 17:41	07:27 18:33	06:09 20:29	05:13 21:20	04:52 21:50	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	07:53 16:17	08:31 16:03
22	08:19 16:43	14:56 (B 01) 17:42	07:24 18:35	06:07 20:31	05:11 21:22	04:52 21:50	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	07:55 16:15	08:32 16:03
23	08:18 16:45	14:57 (B 01) 17:44	07:22 18:37	06:04 20:32	05:10 21:23	04:52 21:51	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	07:57 16:14	08:32 16:04
24	08:17 16:46	14:58 (B 01) 17:46	07:20 18:38	06:02 20:34	05:08 21:25	04:52 21:51	05:22 21:29	06:13 20:29	07:07 19:15	08:01 18:06	07:58 16:13	08:33 16:04
25	08:16 16:48	14:59 (B 01) 17:48	07:18 18:40	06:00 20:36	05:07 21:26	04:53 21:51	05:24 21:27	06:15 20:27	07:09 19:13	08:03 17:04	08:00 16:12	08:33 16:05
26	08:14 16:50	15:00 (B 01) 17:50	07:16 18:42	05:58 20:38	05:06 21:27	04:53 21:51	05:25 21:26	06:17 20:25	07:10 19:10	08:05 17:01	08:02 16:11	08:33 16:06
27	08:13 16:52	15:01 (B 01) 17:52	07:13 18:44	05:56 20:40	05:05 21:29	04:54 21:51	05:27 21:24	06:19 20:22	07:12 19:08	08:06 16:59	08:03 16:10	08:34 16:06
28	08:11 16:54	15:02 (B 01) 17:54	07:11 18:46	05:54 20:41	05:04 21:30	04:54 21:51	05:28 21:22	06:20 20:20	07:14 19:06	08:08 16:57	08:05 16:09	08:34 16:07
29	08:10 16:56	15:03 (B 01) 17:56	07:03 18:47	05:52 20:43	05:03 21:32	04:55 21:50	05:30 21:21	06:22 20:18	07:16 19:03	08:10 16:55	08:06 16:08	08:34 16:08
30	08:08 16:58	15:04 (B 01) 17:58	07:00 18:49	05:50 20:45	05:01 21:33	04:55 21:50	05:31 21:19	06:24 20:15	07:17 19:01	08:12 16:53	08:08 16:07	08:34 16:09
31	08:07 17:00	15:05 (B 01) 18:00	06:58 19:51	05:48 21:34	05:00 21:39	04:56 21:41	05:33 21:17	06:26 20:13	07:14 19:01	08:14 16:51	08:09 16:08	08:34 16:10
Sonnenscheinstunden astr. max. mögl. Beschattung	235	275	367	419	491	506	509	458	382	329	261	237

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s46 - Südergellersen, Im Alten Dorfe 10A

## 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	Juli	August	September	Oktober	November	Dezember
1	08:34	14:39 (B 01)	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16
2	16:11	15:05 (B 01)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49
3	08:34	14:40 (B 01)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18
4	16:12	15:06 (B 01)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47
5	08:34	14:41 (B 01)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20
6	16:14	15:06 (B 01)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45
7	08:33	14:41 (B 01)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22
8	16:15	15:06 (B 01)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44
9	08:33	14:43 (B 01)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23
10	16:16	15:06 (B 01)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42
11	08:33	14:43 (B 01)	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25
12	16:17	15:06 (B 01)	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40
13	08:32	14:44 (B 01)	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27
14	16:19	15:05 (B 01)	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38
15	08:32	14:45 (B 01)	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29
16	16:20	15:06 (B 01)	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36
17	08:31	14:46 (B 01)	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31
18	16:21	15:05 (B 01)	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35
19	08:31	14:47 (B 01)	07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	07:33
20	16:23	15:05 (B 01)	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33
21	08:30	14:49 (B 01)	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35
22	16:24	15:04 (B 01)	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31
23	08:29	14:50 (B 01)	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37
24	16:26	15:03 (B 01)	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30
25	08:29	14:54 (B 01)	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:38
26	16:27	15:02 (B 01)	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28
27	08:28		07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40
28	16:29		17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26
29	08:27		07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42
30	16:31		17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25
31	08:26		07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44
1	16:32		17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23
2	08:25		07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46
3	16:34		17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22
4	08:24		07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48
5	16:36		17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20
6	08:23		07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49
7	16:37		17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19
8	08:22		07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51
9	16:39		17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18
10	08:21		07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53
11	16:41		17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16
12	08:19		07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55
13	16:43		17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15
14	08:18		07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57
15	16:45		17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14
16	08:17		07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58
17	16:46		17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13
18	08:16		07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00
19	16:48		17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12
20	08:14		07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02
21	16:50		17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11
22	08:13		07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03
23	16:52		17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10
24	08:11		07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05
25	16:54		17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09
26	08:10			07:02	05:52	05:03	04:55	05:30	06:22	07:16	07:10	08:06
27	16:56			19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08
28	08:08			07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08
29	16:58			19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07
30	08:07					05:00		05:33	06:26		07:14	
31	17:00			19:51		21:34		21:17	20:13		16:51	
Sonnenscheinstunden												
astr.max.mögl.Beschattung		263	275	367	419	491	506	509	458	382	329	261
											21	803

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s47 - Südergellersen, Kirchgellerser Straße 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	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11	08:05 17:01	07:09 17:56	06:55 19:53	05:48 20:47	04:59 21:35	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	07:16 16:49	08:10 16:06
2	08:34 16:12	08:03 17:03	07:07 17:58	06:53 19:55	05:46 20:48	04:59 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	07:18 16:47	08:11 16:06
3	08:34 16:14	08:02 17:05	07:04 18:00	06:51 19:56	05:44 20:50	04:58 21:38	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	07:20 16:45	08:12 16:05
4	08:34 16:15	08:00 17:07	07:02 18:02	06:48 19:58	05:42 20:52	04:57 21:39	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	07:22 16:44	08:14 16:04
5	08:33 16:16	07:58 17:09	07:00 18:03	06:46 20:00	05:40 20:54	04:56 21:40	04:59 21:48	05:41 21:09	06:34 20:01	07:26 18:49	07:23 16:42	08:15 16:04
6	08:33 16:17	07:56 17:11	06:57 18:05	06:43 20:02	05:38 20:55	04:55 21:41	05:00 21:47	05:43 21:07	06:36 19:59	07:28 18:46	07:25 16:40	08:17 16:03
7	08:32 16:19	07:55 17:13	06:55 18:07	06:41 20:04	05:36 20:57	04:55 21:42	05:01 21:47	05:44 21:05	06:38 19:56	07:30 18:44	07:27 16:38	08:18 16:03
8	08:32 16:20	07:53 17:15	06:53 18:09	06:39 20:05	05:34 20:59	04:54 21:43	05:02 21:46	05:46 21:03	06:39 19:54	07:32 18:42	07:29 16:36	08:19 16:02
9	08:31 16:21	07:51 17:17	06:50 18:11	06:36 20:07	05:32 21:01	04:54 21:44	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	07:31 16:35	08:20 16:02
10	08:31 16:23	07:49 17:19	06:48 18:13	06:34 20:09	05:30 21:02	04:53 21:44	05:04 21:45	05:49 20:59	06:43 19:49	07:35 18:37	07:33 16:33	08:22 16:02
11	08:30 16:24	07:47 17:21	06:46 18:15	06:32 20:11	05:29 21:04	04:53 21:45	05:05 21:44	05:51 20:57	06:44 19:47	07:37 18:35	07:35 16:31	08:23 16:02
12	08:29 16:26	07:45 17:23	06:43 18:16	06:29 20:13	05:27 21:06	04:52 21:46	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	07:37 16:30	08:24 16:01
13	08:29 16:27	07:43 17:25	06:41 18:18	06:27 20:14	05:25 21:07	04:52 21:47	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	07:39 16:28	08:25 16:01
14	08:28 16:29	07:41 17:27	06:39 18:20	06:25 20:16	05:23 21:09	04:52 21:47	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	07:40 16:26	08:26 16:01
15	08:27 16:31	07:39 17:29	06:36 18:22	06:22 20:18	05:22 21:11	04:52 21:48	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	07:42 16:25	08:27 16:01
16	08:26 16:32	07:37 17:31	06:34 18:24	06:20 20:20	05:20 21:12	04:51 21:48	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	07:44 16:23	08:28 16:01
17	08:25 16:34	07:35 17:33	06:31 18:26	06:18 20:22	05:18 21:14	04:51 21:49	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	07:46 16:22	08:29 16:02
18	08:24 16:36	07:33 17:35	06:29 18:27	06:16 20:23	05:17 21:16	04:51 21:49	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	07:48 16:20	08:29 16:02
19	08:23 16:37	07:31 17:37	06:27 18:29	06:13 20:25	05:15 21:17	04:51 21:50	05:15 21:35	06:05 20:40	06:58 19:27	07:52 18:17	07:49 16:19	08:30 16:02
20	08:22 16:39	07:29 17:39	06:24 18:31	06:11 20:27	05:14 21:19	04:51 21:50	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	07:51 16:18	08:31 16:02
21	08:21 16:41	07:27 17:41	06:22 18:33	06:09 20:29	05:13 21:20	04:52 21:50	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	07:53 16:16	08:31 16:03
22	08:19 16:43	07:24 17:42	06:19 18:35	06:07 20:31	05:11 21:22	04:52 21:50	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	07:55 16:15	08:32 16:03
23	08:18 16:45	07:22 17:44	06:17 18:37	06:04 20:32	05:10 21:23	04:52 21:51	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	07:57 16:14	08:32 16:04
24	08:17 16:46	07:20 17:46	06:15 18:38	06:02 20:34	05:08 21:25	04:52 21:51	05:22 21:29	06:13 20:29	07:07 19:15	08:01 18:06	07:58 16:13	08:33 16:04
25	08:16 16:48	07:18 17:48	06:12 18:40	06:00 20:36	05:07 21:26	04:53 21:51	05:24 21:27	06:15 20:27	07:09 19:13	07:03 17:04	08:00 16:12	08:33 16:05
26	08:14 16:50	07:16 17:50	06:10 18:42	05:58 20:38	05:06 21:27	04:53 21:51	05:25 21:26	06:17 20:25	07:10 19:10	07:05 17:01	08:02 16:11	08:33 16:06
27	08:13 16:52	07:13 17:52	06:07 18:44	05:56 20:40	05:05 21:29	04:54 21:51	05:27 21:24	06:19 20:22	07:12 19:08	07:06 16:59	08:03 16:10	08:34 16:06
28	08:11 16:54	07:11 17:54	06:05 18:46	05:54 20:41	05:04 21:30	04:54 21:51	05:28 21:22	06:20 20:20	07:14 19:06	07:08 16:57	08:05 16:09	08:34 16:07
29	08:10 16:56		07:02 19:47	05:52 20:43	05:02 21:32	04:55 21:50	05:30 21:21	06:22 20:18	07:16 19:03	07:10 16:55	08:06 16:08	08:34 16:08
30	08:08 16:58		07:00 19:49	05:50 20:45	05:01 21:33	04:55 21:50	05:31 21:19	06:24 20:15	07:17 19:01	07:12 16:53	08:08 16:07	08:34 16:09
31	08:07 17:00		06:58 19:51		05:00 21:34		05:33 21:17	06:26 20:13		07:14 16:51		08:34 16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s48 - Südergellersen, Kirchgellerser Straße 3

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11	08:05 17:01	07:09 17:56	06:55 19:53	05:48 20:47	04:59 21:35	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	07:16 16:49	08:10 16:06
2	08:34 16:12	08:03 17:03	07:07 17:58	06:53 19:55	05:46 20:48	04:59 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	07:18 16:47	08:11 16:06
3	08:34 16:14	08:02 17:05	07:04 18:00	06:51 19:56	05:44 20:50	04:58 21:38	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	07:20 16:45	08:12 16:05
4	08:34 16:15	08:00 17:07	07:02 18:02	06:48 19:58	05:42 20:52	04:57 21:39	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	07:22 16:44	08:14 16:04
5	08:33 16:16	07:58 17:09	07:00 18:03	06:46 20:00	05:40 20:54	04:56 21:40	04:59 21:48	05:41 21:09	06:34 20:01	07:26 18:49	07:23 16:42	08:15 16:04
6	08:33 16:17	07:56 17:11	06:57 18:05	06:43 20:02	05:38 20:55	04:55 21:41	05:00 21:47	05:43 21:07	06:36 19:59	07:28 18:46	07:25 16:40	08:17 16:03
7	08:32 16:19	07:55 17:13	06:55 18:07	06:41 20:04	05:36 20:57	04:55 21:42	05:01 21:47	05:44 21:05	06:38 19:56	07:30 18:44	07:27 16:38	08:18 16:03
8	08:32 16:20	07:53 17:15	06:53 18:09	06:39 20:05	05:34 20:59	04:54 21:43	05:02 21:46	05:46 21:03	06:39 19:54	07:32 18:42	07:29 16:36	08:19 16:02
9	08:31 16:21	07:51 17:17	06:50 18:11	06:36 20:07	05:32 21:01	04:54 21:44	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	07:31 16:35	08:20 16:02
10	08:31 16:23	07:49 17:19	06:48 18:13	06:34 20:09	05:30 21:02	04:53 21:44	05:04 21:45	05:49 20:59	06:43 19:49	07:35 18:37	07:33 16:33	08:22 16:02
11	08:30 16:24	07:47 17:21	06:46 18:15	06:32 20:11	05:29 21:04	04:53 21:45	05:05 21:44	05:51 20:57	06:44 19:47	07:37 18:35	07:35 16:31	08:23 16:02
12	08:29 16:26	07:45 17:23	06:43 18:16	06:29 20:13	05:27 21:06	04:52 21:46	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	07:37 16:30	08:24 16:01
13	08:29 16:27	07:43 17:25	06:41 18:18	06:27 20:14	05:25 21:07	04:52 21:47	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	07:39 16:28	08:25 16:01
14	08:28 16:29	07:41 17:27	06:39 18:20	06:25 20:16	05:23 21:09	04:52 21:47	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	07:40 16:26	08:26 16:01
15	08:27 16:31	07:39 17:29	06:36 18:22	06:22 20:18	05:22 21:11	04:52 21:48	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	07:42 16:25	08:27 16:01
16	08:26 16:32	07:37 17:31	06:34 18:24	06:20 20:20	05:20 21:12	04:51 21:48	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	07:44 16:23	08:28 16:01
17	08:25 16:34	07:35 17:33	06:31 18:26	06:18 20:22	05:18 21:14	04:51 21:49	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	07:46 16:22	08:29 16:02
18	08:24 16:36	07:33 17:35	06:29 18:27	06:16 20:23	05:17 21:16	04:51 21:49	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	07:48 16:20	08:29 16:02
19	08:23 16:37	07:31 17:37	06:27 18:29	06:13 20:25	05:15 21:17	04:51 21:50	05:15 21:35	06:05 20:40	06:58 19:27	07:52 18:17	07:49 16:19	08:30 16:02
20	08:22 16:39	07:29 17:39	06:24 18:31	06:11 20:27	05:14 21:19	04:51 21:50	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	07:51 16:18	08:31 16:02
21	08:21 16:41	07:27 17:41	06:22 18:33	06:09 20:29	05:13 21:20	04:52 21:50	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	07:53 16:16	08:31 16:03
22	08:19 16:43	07:24 17:42	06:19 18:35	06:07 20:31	05:11 21:22	04:52 21:50	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	07:55 16:15	08:32 16:03
23	08:18 16:45	07:22 17:44	06:17 18:37	06:04 20:32	05:10 21:23	04:52 21:51	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	07:57 16:14	08:32 16:04
24	08:17 16:46	07:20 17:46	06:15 18:38	06:02 20:34	05:08 21:25	04:52 21:51	05:22 21:29	06:13 20:29	07:07 19:15	08:01 18:06	07:58 16:13	08:33 16:04
25	08:16 16:48	07:18 17:48	06:12 18:40	06:00 20:36	05:07 21:26	04:53 21:51	05:24 21:27	06:15 20:27	07:09 19:13	07:03 17:04	08:00 16:12	08:33 16:05
26	08:14 16:50	07:16 17:50	06:10 18:42	05:58 20:38	05:06 21:27	04:53 21:51	05:25 21:26	06:17 20:25	07:10 19:10	07:05 17:01	08:02 16:11	08:33 16:06
27	08:13 16:52	07:13 17:52	06:07 18:44	05:56 20:40	05:05 21:29	04:54 21:51	05:27 21:24	06:19 20:22	07:12 19:08	07:06 16:59	08:03 16:10	08:34 16:06
28	08:11 16:54	07:11 17:54	06:05 18:46	05:54 20:41	05:04 21:30	04:54 21:51	05:28 21:22	06:20 20:20	07:14 19:06	07:08 16:57	08:05 16:09	08:34 16:07
29	08:10 16:56		07:02 19:47	05:52 20:43	05:02 21:32	04:55 21:50	05:30 21:21	06:22 20:18	07:16 19:03	07:10 16:55	08:06 16:08	08:34 16:08
30	08:08 16:58		07:00 19:49	05:50 20:45	05:01 21:33	04:55 21:50	05:31 21:19	06:24 20:15	07:17 19:01	07:12 16:53	08:08 16:07	08:34 16:09
31	08:07 17:00		06:58 19:51		05:00 21:34		05:33 21:17	06:26 20:13		07:14 16:51		08:34 16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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

## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s49 - Südergellersen, Kirchgellerser Straße 6

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11	08:05 17:01	07:09 17:56	06:55 19:53	05:48 20:47	04:59 21:35	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	07:16 16:49	08:10 16:06
2	08:34 16:12	08:03 17:03	07:07 17:58	06:53 19:55	05:46 20:48	04:59 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	07:18 16:47	08:11 16:06
3	08:34 16:14	08:02 17:05	07:04 18:00	06:51 19:56	05:44 20:50	04:58 21:38	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	07:20 16:45	08:12 16:05
4	08:34 16:15	08:00 17:07	07:02 18:02	06:48 19:58	05:42 20:52	04:57 21:39	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	07:22 16:44	08:14 16:04
5	08:33 16:16	07:58 17:09	07:00 18:03	06:46 20:00	05:40 20:54	04:56 21:40	04:59 21:48	05:41 21:09	06:34 20:01	07:26 18:49	07:23 16:42	08:15 16:04
6	08:33 16:17	07:56 17:11	06:57 18:05	06:43 20:02	05:38 20:55	04:55 21:41	05:00 21:47	05:43 21:07	06:36 19:59	07:28 18:46	07:25 16:40	08:17 16:03
7	08:32 16:19	07:55 17:13	06:55 18:07	06:41 20:04	05:36 20:57	04:55 21:42	05:01 21:47	05:44 21:05	06:38 19:56	07:30 18:44	07:27 16:38	08:18 16:03
8	08:32 16:20	07:53 17:15	06:53 18:09	06:39 20:05	05:34 20:59	04:54 21:43	05:02 21:46	05:46 21:03	06:39 19:54	07:32 18:42	07:29 16:36	08:19 16:02
9	08:31 16:21	07:51 17:17	06:50 18:11	06:36 20:07	05:32 21:01	04:54 21:44	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	07:31 16:35	08:20 16:02
10	08:31 16:23	07:49 17:19	06:48 18:13	06:34 20:09	05:30 21:02	04:53 21:44	05:04 21:45	05:49 20:59	06:43 19:49	07:35 18:37	07:33 16:33	08:22 16:02
11	08:30 16:24	07:47 17:21	06:46 18:15	06:32 20:11	05:29 21:04	04:53 21:45	05:05 21:44	05:51 20:57	06:44 19:47	07:37 18:35	07:35 16:31	08:23 16:02
12	08:29 16:26	07:45 17:23	06:43 18:16	06:29 20:13	05:27 21:06	04:52 21:46	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	07:37 16:30	08:24 16:01
13	08:29 16:27	07:43 17:25	06:41 18:18	06:27 20:14	05:25 21:07	04:52 21:47	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	07:39 16:28	08:25 16:01
14	08:28 16:29	07:41 17:27	06:39 18:20	06:25 20:16	05:23 21:09	04:52 21:47	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	07:40 16:26	08:26 16:01
15	08:27 16:31	07:39 17:29	06:36 18:22	06:22 20:18	05:22 21:11	04:52 21:48	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	07:42 16:25	08:27 16:01
16	08:26 16:32	07:37 17:31	06:34 18:24	06:20 20:20	05:20 21:12	04:51 21:48	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	07:44 16:23	08:28 16:01
17	08:25 16:34	07:35 17:33	06:31 18:26	06:18 20:22	05:18 21:14	04:51 21:49	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	07:46 16:22	08:29 16:02
18	08:24 16:36	07:33 17:35	06:29 18:27	06:16 20:23	05:17 21:16	04:51 21:49	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	07:48 16:20	08:29 16:02
19	08:23 16:37	07:31 17:37	06:27 18:29	06:13 20:25	05:15 21:17	04:51 21:50	05:15 21:35	06:05 20:40	06:58 19:27	07:52 18:17	07:49 16:19	08:30 16:02
20	08:22 16:39	07:29 17:39	06:24 18:31	06:11 20:27	05:14 21:19	04:51 21:50	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	07:51 16:18	08:31 16:02
21	08:21 16:41	07:27 17:40	06:22 18:33	06:09 20:29	05:13 21:20	04:52 21:50	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	07:53 16:16	08:31 16:03
22	08:19 16:43	07:24 17:42	06:19 18:35	06:07 20:31	05:11 21:22	04:52 21:50	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	07:55 16:15	08:32 16:03
23	08:18 16:45	07:22 17:44	06:17 18:37	06:04 20:32	05:10 21:23	04:52 21:51	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	07:57 16:14	08:32 16:04
24	08:17 16:46	07:20 17:46	06:15 18:38	06:02 20:34	05:08 21:25	04:52 21:51	05:22 21:29	06:13 20:29	07:07 19:15	08:01 18:06	07:58 16:13	08:33 16:04
25	08:16 16:48	07:18 17:48	06:12 18:40	06:00 20:36	05:07 21:26	04:53 21:51	05:24 21:27	06:15 20:27	07:09 19:13	07:03 17:04	08:00 16:12	08:33 16:05
26	08:14 16:50	07:16 17:50	06:10 18:42	05:58 20:38	05:06 21:27	04:53 21:51	05:25 21:26	06:17 20:25	07:10 19:10	07:05 17:01	08:02 16:11	08:33 16:06
27	08:13 16:52	07:13 17:52	06:07 18:44	05:56 20:40	05:05 21:29	04:53 21:51	05:27 21:24	06:19 20:22	07:12 19:08	07:06 16:59	08:03 16:10	08:34 16:06
28	08:11 16:54	07:11 17:54	06:05 18:46	05:54 20:41	05:04 21:30	04:54 21:51	05:28 21:22	06:20 20:20	07:14 19:06	07:08 16:57	08:05 16:09	08:34 16:07
29	08:10 16:56		07:02 19:47	05:52 20:43	05:02 21:32	04:55 21:50	05:30 21:21	06:22 20:18	07:16 19:03	07:10 16:55	08:06 16:08	08:34 16:08
30	08:08 16:58		07:00 19:49	05:50 20:45	05:01 21:33	04:55 21:50	05:31 21:19	06:24 20:15	07:17 19:01	07:12 16:53	08:08 16:07	08:34 16:09
31	08:07 17:00		06:58 19:51		05:00 21:34		05:33 21:17	06:26 20:13		07:14 16:51		08:34 16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s50 - Südergellersen, Kirchgellerser Straße 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	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11	08:05 17:01	07:09 17:56	06:55 19:53	05:48 20:47	04:59 21:35	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	07:16 16:49	08:10 16:06
2	08:34 16:12	08:03 17:03	07:07 17:58	06:53 19:55	05:46 20:48	04:59 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	07:18 16:47	08:11 16:06
3	08:34 16:14	08:02 17:05	07:04 18:00	06:51 19:56	05:44 20:50	04:58 21:38	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	07:20 16:45	08:12 16:05
4	08:34 16:15	08:00 17:07	07:02 18:02	06:48 19:58	05:42 20:52	04:57 21:39	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	07:22 16:44	08:14 16:04
5	08:33 16:16	07:58 17:09	07:00 18:03	06:46 20:00	05:40 20:54	04:56 21:40	04:59 21:48	05:41 21:09	06:34 20:01	07:26 18:49	07:23 16:42	08:15 16:04
6	08:33 16:17	07:56 17:11	06:57 18:05	06:43 20:02	05:38 20:55	04:55 21:41	05:00 21:47	05:43 21:07	06:36 19:59	07:28 18:46	07:25 16:40	08:17 16:03
7	08:32 16:19	07:55 17:13	06:55 18:07	06:41 20:04	05:36 20:57	04:55 21:42	05:01 21:47	05:44 21:05	06:38 19:56	07:30 18:44	07:27 16:38	08:18 16:03
8	08:32 16:20	07:53 17:15	06:53 18:09	06:39 20:05	05:34 20:59	04:54 21:43	05:02 21:46	05:46 21:03	06:39 19:54	07:32 18:42	07:29 16:36	08:19 16:02
9	08:31 16:21	07:51 17:17	06:50 18:11	06:36 20:07	05:32 21:01	04:54 21:44	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	07:31 16:35	08:20 16:02
10	08:31 16:23	07:49 17:19	06:48 18:13	06:34 20:09	05:30 21:02	04:53 21:44	05:04 21:45	05:49 20:59	06:43 19:49	07:35 18:37	07:33 16:33	08:22 16:02
11	08:30 16:24	07:47 17:21	06:46 18:15	06:32 20:11	05:29 21:04	04:53 21:45	05:05 21:44	05:51 20:57	06:44 19:47	07:37 18:35	07:35 16:31	08:23 16:02
12	08:29 16:26	07:45 17:23	06:43 18:16	06:29 20:13	05:27 21:06	04:52 21:46	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	07:37 16:30	08:24 16:01
13	08:29 16:27	07:43 17:25	06:41 18:18	06:27 20:14	05:25 21:07	04:52 21:47	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	07:39 16:28	08:25 16:01
14	08:28 16:29	07:41 17:27	06:39 18:20	06:25 20:16	05:23 21:09	04:52 21:47	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	07:40 16:26	08:26 16:01
15	08:27 16:31	07:39 17:29	06:36 18:22	06:22 20:18	05:22 21:11	04:52 21:48	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	07:42 16:25	08:27 16:01
16	08:26 16:32	07:37 17:31	06:34 18:24	06:20 20:20	05:20 21:12	04:51 21:48	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	07:44 16:23	08:28 16:01
17	08:25 16:34	07:35 17:33	06:31 18:26	06:18 20:22	05:18 21:14	04:51 21:49	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	07:46 16:22	08:29 16:02
18	08:24 16:36	07:33 17:35	06:29 18:27	06:16 20:23	05:17 21:16	04:51 21:49	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	07:48 16:20	08:29 16:02
19	08:23 16:37	07:31 17:37	06:27 18:29	06:13 20:25	05:15 21:17	04:51 21:50	05:15 21:35	06:05 20:40	06:58 19:27	07:52 18:17	07:49 16:19	08:30 16:02
20	08:22 16:39	07:29 17:39	06:24 18:31	06:11 20:27	05:14 21:19	04:51 21:50	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	07:51 16:18	08:31 16:02
21	08:21 16:41	07:27 17:40	06:22 18:33	06:09 20:29	05:12 21:20	04:52 21:50	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	07:53 16:16	08:31 16:03
22	08:19 16:43	07:24 17:42	06:19 18:35	06:07 20:31	05:11 21:22	04:52 21:50	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	07:55 16:15	08:32 16:03
23	08:18 16:45	07:22 17:44	06:17 18:37	06:04 20:32	05:10 21:23	04:52 21:51	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	07:57 16:14	08:32 16:04
24	08:17 16:46	07:20 17:46	06:15 18:38	06:02 20:34	05:08 21:25	04:52 21:51	05:22 21:29	06:13 20:29	07:07 19:15	08:01 18:06	07:58 16:13	08:33 16:04
25	08:16 16:48	07:18 17:48	06:12 18:40	06:00 20:36	05:07 21:26	04:53 21:51	05:24 21:27	06:15 20:27	07:09 19:13	07:03 17:04	08:00 16:12	08:33 16:05
26	08:14 16:50	07:16 17:50	06:10 18:42	05:58 20:38	05:06 21:27	04:53 21:51	05:25 21:26	06:17 20:25	07:10 19:10	07:05 17:01	08:02 16:11	08:33 16:06
27	08:13 16:52	07:13 17:52	06:07 18:44	05:56 20:40	05:05 21:29	04:53 21:51	05:27 21:24	06:19 20:22	07:12 19:08	07:06 16:59	08:03 16:10	08:34 16:06
28	08:11 16:54	07:11 17:54	06:05 18:46	05:54 20:41	05:04 21:30	04:54 21:51	05:28 21:22	06:20 20:20	07:14 19:06	07:08 16:57	08:05 16:09	08:34 16:07
29	08:10 16:56		07:02 19:47	05:52 20:43	05:02 21:32	04:55 21:50	05:30 21:21	06:22 20:18	07:16 19:03	07:10 16:55	08:06 16:08	08:34 16:08
30	08:08 16:58		07:00 19:49	05:50 20:45	05:01 21:33	04:55 21:50	05:31 21:19	06:24 20:15	07:17 19:01	07:12 16:53	08:08 16:07	08:34 16:09
31	08:07 17:00		06:58 19:51		05:00 21:34		05:33 21:17	06:26 20:13		07:14 16:51		08:34 16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s51 - Südergellersen, Kirchgellerser Straße 10

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11	08:05 17:01	07:09 17:56	06:55 19:53	05:48 20:47	04:59 21:35	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	07:16 16:49	08:10 16:06
2	08:34 16:12	08:03 17:03	07:07 17:58	06:53 19:55	05:46 20:48	04:59 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	07:18 16:47	08:11 16:06
3	08:34 16:14	08:02 17:05	07:04 18:00	06:51 19:56	05:44 20:50	04:58 21:38	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	07:20 16:45	08:12 16:05
4	08:34 16:15	08:00 17:07	07:02 18:02	06:48 19:58	05:42 20:52	04:57 21:39	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	07:22 16:44	08:14 16:04
5	08:33 16:16	07:58 17:09	07:00 18:03	06:46 20:00	05:40 20:54	04:56 21:40	04:59 21:48	05:41 21:09	06:34 20:01	07:26 18:49	07:23 16:42	08:15 16:04
6	08:33 16:17	07:56 17:11	06:57 18:05	06:43 20:02	05:38 20:55	04:55 21:41	05:00 21:47	05:43 21:07	06:36 19:59	07:28 18:46	07:25 16:40	08:17 16:03
7	08:32 16:19	07:55 17:13	06:55 18:07	06:41 20:04	05:36 20:57	04:55 21:42	05:01 21:47	05:44 21:05	06:38 19:56	07:30 18:44	07:27 16:38	08:18 16:03
8	08:32 16:20	07:53 17:15	06:53 18:09	06:39 20:05	05:34 20:59	04:54 21:43	05:02 21:46	05:46 21:03	06:39 19:54	07:32 18:42	07:29 16:36	08:19 16:02
9	08:31 16:21	07:51 17:17	06:50 18:11	06:36 20:07	05:32 21:01	04:54 21:44	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	07:31 16:35	08:20 16:02
10	08:31 16:23	07:49 17:19	06:48 18:13	06:34 20:09	05:30 21:02	04:53 21:44	05:04 21:45	05:49 20:59	06:43 19:49	07:35 18:37	07:33 16:33	08:22 16:02
11	08:30 16:24	07:47 17:21	06:46 18:15	06:32 20:11	05:29 21:04	04:53 21:45	05:05 21:44	05:51 20:57	06:44 19:47	07:37 18:35	07:35 16:31	08:23 16:02
12	08:29 16:26	07:45 17:23	06:43 18:16	06:29 20:13	05:27 21:06	04:52 21:46	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	07:37 16:30	08:24 16:01
13	08:29 16:27	07:43 17:25	06:41 18:18	06:27 20:14	05:25 21:07	04:52 21:47	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	07:39 16:28	08:25 16:01
14	08:28 16:29	07:41 17:27	06:39 18:20	06:25 20:16	05:23 21:09	04:52 21:47	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	07:40 16:26	08:26 16:01
15	08:27 16:31	07:39 17:29	06:36 18:22	06:22 20:18	05:22 21:11	04:52 21:48	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	07:42 16:25	08:27 16:01
16	08:26 16:32	07:37 17:31	06:34 18:24	06:20 20:20	05:20 21:12	04:51 21:48	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	07:44 16:23	08:28 16:01
17	08:25 16:34	07:35 17:33	06:31 18:26	06:18 20:22	05:18 21:14	04:51 21:49	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	07:46 16:22	08:29 16:02
18	08:24 16:36	07:33 17:35	06:29 18:27	06:16 20:23	05:17 21:16	04:51 21:49	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	07:48 16:20	08:29 16:02
19	08:23 16:37	07:31 17:37	06:27 18:29	06:13 20:25	05:15 21:17	04:51 21:50	05:15 21:35	06:05 20:40	06:58 19:27	07:52 18:17	07:49 16:19	08:30 16:02
20	08:22 16:39	07:29 17:39	06:24 18:31	06:11 20:27	05:14 21:19	04:51 21:50	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	07:51 16:18	08:31 16:02
21	08:21 16:41	07:27 17:40	06:22 18:33	06:09 20:29	05:12 21:20	04:52 21:50	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	07:53 16:16	08:31 16:03
22	08:19 16:43	07:24 17:42	06:19 18:35	06:07 20:31	05:11 21:22	04:52 21:50	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	07:55 16:15	08:32 16:03
23	08:18 16:45	07:22 17:44	06:17 18:37	06:04 20:32	05:10 21:23	04:52 21:51	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	07:57 16:14	08:32 16:04
24	08:17 16:46	07:20 17:46	06:15 18:38	06:02 20:34	05:08 21:25	04:52 21:51	05:22 21:29	06:13 20:29	07:07 19:15	08:01 18:06	07:58 16:13	08:33 16:04
25	08:16 16:48	07:18 17:48	06:12 18:40	06:00 20:36	05:07 21:26	04:53 21:51	05:24 21:27	06:15 20:27	07:09 19:13	07:03 17:04	08:00 16:12	08:33 16:05
26	08:14 16:50	07:16 17:50	06:10 18:42	05:58 20:38	05:06 21:27	04:53 21:51	05:25 21:26	06:17 20:25	07:10 19:10	07:05 17:01	08:02 16:11	08:33 16:06
27	08:13 16:52	07:13 17:52	06:07 18:44	05:56 20:40	05:05 21:29	04:53 21:51	05:27 21:24	06:19 20:22	07:12 19:08	07:06 16:59	08:03 16:10	08:34 16:06
28	08:11 16:54	07:11 17:54	06:05 18:46	05:54 20:41	05:04 21:30	04:54 21:51	05:28 21:22	06:20 20:20	07:14 19:06	07:08 16:57	08:05 16:09	08:34 16:07
29	08:10 16:56		07:02 19:47	05:52 20:43	05:02 21:32	04:55 21:50	05:30 21:21	06:22 20:18	07:16 19:03	07:10 16:55	08:06 16:08	08:34 16:08
30	08:08 16:58		07:00 19:49	05:50 20:45	05:01 21:33	04:55 21:50	05:31 21:19	06:24 20:15	07:17 19:01	07:12 16:53	08:08 16:07	08:34 16:09
31	08:07 17:00		06:58 19:51		05:00 21:34		05:33 21:17	06:26 20:13		07:14 16:51		08:34 16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s52 - Südergellersen, Kirchgellerser Straße 13

## 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	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11	08:05 17:01	07:09 17:56	06:55 19:53	05:48 20:47	04:59 21:35	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	07:16 16:49	08:10 16:06
2	08:34 16:12	08:03 17:03	07:07 17:58	06:53 19:55	05:46 20:48	04:59 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	07:18 16:47	08:11 16:06
3	08:34 16:14	08:02 17:05	07:04 18:00	06:51 19:56	05:44 20:50	04:58 21:38	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	07:20 16:45	08:12 16:05
4	08:34 16:15	08:00 17:07	07:02 18:02	06:48 19:58	05:42 20:52	04:57 21:39	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	07:22 16:44	08:14 16:04
5	08:33 16:16	07:58 17:09	07:00 18:03	06:46 20:00	05:40 20:54	04:56 21:40	04:59 21:48	05:41 21:09	06:34 20:01	07:26 18:49	07:23 16:42	08:15 16:04
6	08:33 16:17	07:56 17:11	06:57 18:05	06:43 20:02	05:38 20:55	04:55 21:41	05:00 21:47	05:43 21:07	06:36 19:59	07:28 18:46	07:25 16:40	08:17 16:03
7	08:32 16:19	07:55 17:13	06:55 18:07	06:41 20:04	05:36 20:57	04:55 21:42	05:01 21:47	05:44 21:05	06:38 19:56	07:30 18:44	07:27 16:38	08:18 16:03
8	08:32 16:20	07:53 17:15	06:53 18:09	06:39 20:05	05:34 20:59	04:54 21:43	05:02 21:46	05:46 21:03	06:39 19:54	07:32 18:42	07:29 16:36	08:19 16:02
9	08:31 16:21	07:51 17:17	06:50 18:11	06:36 20:07	05:32 21:01	04:54 21:44	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	07:31 16:35	08:20 16:02
10	08:31 16:23	07:49 17:19	06:48 18:13	06:34 20:09	05:30 21:02	04:53 21:44	05:04 21:45	05:49 20:59	06:43 19:49	07:35 18:37	07:33 16:33	08:22 16:02
11	08:30 16:24	07:47 17:21	06:46 18:15	06:32 20:11	05:29 21:04	04:53 21:45	05:05 21:44	05:51 20:57	06:44 19:47	07:37 18:35	07:35 16:31	08:23 16:02
12	08:29 16:26	07:45 17:23	06:43 18:16	06:29 20:13	05:27 21:06	04:52 21:46	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	07:37 16:30	08:24 16:01
13	08:29 16:27	07:43 17:25	06:41 18:18	06:27 20:14	05:25 21:07	04:52 21:47	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	07:39 16:28	08:25 16:01
14	08:28 16:29	07:41 17:27	06:39 18:20	06:25 20:16	05:23 21:09	04:52 21:47	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	07:40 16:26	08:26 16:01
15	08:27 16:31	07:39 17:29	06:36 18:22	06:22 20:18	05:22 21:11	04:52 21:48	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	07:42 16:25	08:27 16:01
16	08:26 16:32	07:37 17:31	06:34 18:24	06:20 20:20	05:20 21:12	04:51 21:48	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	07:44 16:23	08:28 16:01
17	08:25 16:34	07:35 17:33	06:31 18:26	06:18 20:22	05:18 21:14	04:51 21:49	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	07:46 16:22	08:29 16:02
18	08:24 16:36	07:33 17:35	06:29 18:27	06:16 20:23	05:17 21:16	04:51 21:49	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	07:48 16:20	08:29 16:02
19	08:23 16:37	07:31 17:37	06:27 18:29	06:13 20:25	05:15 21:17	04:51 21:50	05:15 21:35	06:05 20:40	06:58 19:27	07:52 18:17	07:49 16:19	08:30 16:02
20	08:22 16:39	07:29 17:39	06:24 18:31	06:11 20:27	05:14 21:19	04:51 21:50	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	07:51 16:18	08:31 16:02
21	08:21 16:41	07:27 17:40	06:22 18:33	06:09 20:29	05:12 21:20	04:52 21:50	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	07:53 16:16	08:31 16:03
22	08:19 16:43	07:24 17:42	06:19 18:35	06:07 20:31	05:11 21:22	04:52 21:50	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	07:55 16:15	08:32 16:03
23	08:18 16:45	07:22 17:44	06:17 18:37	06:04 20:32	05:10 21:23	04:52 21:51	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	07:57 16:14	08:32 16:04
24	08:17 16:46	07:20 17:46	06:15 18:38	06:02 20:34	05:08 21:25	04:52 21:51	05:22 21:29	06:13 20:29	07:07 19:15	08:01 18:06	07:58 16:13	08:33 16:04
25	08:16 16:48	07:18 17:48	06:12 18:40	06:00 20:36	05:07 21:26	04:53 21:51	05:24 21:27	06:15 20:27	07:09 19:13	07:03 17:04	08:00 16:12	08:33 16:05
26	08:14 16:50	07:16 17:50	06:10 18:42	05:58 20:38	05:06 21:27	04:53 21:51	05:25 21:26	06:17 20:25	07:10 19:10	07:05 17:01	08:02 16:11	08:33 16:06
27	08:13 16:52	07:13 17:52	06:07 18:44	05:56 20:40	05:05 21:29	04:53 21:51	05:27 21:24	06:19 20:22	07:12 19:08	07:06 16:59	08:03 16:10	08:34 16:06
28	08:11 16:54	07:11 17:54	06:05 18:46	05:54 20:41	05:04 21:30	04:54 21:51	05:28 21:22	06:20 20:20	07:14 19:06	07:08 16:57	08:05 16:09	08:34 16:07
29	08:10 16:56		07:02 19:47	05:52 20:43	05:02 21:32	04:55 21:50	05:30 21:21	06:22 20:18	07:16 19:03	07:10 16:55	08:06 16:08	08:34 16:08
30	08:08 16:58		07:00 19:49	05:50 20:45	05:01 21:33	04:55 21:50	05:31 21:19	06:24 20:15	07:17 19:01	07:12 16:53	08:08 16:07	08:34 16:09
31	08:07 17:00		06:58 19:51		05:00 21:34		05:33 21:17	06:26 20:13		07:14 16:51		08:34 16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s53 - Südergellersen, Kirchgellerser Straße 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	Juli	August	September	Oktober	November	Dezember
1	08:34	14:50 (B 01)	08:05	07:09	06:55	05:48	04:59	04:56	05:35	06:27	07:19	07:16
	16:11	24	15:14 (B 01)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58
2	08:34	14:51 (B 01)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18
	16:12	24	15:15 (B 01)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56
3	08:34	14:52 (B 01)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20
	16:14	23	15:15 (B 01)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54
4	08:33	14:52 (B 01)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22
	16:15	23	15:15 (B 01)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51
5	08:33	14:54 (B 01)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23
	16:16	22	15:16 (B 01)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49
6	08:33	14:54 (B 01)	07:56	06:57	06:43	05:38	04:55	05:00	05:43	06:36	07:28	07:25
	16:17	21	15:15 (B 01)	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46
7	08:32	14:54 (B 01)	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27
	16:19	21	15:15 (B 01)	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44
8	08:32	14:56 (B 01)	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29
	16:20	19	15:15 (B 01)	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42
9	08:31	14:57 (B 01)	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31
	16:21	18	15:15 (B 01)	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39
10	08:31	14:58 (B 01)	07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	07:33
	16:23	16	15:14 (B 01)	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37
11	08:30	14:59 (B 01)	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35
	16:24	14	15:13 (B 01)	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35
12	08:29	15:01 (B 01)	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37
	16:26	11	15:12 (B 01)	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32
13	08:29	15:04 (B 01)	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:38
	16:27	8	15:12 (B 01)	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30
14	08:28		07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40
	16:29		17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26
15	08:27		07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42
	16:31		17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25
16	08:26		07:37	06:34	06:20	05:20	04:51	05:11	06:00	06:53	07:46	07:44
	16:32		17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23
17	08:25		07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46
	16:34		17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22
18	08:24		07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48
	16:36		17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20
19	08:23		07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49
	16:37		17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19
20	08:22		07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51
	16:39		17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18
21	08:21		07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53
	16:41		17:40	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16
22	08:19		07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55
	16:43		17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15
23	08:18		07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:56
	16:45		17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14
24	08:17		07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58
	16:46		17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13
25	08:16		07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00
	16:48		17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12
26	08:14		07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02
	16:50		17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11
27	08:13		07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03
	16:52		17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10
28	08:11		07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05
	16:54		17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09
29	08:10			07:02	05:52	05:02	04:55	05:30	06:22	07:16	07:10	08:06
	16:56			19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08
30	08:08			07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08
	16:58			19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07
31	08:07					05:00		05:33	06:26		07:14	
	17:00					19:51		21:17	20:13		16:51	
Sonnenscheinstunden												
astr.max.mögl.Beschattung		244	275	367	419	491	506	519	458	382	329	261
											19	736

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

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



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s54 - Südergellersen, Kirchgellerser Straße 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	Juli	August	September	Oktober	November	Dezember
1	08:34	14:53 (8 01)	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16
2	16:11	15:21 (8 01)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49
3	08:34	14:53 (8 01)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18
4	16:12	15:21 (8 01)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47
5	08:34	14:54 (8 01)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20
6	16:14	15:22 (8 01)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45
7	08:33	14:54 (8 01)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22
8	16:15	15:22 (8 01)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44
9	08:33	14:55 (8 01)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23
10	16:16	15:23 (8 01)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42
11	08:33	14:56 (8 01)	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25
12	16:17	15:22 (8 01)	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40
13	08:32	14:56 (8 01)	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27
14	16:19	15:22 (8 01)	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38
15	08:32	14:57 (8 01)	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29
16	16:20	15:23 (8 01)	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36
17	08:31	14:58 (8 01)	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31
18	16:21	15:23 (8 01)	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35
19	08:31	14:58 (8 01)	07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	07:33
20	16:23	15:23 (8 01)	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33
21	08:30	14:59 (8 01)	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35
22	16:24	15:22 (8 01)	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31
23	08:29	15:00 (8 01)	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37
24	16:26	15:22 (8 01)	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30
25	08:29	15:02 (8 01)	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:38
26	16:27	15:23 (8 01)	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28
27	08:28	15:02 (8 01)	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40
28	16:29	15:21 (8 01)	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26
29	08:27	15:04 (8 01)	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42
30	16:31	15:21 (8 01)	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25
31	08:26	15:05 (8 01)	07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44
1	16:32	15:20 (8 01)	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23
2	08:25	15:07 (8 01)	07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46
3	16:34	15:19 (8 01)	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22
4	08:24	15:11 (8 01)	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48
5	16:36	15:17 (8 01)	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20
6	08:23	15:09	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49
7	16:37	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	17:06	16:19
8	08:22	15:09	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51
9	16:39	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	17:03	16:18
10	08:21	15:07	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53
11	16:41	17:40	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	17:01	16:16
12	08:19	15:04	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55
13	16:43	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	17:00	16:15
14	08:18	15:02	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:56
15	16:45	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	17:00	16:14
16	08:17	15:00	07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58
17	16:46	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	17:00	16:13
18	08:16	15:00	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	08:03	08:00
19	16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	18:04	17:00	16:12
20	08:14	15:00	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	08:05	08:02
21	16:50	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	18:01	17:01	16:11
22	08:13	15:00	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	08:06	08:03
23	16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	18:00	17:00	16:10
24	08:11	15:00	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	08:08	08:05
25	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	18:00	17:00	16:10
26	08:10	15:00	07:10	06:04	05:53	05:03	04:55	05:30	06:22	07:16	08:10	08:06
27	16:56	17:56	18:48	20:43	21:32	21:50	21:21	20:18	19:03	18:00	17:00	16:10
28	08:08	15:00	07:00	05:50	05:01	04:55	05:31	06:24	07:17	08:12	09:06	09:03
29	16:58	17:58	18:49	20:45	21:33	21:50	21:19	20:15	19:01	18:00	17:00	16:10
30	08:07	15:00	07:00	05:50	05:00	04:55	05:33	06:26	07:19	08:14	09:08	09:05
31	17:00	19:51	19:51	21:34	21:34	21:34	21:17	20:13	19:00	18:00	17:00	16:10
Sonnenscheinstunden		275	367	419	491	506	509	458	382	329	261	111
astr. max. mögl. Beschattung		403										861

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

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

## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s55 - Südergellersen, Oerzer Str. 13A

## 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	08:34	13:12 (Rep 11)   08:05	15:45 (B 01)   07:09	06:55	05:48	04:59
	16:11	88 15:14 (Rep 8)   17:01	21 16:06 (B 01)   17:56	19:53	20:47	21:35
2	08:34	13:13 (Rep 11)   08:03	15:46 (B 01)   07:07	06:53	05:46	04:59
	16:12	87 15:14 (Rep 8)   17:03	19 16:05 (B 01)   17:58	19:55	20:48	21:36
3	08:34	13:14 (Rep 11)   08:02	15:49 (B 01)   07:04	06:51	05:44	04:58
	16:14	86 15:15 (Rep 8)   17:05	15 16:04 (B 01)   18:00	19:56	20:50	21:38
4	08:33	13:14 (Rep 11)   08:00	15:51 (B 01)   07:02	06:48	05:42	04:57
	16:15	85 15:15 (Rep 8)   17:07	11 16:02 (B 01)   18:01	19:58	20:52	21:39
5	08:33	13:16 (Rep 11)   07:58	07:00	06:46	05:40	04:56
	16:16	83 15:16 (Rep 8)   17:09	18:03	20:00	20:54	21:40
6	08:33	13:16 (Rep 11)   07:56	06:57	06:43	05:38	04:55
	16:17	81 15:16 (Rep 8)   17:11	18:05	20:02	20:55	21:41
7	08:32	13:17 (Rep 11)   07:55	06:55	06:41	05:36	04:55
	16:19	77 15:15 (Rep 8)   17:13	18:07	20:04	20:57	21:42
8	08:32	13:19 (Rep 11)   07:53	06:53	06:39	05:34	04:54
	16:20	77 15:44 (B 01)   17:15	18:09	20:05	20:59	21:43
9	08:31	13:20 (Rep 11)   07:51	06:50	06:36	05:32	04:54
	16:21	75 15:46 (B 01)   17:17	18:11	20:07	21:01	21:44
10	08:31	13:21 (Rep 11)   07:49	06:48	06:34	05:30	04:53
	16:23	74 15:47 (B 01)   17:19	18:13	20:09	21:02	21:44
11	08:30	13:23 (Rep 11)   07:47	06:46	06:32	05:29	04:53
	16:24	72 15:49 (B 01)   17:21	18:15	20:11	21:04	21:45
12	08:29	13:25 (Rep 11)   07:45	06:43	06:29	05:27	04:52
	16:26	66 15:50 (B 01)   17:23	18:16	20:13	21:06	21:46
13	08:29	13:28 (Rep 11)   07:43	06:41	06:27	05:25	04:52
	16:27	60 15:52 (B 01)   17:25	18:18	20:14	21:07	21:47
14	08:28	14:27 (Rep 9)   07:41	06:39	06:25	05:23	04:52
	16:29	50 15:54 (B 01)   17:27	18:20	20:16	21:09	21:47
15	08:27	14:29 (Rep 9)   07:39	06:36	06:22	05:22	04:52
	16:31	46 15:56 (B 01)   17:29	18:22	20:18	21:11	21:48
16	08:26	14:32 (Rep 9)   07:37	06:34	06:20	05:20	04:51
	16:32	40 15:58 (B 01)   17:31	18:24	20:20	21:12	21:48
17	08:25	15:04 (Rep 8)   07:35	06:31	06:18	05:18	04:51
	16:34	29 16:00 (B 01)   17:33	18:26	20:22	21:14	21:49
18	08:24	15:39 (B 01)   07:33	06:29	06:16	05:17	04:51
	16:36	23 16:02 (B 01)   17:35	18:27	20:23	21:16	21:49
19	08:23	15:40 (B 01)   07:31	06:27	06:13	05:15	04:51
	16:37	24 16:04 (B 01)   17:37	18:29	20:25	21:17	21:50
20	08:22	15:39 (B 01)   07:29	06:24	06:11	05:14	04:51
	16:39	26 16:05 (B 01)   17:39	18:31	20:27	21:19	21:50
21	08:21	15:40 (B 01)   07:27	06:22	06:09	05:13	04:52
	16:41	27 16:07 (B 01)   17:40	18:33	20:29	21:20	21:50
22	08:19	15:39 (B 01)   07:24	06:19	06:07	05:11	04:52
	16:43	28 16:07 (B 01)   17:42	18:35	20:31	21:22	21:50
23	08:18	15:40 (B 01)   07:22	06:17	06:04	05:10	04:52
	16:45	28 16:08 (B 01)   17:44	18:37	20:32	21:23	21:51
24	08:17	15:40 (B 01)   07:20	06:15	06:02	05:08	04:52
	16:46	28 16:08 (B 01)   17:46	18:38	20:34	21:25	21:51
25	08:15	15:40 (B 01)   07:18	06:12	06:00	05:07	04:53
	16:48	28 16:08 (B 01)   17:48	18:40	20:36	21:26	21:51
26	08:14	15:40 (B 01)   07:16	06:10	05:58	05:06	04:53
	16:50	28 16:08 (B 01)   17:50	18:42	20:38	21:27	21:51
27	08:13	15:41 (B 01)   07:13	06:07	05:56	05:05	04:54
	16:52	27 16:08 (B 01)   17:52	18:44	20:40	21:29	21:51
28	08:11	15:42 (B 01)   07:11	06:05	05:54	05:04	04:54
	16:54	26 16:08 (B 01)   17:54	18:46	20:41	21:30	21:51
29	08:10	15:42 (B 01)	07:02	05:52	05:02	04:55
	16:56	25 16:07 (B 01)	19:47	20:43	21:31	21:50
30	08:08	15:43 (B 01)	07:00	05:50	05:01	04:55
	16:58	25 16:08 (B 01)	19:49	20:45	21:33	21:50
31	08:07	15:44 (B 01)	06:58		05:00	
	17:00	23 16:07 (B 01)	19:51		21:34	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	1542	66				

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

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



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s55 - Südergellersen, Oerzer Str. 13A

### 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	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	07:16 16:49	08:09 16:06 71 15:31 (B 01)
2	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	07:18 16:47	08:11 16:06 74 15:30 (B 01)
3	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	07:20 16:45	08:12 16:05 75 15:30 (B 01)
4	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	07:22 16:44	08:14 16:04 78 15:29 (B 01)
5	04:59 21:48	05:41 21:09	06:34 20:01	07:26 18:49	07:23 16:42	08:15 16:04 77 15:01 (Rep 8)
6	05:00 21:47	05:43 21:07	06:36 19:59	07:28 18:46	07:25 16:40	08:17 16:03 80 15:02 (Rep 8)
7	05:01 21:47	05:44 21:05	06:38 19:56	07:30 18:44	07:27 16:38	15:21 (B 01) 08:18 15:32 (B 01) 16:03 82 15:02 (Rep 8)
8	05:02 21:46	05:46 21:03	06:39 19:54	07:32 18:42	07:29 16:36	15:18 (B 01) 08:19 15:34 (B 01) 16:02 85 15:03 (Rep 8)
9	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	07:31 16:35	15:17 (B 01) 08:20 15:36 (B 01) 16:02 86 15:03 (Rep 8)
10	05:04 21:45	05:49 20:59	06:43 19:49	07:35 18:37	07:33 16:33	15:16 (B 01) 08:22 15:37 (B 01) 16:02 87 15:04 (Rep 8)
11	05:05 21:44	05:51 20:57	06:44 19:47	07:37 18:35	07:35 16:31	15:15 (B 01) 08:23 15:38 (B 01) 16:02 88 15:04 (Rep 8)
12	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	07:37 16:30	15:14 (B 01) 08:24 15:39 (B 01) 16:01 89 15:05 (Rep 8)
13	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	07:38 16:28	15:14 (B 01) 08:25 15:39 (B 01) 16:01 91 15:06 (Rep 8)
14	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	07:40 16:26	15:13 (B 01) 08:26 15:40 (B 01) 16:01 92 15:06 (Rep 8)
15	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	07:42 16:25	15:14 (B 01) 08:27 15:41 (B 01) 16:01 92 15:07 (Rep 8)
16	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	07:44 16:23	15:14 (B 01) 08:28 15:42 (B 01) 16:01 92 15:06 (Rep 8)
17	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	07:46 16:22	15:14 (B 01) 08:28 15:42 (B 01) 16:02 94 15:07 (Rep 8)
18	05:14 21:36	06:03 20:42	06:57 19:30	07:50 18:19	07:48 16:20	15:14 (B 01) 08:29 15:42 (B 01) 16:02 93 15:08 (Rep 8)
19	05:15 21:35	06:05 20:40	06:58 19:27	07:51 18:17	07:49 16:19	15:14 (B 01) 08:30 15:42 (B 01) 16:02 93 15:08 (Rep 8)
20	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	07:51 16:18	15:14 (B 01) 08:31 15:42 (B 01) 16:02 92 15:08 (Rep 8)
21	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	07:53 16:16	15:15 (B 01) 08:31 15:42 (B 01) 16:03 93 15:09 (Rep 8)
22	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	07:55 16:15	15:15 (B 01) 08:32 15:41 (B 01) 16:03 93 15:09 (Rep 8)
23	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	07:56 16:14	15:16 (B 01) 08:32 15:40 (B 01) 16:04 93 15:10 (Rep 8)
24	05:22 21:29	06:13 20:29	07:07 19:15	08:01 18:06	07:58 16:13	15:17 (B 01) 08:33 15:39 (B 01) 16:04 93 15:10 (Rep 8)
25	05:24 21:27	06:15 20:27	07:09 19:13	08:00 17:04	08:00 16:12	14:42 (Rep 8) 08:33 15:38 (B 01) 16:05 94 15:11 (Rep 8)
26	05:25 21:26	06:17 20:25	07:10 19:10	08:02 17:01	08:02 16:11	14:11 (Rep 9) 08:33 15:37 (B 01) 16:06 94 15:12 (Rep 8)
27	05:27 21:24	06:19 20:22	07:12 19:08	08:06 16:59	08:03 16:10	14:10 (Rep 9) 08:34 15:36 (B 01) 16:06 92 15:12 (Rep 8)
28	05:28 21:22	06:20 20:20	07:14 19:06	08:08 16:57	08:05 16:09	14:08 (Rep 9) 08:34 15:34 (B 01) 16:07 92 15:13 (Rep 8)
29	05:30 21:21	06:22 20:18	07:16 19:03	08:10 16:55	08:06 16:08	13:09 (Rep 11) 08:34 15:33 (B 01) 16:08 92 15:13 (Rep 8)
30	05:31 21:19	06:24 20:15	07:17 19:01	08:12 16:53	08:08 16:07	13:07 (Rep 11) 08:34 15:32 (B 01) 16:09 90 15:13 (Rep 8)
31	05:33 21:17	06:26 20:13		07:14 16:51		08:34 16:10 88 15:13 (Rep 8)
Sonnenscheinstunden	509	458	382	329	261	237
astr.max.mögl.Beschattung					723	2725

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s56 - Südergellersen, Oerzer Str. 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	08:34	13:35 (Rep 11)   08:05	16:03 (B 01)   07:09	06:55	05:48	04:59
	16:11	97 15:30 (Rep 8)   17:01	26 16:29 (B 01)   17:56	19:53	20:47	21:35
2	08:34	13:36 (Rep 11)   08:03	16:02 (B 01)   07:07	06:53	05:46	04:59
	16:12	96 15:30 (Rep 8)   17:03	27 16:29 (B 01)   17:58	19:55	20:48	21:36
3	08:34	13:37 (Rep 11)   08:02	16:03 (B 01)   07:04	06:50	05:44	04:58
	16:14	97 15:31 (Rep 8)   17:05	27 16:30 (B 01)   18:00	19:56	20:50	21:38
4	08:33	13:37 (Rep 11)   08:00	16:03 (B 01)   07:02	06:48	05:42	04:57
	16:15	96 15:31 (Rep 8)   17:07	27 16:30 (B 01)   18:01	19:58	20:52	21:39
5	08:33	13:38 (Rep 11)   07:58	16:04 (B 01)   07:00	06:46	05:40	04:56
	16:16	97 15:33 (Rep 8)   17:09	26 16:30 (B 01)   18:03	20:00	20:54	21:40
6	08:33	13:38 (Rep 11)   07:56	16:04 (B 01)   06:57	06:43	05:38	04:55
	16:17	97 15:33 (Rep 8)   17:11	26 16:30 (B 01)   18:05	20:02	20:55	21:41
7	08:32	13:39 (Rep 11)   07:55	16:04 (B 01)   06:55	06:41	05:36	04:55
	16:19	96 15:33 (Rep 8)   17:13	25 16:29 (B 01)   18:07	20:04	20:57	21:42
8	08:32	13:40 (Rep 11)   07:53	16:05 (B 01)   06:53	06:39	05:34	04:54
	16:20	96 15:34 (Rep 8)   17:15	24 16:29 (B 01)   18:09	20:05	20:59	21:43
9	08:31	13:40 (Rep 11)   07:51	16:06 (B 01)   06:50	06:36	05:32	04:54
	16:21	96 15:34 (Rep 8)   17:17	22 16:28 (B 01)   18:11	20:07	21:01	21:44
10	08:31	13:41 (Rep 11)   07:49	16:07 (B 01)   06:48	06:34	05:30	04:53
	16:23	95 15:35 (Rep 8)   17:19	20 16:27 (B 01)   18:13	20:09	21:02	21:44
11	08:30	13:41 (Rep 11)   07:47	16:09 (B 01)   06:46	06:32	05:29	04:53
	16:24	95 15:35 (Rep 8)   17:21	17 16:26 (B 01)   18:15	20:11	21:04	21:45
12	08:29	13:42 (Rep 11)   07:45	16:11 (B 01)   06:43	06:29	05:27	04:52
	16:26	94 15:35 (Rep 8)   17:23	13 16:24 (B 01)   18:16	20:13	21:06	21:46
13	08:29	13:43 (Rep 11)   07:43	16:14 (B 01)   06:41	06:27	05:25	04:52
	16:27	93 15:36 (Rep 8)   17:25	7 16:21 (B 01)   18:18	20:14	21:07	21:47
14	08:28	13:44 (Rep 11)   07:41	06:39	06:25	05:23	04:52
	16:29	90 15:36 (Rep 8)   17:27	18:20	20:16	21:09	21:47
15	08:27	13:45 (Rep 11)   07:39	06:36	06:22	05:22	04:52
	16:31	89 15:36 (Rep 8)   17:29	18:22	20:18	21:11	21:48
16	08:26	13:46 (Rep 11)   07:37	06:34	06:20	05:20	04:51
	16:32	88 15:37 (Rep 8)   17:31	18:24	20:20	21:12	21:48
17	08:25	13:47 (Rep 11)   07:35	06:31	06:18	05:18	04:51
	16:34	86 15:37 (Rep 8)   17:33	18:26	20:22	21:14	21:49
18	08:24	13:49 (Rep 11)   07:33	06:29	06:16	05:17	04:51
	16:36	83 15:37 (Rep 8)   17:35	18:27	20:23	21:16	21:49
19	08:23	13:50 (Rep 11)   07:31	06:27	06:13	05:15	04:51
	16:37	81 15:37 (Rep 8)   17:37	18:29	20:25	21:17	21:50
20	08:22	13:51 (Rep 11)   07:29	06:24	06:11	05:14	04:51
	16:39	77 15:36 (Rep 8)   17:39	18:31	20:27	21:19	21:50
21	08:21	13:53 (Rep 11)   07:27	06:22	06:09	05:12	04:52
	16:41	73 15:37 (Rep 8)   17:40	18:33	20:29	21:20	21:50
22	08:19	13:54 (Rep 11)   07:24	06:19	06:07	05:11	04:52
	16:43	65 15:35 (Rep 8)   17:42	18:35	20:31	21:22	21:50
23	08:18	13:57 (Rep 11)   07:22	06:17	06:04	05:10	04:52
	16:45	60 16:11 (B 01)   17:44	18:37	20:32	21:23	21:51
24	08:17	14:00 (Rep 11)   07:20	06:15	06:02	05:08	04:52
	16:46	54 16:14 (B 01)   17:46	18:38	20:34	21:25	21:51
25	08:15	14:55 (Rep 9)   07:18	06:12	06:00	05:07	04:53
	16:48	36 16:15 (B 01)   17:48	18:40	20:36	21:26	21:51
26	08:14	14:57 (Rep 9)   07:16	06:10	05:58	05:06	04:53
	16:50	24 16:17 (B 01)   17:50	18:42	20:38	21:27	21:51
27	08:13	16:05 (B 01)   07:13	06:07	05:56	05:05	04:54
	16:52	15 16:20 (B 01)   17:52	18:44	20:40	21:29	21:51
28	08:11	16:04 (B 01)   07:11	06:05	05:54	05:04	04:54
	16:54	18 16:22 (B 01)   17:54	18:46	20:41	21:30	21:50
29	08:10	16:03 (B 01)	07:02	05:52	05:02	04:55
	16:56	20 16:23 (B 01)	19:47	20:43	21:31	21:50
30	08:08	16:03 (B 01)	07:00	05:50	05:01	04:55
	16:58	23 16:26 (B 01)	19:49	20:45	21:33	21:50
31	08:07	16:03 (B 01)	06:58		05:00	
	17:00	25 16:28 (B 01)	19:51		21:34	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	2252	287				

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s56 - Südergellersen, Oerzer Str. 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

	Juli	August	September	Oktober		November		Dezember		
1	04:56	05:35	06:27	07:19		07:16	15:37 (B 01)	08:09	13:24 (Rep 11)	
	21:50	21:16	20:11	18:58		16:49	20 15:57 (B 01)	16:06	94 15:17 (Rep 8)	
2	04:57	05:36	06:29	07:21		07:18	15:35 (B 01)	08:11	13:24 (Rep 11)	
	21:49	21:14	20:08	18:56		16:47	23 15:58 (B 01)	16:06	95 15:18 (Rep 8)	
3	04:57	05:38	06:31	07:23		07:20	15:35 (B 01)	08:12	13:24 (Rep 11)	
	21:49	21:12	20:06	18:54		16:45	24 15:59 (B 01)	16:05	96 15:19 (Rep 8)	
4	04:58	05:39	06:32	07:24		07:22	15:34 (B 01)	08:14	13:24 (Rep 11)	
	21:49	21:10	20:04	18:51		16:44	25 15:59 (B 01)	16:04	96 15:18 (Rep 8)	
5	04:59	05:41	06:34	07:26		07:23	15:34 (B 01)	08:15	13:25 (Rep 11)	
	21:48	21:09	20:01	18:49		16:42	26 16:00 (B 01)	16:04	96 15:19 (Rep 8)	
6	05:00	05:43	06:36	07:28		07:25	15:33 (B 01)	08:17	13:25 (Rep 11)	
	21:47	21:07	19:59	18:46		16:40	27 16:00 (B 01)	16:03	96 15:19 (Rep 8)	
7	05:01	05:44	06:38	07:30		07:27	15:33 (B 01)	08:18	13:24 (Rep 11)	
	21:47	21:05	19:56	18:44		16:38	27 16:00 (B 01)	16:03	97 15:19 (Rep 8)	
8	05:02	05:46	06:39	07:32		07:29	15:33 (B 01)	08:19	13:25 (Rep 11)	
	21:46	21:03	19:54	18:42		16:36	27 16:00 (B 01)	16:02	98 15:20 (Rep 8)	
9	05:03	05:48	06:41	07:33		07:31	15:33 (B 01)	08:20	13:25 (Rep 11)	
	21:45	21:01	19:52	18:39		16:35	27 16:00 (B 01)	16:02	97 15:20 (Rep 8)	
10	05:04	05:49	06:43	07:35		07:33	15:33 (B 01)	08:22	13:25 (Rep 11)	
	21:45	20:59	19:49	18:37		16:33	27 16:00 (B 01)	16:02	97 15:20 (Rep 8)	
11	05:05	05:51	06:44	07:37		07:35	15:34 (B 01)	08:23	13:26 (Rep 11)	
	21:44	20:57	19:47	18:35		16:31	25 15:59 (B 01)	16:02	96 15:20 (Rep 8)	
12	05:06	05:53	06:46	07:39		07:37	15:34 (B 01)	08:24	13:27 (Rep 11)	
	21:43	20:55	19:44	18:32		16:30	23 15:57 (B 01)	16:01	97 15:21 (Rep 8)	
13	05:07	05:55	06:48	07:41		07:38	15:35 (B 01)	08:25	13:27 (Rep 11)	
	21:42	20:53	19:42	18:30		16:28	20 15:55 (B 01)	16:01	96 15:21 (Rep 8)	
14	05:08	05:56	06:50	07:42		07:40	15:36 (B 01)	08:26	13:28 (Rep 11)	
	21:41	20:51	19:40	18:28		16:26	17 15:53 (B 01)	16:01	96 15:21 (Rep 8)	
15	05:10	05:58	06:51	07:44		07:42	15:38 (B 01)	08:27	13:28 (Rep 11)	
	21:40	20:49	19:37	18:26		16:25	15 15:53 (B 01)	16:01	96 15:22 (Rep 8)	
16	05:11	06:00	06:53	07:46		07:44	14:31 (Rep 9)	08:28	13:28 (Rep 11)	
	21:39	20:47	19:35	18:23		16:23	25 15:51 (B 01)	16:01	95 15:21 (Rep 8)	
17	05:12	06:01	06:55	07:48		07:46	14:29 (Rep 9)	08:28	13:28 (Rep 11)	
	21:38	20:44	19:32	18:21		16:22	36 15:49 (B 01)	16:02	97 15:22 (Rep 8)	
18	05:14	06:03	06:57	07:50		07:48	13:34 (Rep 11)	08:29	13:29 (Rep 11)	
	21:36	20:42	19:30	18:19		16:20	54 15:48 (B 01)	16:02	95 15:22 (Rep 8)	
19	05:15	06:05	06:58	07:51		07:49	13:31 (Rep 11)	08:30	13:30 (Rep 11)	
	21:35	20:40	19:27	18:17		16:19	60 15:45 (B 01)	16:02	95 15:23 (Rep 8)	
20	05:16	06:07	07:00	07:53		07:51	13:29 (Rep 11)	08:31	13:29 (Rep 11)	
	21:34	20:38	19:25	18:14		16:18	65 15:10 (Rep 8)	16:02	96 15:23 (Rep 8)	
21	05:18	06:08	07:02	07:55		07:53	13:28 (Rep 11)	08:31	13:30 (Rep 11)	
	21:33	20:36	19:23	18:12		16:16	73 15:12 (Rep 8)	16:03	96 15:24 (Rep 8)	
22	05:19	06:10	07:03	07:57		07:55	13:27 (Rep 11)	08:32	13:30 (Rep 11)	
	21:31	20:34	19:20	18:10		16:15	77 15:12 (Rep 8)	16:03	96 15:24 (Rep 8)	
23	05:21	06:12	07:05	07:59		07:56	13:26 (Rep 11)	08:32	13:31 (Rep 11)	
	21:30	20:31	19:18	18:08		16:14	81 15:13 (Rep 8)	16:04	96 15:25 (Rep 8)	
24	05:22	06:13	07:07	08:01		07:58	13:26 (Rep 11)	08:33	13:32 (Rep 11)	
	21:28	20:29	19:15	18:06		16:13	83 15:14 (Rep 8)	16:04	95 15:25 (Rep 8)	
25	05:24	06:15	07:09	07:03		08:00	13:25 (Rep 11)	08:33	13:32 (Rep 11)	
	21:27	20:27	19:13	17:04		16:12	86 15:15 (Rep 8)	16:05	95 15:25 (Rep 8)	
26	05:25	06:17	07:10	07:05		08:02	13:25 (Rep 11)	08:33	13:32 (Rep 11)	
	21:26	20:25	19:10	17:01		16:11	88 15:16 (Rep 8)	16:06	95 15:25 (Rep 8)	
27	05:27	06:19	07:12	07:06		08:03	13:25 (Rep 11)	08:34	13:33 (Rep 11)	
	21:24	20:22	19:08	16:59		16:10	89 15:16 (Rep 8)	16:06	96 15:27 (Rep 8)	
28	05:28	06:20	07:14	07:08		08:05	13:24 (Rep 11)	08:34	13:34 (Rep 11)	
	21:22	20:20	19:06	16:57		16:09	91 15:16 (Rep 8)	16:07	95 15:27 (Rep 8)	
29	05:30	06:22	07:16	07:10		08:06	13:24 (Rep 11)	08:34	13:34 (Rep 11)	
	21:21	20:18	19:03	16:55	9	15:43 (B 01)	93 15:17 (Rep 8)	16:08	97 15:28 (Rep 8)	
30	05:31	06:24	07:17	07:12		15:40 (B 01)	08:08	13:24 (Rep 11)	08:34	13:35 (Rep 11)
	21:19	20:15	19:01	16:53	14	15:54 (B 01)	16:07	93 15:17 (Rep 8)	16:09	96 15:29 (Rep 8)
31	05:33	06:26		07:14		15:38 (B 01)		08:34	13:35 (Rep 11)	
	21:17	20:13		16:51	18	15:56 (B 01)		16:10	96 15:28 (Rep 8)	
Sonnenscheinstunden	509	458	382	329		261		237		
astr.max.mögl.Beschattung				41		1447		2974		

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

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

## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s57 - Südergellersen, Oerzer Str. 18

## 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	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11	14:00 (Rep 9) 15:34 (B 01)	08:05 17:01	06:55 19:53	05:48 20:47	05:00 21:35	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	07:16 16:49	08:10 15:06
2	08:34 16:12	14:04 (Rep 9) 15:35 (B 01)	08:03 17:03	06:53 19:55	05:46 20:48	04:59 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	07:18 16:47	08:11 15:06
3	08:34 16:14	14:37 (Rep 8) 15:36 (B 01)	08:02 17:05	06:51 19:56	05:44 20:50	04:58 21:38	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	07:20 16:45	08:12 15:05
4	08:33 16:15	14:38 (Rep 8) 15:36 (B 01)	08:00 17:07	06:48 19:58	05:42 20:52	04:57 21:39	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	07:22 16:44	08:14 15:04
5	08:33 16:16	14:40 (Rep 8) 15:37 (B 01)	07:58 17:09	06:46 19:03	05:40 20:04	04:56 21:40	04:56 21:48	05:41 21:09	06:34 20:01	07:26 18:49	07:23 16:42	08:15 15:04
6	08:33 16:17	15:08 (B 01) 15:37 (B 01)	07:56 17:11	06:57 18:05	05:38 20:02	04:56 21:41	05:00 21:47	05:43 21:07	06:36 19:59	07:28 18:46	07:25 16:40	08:17 15:03
7	08:32 16:19	15:08 (B 01) 15:37 (B 01)	07:55 17:13	06:55 18:07	05:36 20:04	04:55 21:42	05:01 21:47	05:44 21:05	06:38 19:56	07:30 18:44	07:27 16:38	08:18 15:03
8	08:32 16:20	15:09 (B 01) 15:38 (B 01)	07:53 17:15	06:53 18:09	05:34 20:05	04:54 21:43	05:02 21:46	05:46 21:03	06:39 19:54	07:32 18:42	07:29 16:36	08:19 15:02
9	08:31 16:21	15:09 (B 01) 15:38 (B 01)	07:51 17:17	06:50 18:11	05:32 21:01	04:54 21:44	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	07:31 16:35	08:20 15:02
10	08:31 16:23	15:09 (B 01) 15:38 (B 01)	07:49 17:19	06:48 18:13	05:30 21:02	04:53 21:44	05:04 21:45	05:49 20:59	06:43 19:49	07:35 18:37	07:33 16:33	08:22 15:02
11	08:30 16:24	15:09 (B 01) 15:38 (B 01)	07:47 17:21	06:46 18:15	05:29 21:04	04:53 21:45	05:05 21:44	05:51 20:57	06:44 19:47	07:37 18:35	07:35 16:31	08:23 15:02
12	08:29 16:26	15:10 (B 01) 15:38 (B 01)	07:45 17:23	06:43 18:16	05:27 21:06	04:52 21:46	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	07:37 16:30	08:24 15:01
13	08:29 16:27	15:10 (B 01) 15:39 (B 01)	07:43 17:25	06:41 18:18	05:25 21:07	04:52 21:47	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	07:38 16:28	08:25 15:01
14	08:28 16:29	15:11 (B 01) 15:39 (B 01)	07:41 17:27	06:39 18:20	05:23 21:09	04:52 21:47	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	07:40 16:26	08:26 15:01
15	08:27 16:31	15:12 (B 01) 15:39 (B 01)	07:39 17:29	06:36 18:22	05:22 21:11	04:52 21:48	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	07:42 16:25	08:27 15:01
16	08:26 16:32	15:13 (B 01) 15:39 (B 01)	07:37 17:31	06:34 18:24	05:20 21:12	04:52 21:48	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	07:44 16:23	08:28 15:01
17	08:25 16:34	15:13 (B 01) 15:39 (B 01)	07:35 17:33	06:31 18:26	05:18 21:14	04:51 21:49	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	07:46 16:22	08:28 15:00
18	08:24 16:36	15:14 (B 01) 15:40 (B 01)	07:33 17:35	06:29 18:27	05:17 21:16	04:51 21:49	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	07:48 16:20	08:29 15:00
19	08:23 16:37	15:16 (B 01) 15:40 (B 01)	07:31 17:37	06:27 18:29	05:15 21:17	04:51 21:50	05:15 21:35	06:05 20:40	06:58 19:27	07:52 18:17	07:49 16:19	08:30 15:00
20	08:22 16:39	15:16 (B 01) 15:39 (B 01)	07:29 17:39	06:24 18:31	05:14 21:27	04:51 21:50	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	07:51 16:18	08:31 15:00
21	08:21 16:41	15:17 (B 01) 15:38 (B 01)	07:27 17:40	06:22 18:33	05:13 21:20	04:52 21:50	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	07:53 16:16	08:32 15:00
22	08:19 16:43	15:18 (B 01) 15:37 (B 01)	07:24 17:42	06:19 18:35	05:11 21:22	04:52 21:50	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	07:55 16:15	08:33 15:00
23	08:18 16:45	15:20 (B 01) 15:37 (B 01)	07:22 17:44	06:17 18:37	05:10 21:23	04:52 21:51	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	07:56 16:14	08:34 15:00
24	08:17 16:46	15:23 (B 01) 15:36 (B 01)	07:20 17:46	06:15 18:38	05:08 21:25	04:52 21:51	05:22 21:29	06:13 20:29	07:07 19:15	08:01 18:06	07:58 16:13	08:35 15:00
25	08:16 16:48	15:25 (B 01) 15:33 (B 01)	07:18 17:48	06:12 18:40	05:07 21:26	04:53 21:51	05:24 21:27	06:15 20:27	07:09 19:13	08:03 18:04	08:00 16:12	08:36 15:00
26	08:14 16:50	15:26 (B 01) 17:50	07:16 18:42	06:10 19:42	05:06 21:27	04:53 21:51	05:25 21:26	06:17 20:25	07:10 19:10	08:05 18:03	08:02 16:11	08:37 15:00
27	08:13 16:52	15:27 (B 01) 17:52	07:13 18:44	06:07 19:44	05:05 21:29	04:54 21:51	05:27 21:24	06:19 20:22	07:12 19:08	08:06 18:00	08:03 16:10	08:38 15:00
28	08:11 16:54	15:28 (B 01) 17:54	07:11 18:46	06:05 19:41	05:04 21:30	04:54 21:51	05:28 21:22	06:20 20:20	07:14 19:06	08:08 18:00	08:05 16:09	08:39 15:00
29	08:10 16:56	15:29 (B 01) 17:56	07:10 18:47	06:04 19:42	05:03 21:31	04:55 21:52	05:30 21:21	06:22 20:19	07:16 19:03	08:10 18:00	08:06 16:08	08:40 15:00
30	08:08 16:58	15:30 (B 01) 17:58	07:09 18:49	06:03 19:43	05:01 21:33	04:55 21:50	05:31 21:19	06:24 20:15	07:17 19:01	08:12 18:00	08:08 16:07	08:41 15:00
31	08:07 17:00	15:31 (B 01) 17:59	07:08 18:51	06:02 19:44	05:00 21:34	04:56 21:51	05:33 21:17	06:26 20:13	07:18 19:02	08:14 18:01	08:10 16:07	08:42 15:00
Sonnenscheinstunden astr. max. mögl. Beschattung	2500 694	275	367	419	491	506	509	458	382	329	261	1710

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s58 - Südergellersen, Oerzer Str. 19

## 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	08:34		13:04 (Rep 11)	08:05		15:51 (B 01)	07:09		06:55		05:48		05:00					
	16:11	109	15:20 (Rep 8)	17:01	29	16:20 (B 01)	17:56		19:53		20:47		21:35					
2	08:34		13:05 (Rep 11)	08:03		15:51 (B 01)	07:07		06:53		05:46		04:59					
	16:12	109	15:21 (Rep 8)	17:03	29	16:20 (B 01)	17:58		19:55		20:48		21:36					
3	08:34		13:06 (Rep 11)	08:02		15:52 (B 01)	07:04		06:51		05:44		04:58					
	16:14	108	15:22 (Rep 8)	17:05	29	16:21 (B 01)	18:00		19:56		20:50		21:38					
4	08:33		13:06 (Rep 11)	08:00		15:52 (B 01)	07:02		06:48		05:42		04:57					
	16:15	107	15:21 (Rep 8)	17:07	29	16:21 (B 01)	18:01		19:58		20:52		21:39					
5	08:33		13:07 (Rep 11)	07:58		15:53 (B 01)	07:00		06:46		05:40		04:56					
	16:16	107	15:22 (Rep 8)	17:09	27	16:20 (B 01)	18:03		20:00		20:54		21:40					
6	08:33		13:07 (Rep 11)	07:56		15:53 (B 01)	06:57		06:43		05:38		04:56					
	16:17	107	15:22 (Rep 8)	17:11	27	16:20 (B 01)	18:05		20:02		20:55		21:41					
7	08:32		13:07 (Rep 11)	07:55		15:54 (B 01)	06:55		06:41		05:36		04:55					
	16:19	106	15:22 (Rep 8)	17:13	25	16:19 (B 01)	18:07		20:04		20:57		21:42					
8	08:32		13:09 (Rep 11)	07:53		15:55 (B 01)	06:53		06:39		05:34		04:54					
	16:20	106	15:24 (Rep 8)	17:15	23	16:18 (B 01)	18:09		20:05		20:59		21:43					
9	08:31		13:09 (Rep 11)	07:51		15:56 (B 01)	06:50		06:36		05:32		04:54					
	16:21	104	15:24 (Rep 8)	17:17	21	16:17 (B 01)	18:11		20:07		21:01		21:44					
10	08:31		13:10 (Rep 11)	07:49		15:58 (B 01)	06:48		06:34		05:30		04:53					
	16:23	103	15:24 (Rep 8)	17:19	18	16:16 (B 01)	18:13		20:09		21:02		21:44					
11	08:30		13:10 (Rep 11)	07:47		16:00 (B 01)	06:46		06:32		05:29		04:53					
	16:24	104	15:24 (Rep 8)	17:21	14	16:14 (B 01)	18:15		20:11		21:04		21:45					
12	08:29		13:11 (Rep 11)	07:45		16:05 (B 01)	06:43		06:29		05:27		04:52					
	16:26	101	15:24 (Rep 8)	17:23	5	16:10 (B 01)	18:16		20:13		21:06		21:46					
13	08:29		13:12 (Rep 11)	07:43			06:41		06:27		05:25		04:52					
	16:27	99	15:24 (Rep 8)	17:25			18:18		20:14		21:07		21:47					
14	08:28		13:13 (Rep 11)	07:41			06:39		06:25		05:23		04:52					
	16:29	96	15:24 (Rep 8)	17:27			18:20		20:16		21:09		21:47					
15	08:27		13:14 (Rep 11)	07:39			06:36		06:22		05:22		04:52					
	16:31	93	15:24 (Rep 8)	17:29			18:22		20:18		21:11		21:48					
16	08:26		13:15 (Rep 11)	07:37			06:34		06:20		05:20		04:52					
	16:32	91	15:25 (Rep 8)	17:31			18:24		20:20		21:12		21:48					
17	08:25		13:17 (Rep 11)	07:35			06:31		06:18		05:18		04:51					
	16:34	87	15:25 (Rep 8)	17:33			18:26		20:22		21:14		21:49					
18	08:24		13:18 (Rep 11)	07:33			06:29		06:16		05:17		04:51					
	16:36	85	16:02 (B 01)	17:35			18:27		20:23		21:16		21:49					
19	08:23		13:20 (Rep 11)	07:31			06:27		06:13		05:15		04:51					
	16:37	84	16:04 (B 01)	17:37			18:29		20:25		21:17		21:50					
20	08:22		13:21 (Rep 11)	07:29			06:24		06:11		05:14		04:51					
	16:39	80	16:05 (B 01)	17:39			18:31		20:27		21:19		21:50					
21	08:21		13:24 (Rep 11)	07:27			06:22		06:09		05:13		04:52					
	16:41	74	16:08 (B 01)	17:40			18:33		20:29		21:20		21:50					
22	08:19		13:25 (Rep 11)	07:24			06:19		06:07		05:11		04:52					
	16:43	69	16:09 (B 01)	17:42			18:35		20:31		21:22		21:50					
23	08:18		13:29 (Rep 11)	07:22			06:17		06:04		05:10		04:52					
	16:45	58	16:11 (B 01)	17:44			18:37		20:32		21:23		21:51					
24	08:17		14:40 (Rep 9)	07:20			06:15		06:02		05:08		04:52					
	16:46	32	16:14 (B 01)	17:46			18:38		20:34		21:25		21:51					
25	08:15		15:51 (B 01)	07:18			06:12		06:00		05:07		04:53					
	16:48	25	16:16 (B 01)	17:48			18:40		20:36		21:26		21:51					
26	08:14		15:51 (B 01)	07:16			06:10		05:58		05:06		04:53					
	16:50	26	16:17 (B 01)	17:50			18:42		20:38		21:27		21:51					
27	08:13		15:51 (B 01)	07:13			06:07		05:56		05:05		04:54					
	16:52	28	16:19 (B 01)	17:52			18:44		20:40		21:29		21:51					
28	08:11		15:51 (B 01)	07:11			06:05		05:54		05:04		04:54					
	16:54	28	16:19 (B 01)	17:54			18:46		20:41		21:30		21:51					
29	08:10		15:50 (B 01)				07:02		05:52		05:03		04:55					
	16:56	29	16:19 (B 01)				19:47		20:43		21:31		21:50					
30	08:08		15:51 (B 01)				07:00		05:50		05:01		04:55					
	16:58	29	16:20 (B 01)				19:49		20:45		21:33		21:50					
31	08:07		15:51 (B 01)				06:58				05:00							
	17:00	29	16:20 (B 01)				19:51				21:34							
Sonnenscheinstunden	253			275			367		419		491		506					
astr.max.mögl.Beschattung		2413			276													

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

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

## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s58 - Südergellersen, Oerzer Str. 19

## 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	04:56	05:35	06:27	07:19		07:16	15:27 (B 01)	08:09	12:53 (Rep 11)
	21:50	21:16	20:11	18:58		16:49	19 15:46 (B 01)	16:06	102 15:06 (Rep 8)
2	04:57	05:36	06:29	07:21		07:18	15:26 (B 01)	08:11	12:53 (Rep 11)
	21:49	21:14	20:08	18:56		16:47	21 15:47 (B 01)	16:06	104 15:07 (Rep 8)
3	04:57	05:38	06:31	07:23		07:20	15:25 (B 01)	08:12	12:53 (Rep 11)
	21:49	21:12	20:06	18:54		16:45	23 15:48 (B 01)	16:05	105 15:08 (Rep 8)
4	04:58	05:39	06:32	07:24		07:22	15:24 (B 01)	08:14	12:53 (Rep 11)
	21:49	21:10	20:04	18:51		16:44	25 15:49 (B 01)	16:04	106 15:08 (Rep 8)
5	04:59	05:41	06:34	07:26		07:23	15:23 (B 01)	08:15	12:53 (Rep 11)
	21:48	21:09	20:01	18:49		16:42	27 15:50 (B 01)	16:04	107 15:09 (Rep 8)
6	05:00	05:43	06:36	07:28		07:25	15:22 (B 01)	08:17	12:53 (Rep 11)
	21:47	21:07	19:59	18:46		16:40	28 15:50 (B 01)	16:03	108 15:09 (Rep 8)
7	05:01	05:44	06:38	07:30		07:27	15:22 (B 01)	08:18	12:53 (Rep 11)
	21:47	21:05	19:56	18:44		16:38	29 15:51 (B 01)	16:03	108 15:09 (Rep 8)
8	05:02	05:46	06:39	07:32		07:29	15:22 (B 01)	08:19	12:54 (Rep 11)
	21:46	21:03	19:54	18:42		16:36	29 15:51 (B 01)	16:02	108 15:10 (Rep 8)
9	05:03	05:48	06:41	07:33		07:31	15:22 (B 01)	08:20	12:54 (Rep 11)
	21:45	21:01	19:52	18:39		16:35	29 15:51 (B 01)	16:02	108 15:10 (Rep 8)
10	05:04	05:49	06:43	07:35		07:33	15:21 (B 01)	08:22	12:54 (Rep 11)
	21:45	20:59	19:49	18:37		16:33	30 15:51 (B 01)	16:02	109 15:10 (Rep 8)
11	05:05	05:51	06:44	07:37		07:35	15:22 (B 01)	08:23	12:54 (Rep 11)
	21:44	20:57	19:47	18:35		16:31	29 15:51 (B 01)	16:02	109 15:10 (Rep 8)
12	05:06	05:53	06:46	07:39		07:37	15:22 (B 01)	08:24	12:55 (Rep 11)
	21:43	20:55	19:44	18:32		16:30	29 15:51 (B 01)	16:01	109 15:11 (Rep 8)
13	05:07	05:55	06:48	07:41		07:38	15:22 (B 01)	08:25	11:13 (Oerzen 1)
	21:42	20:53	19:42	18:30		16:28	29 15:51 (B 01)	16:01	116 15:12 (Rep 8)
14	05:08	05:56	06:50	07:42		07:40	15:22 (B 01)	08:26	11:12 (Oerzen 1)
	21:41	20:51	19:40	18:28		16:26	29 15:51 (B 01)	16:01	119 15:12 (Rep 8)
15	05:10	05:58	06:51	07:44		07:42	15:24 (B 01)	08:27	11:12 (Oerzen 1)
	21:40	20:49	19:37	18:26		16:25	28 15:52 (B 01)	16:01	120 15:12 (Rep 8)
16	05:11	06:00	06:53	07:46		07:44	15:25 (B 01)	08:28	11:11 (Oerzen 1)
	21:39	20:47	19:35	18:23		16:23	26 15:51 (B 01)	16:01	122 15:12 (Rep 8)
17	05:12	06:01	06:55	07:48		07:46	15:25 (B 01)	08:28	11:11 (Oerzen 1)
	21:38	20:44	19:32	18:21		16:22	24 15:49 (B 01)	16:02	123 15:12 (Rep 8)
18	05:14	06:03	06:57	07:50		07:48	14:14 (Rep 9)	08:29	11:11 (Oerzen 1)
	21:36	20:42	19:30	18:19		16:20	32 15:48 (B 01)	16:02	123 15:13 (Rep 8)
19	05:15	06:05	06:58	07:51		07:49	13:03 (Rep 11)	08:30	11:11 (Oerzen 1)
	21:35	20:40	19:27	18:17		16:19	58 15:45 (B 01)	16:02	124 15:14 (Rep 8)
20	05:16	06:07	07:00	07:53		07:51	13:00 (Rep 11)	08:31	11:11 (Oerzen 1)
	21:34	20:38	19:25	18:14		16:18	69 15:44 (B 01)	16:02	125 15:14 (Rep 8)
21	05:18	06:08	07:02	07:55		07:53	12:59 (Rep 11)	08:31	11:12 (Oerzen 1)
	21:33	20:36	19:23	18:12		16:16	74 15:43 (B 01)	16:03	126 15:15 (Rep 8)
22	05:19	06:10	07:03	07:57		07:55	12:57 (Rep 11)	08:32	11:12 (Oerzen 1)
	21:31	20:34	19:20	18:10		16:15	80 15:41 (B 01)	16:03	126 15:15 (Rep 8)
23	05:21	06:12	07:05	07:59		07:56	12:56 (Rep 11)	08:32	11:13 (Oerzen 1)
	21:30	20:31	19:18	18:08		16:14	84 15:40 (B 01)	16:04	126 15:16 (Rep 8)
24	05:22	06:13	07:07	08:01		07:58	12:55 (Rep 11)	08:33	11:13 (Oerzen 1)
	21:29	20:29	19:15	18:06		16:13	86 15:39 (B 01)	16:04	124 15:16 (Rep 8)
25	05:24	06:15	07:09	07:03		08:00	12:55 (Rep 11)	08:33	11:14 (Oerzen 1)
	21:27	20:27	19:13	17:04		16:12	86 15:03 (Rep 8)	16:05	123 15:16 (Rep 8)
26	05:25	06:17	07:10	07:05		08:02	12:55 (Rep 11)	08:33	11:14 (Oerzen 1)
	21:26	20:25	19:10	17:01		16:11	90 15:04 (Rep 8)	16:06	123 15:16 (Rep 8)
27	05:27	06:19	07:12	07:06		08:03	12:54 (Rep 11)	08:34	11:16 (Oerzen 1)
	21:24	20:22	19:08	16:59		16:10	94 15:05 (Rep 8)	16:06	123 15:18 (Rep 8)
28	05:28	06:20	07:14	07:08		08:05	12:53 (Rep 11)	08:34	11:17 (Oerzen 1)
	21:22	20:20	19:06	16:57		16:09	95 15:04 (Rep 8)	16:07	121 15:18 (Rep 8)
29	05:30	06:22	07:16	07:10		08:06	12:53 (Rep 11)	08:34	11:18 (Oerzen 1)
	21:21	20:18	19:03	16:55		16:08	99 15:05 (Rep 8)	16:08	119 15:19 (Rep 8)
30	05:31	06:24	07:17	07:12	15:33 (B 01)	08:08	12:53 (Rep 11)	08:34	11:20 (Oerzen 1)
	21:19	20:15	19:01	16:53	8 15:41 (B 01)	16:07	101 15:06 (Rep 8)	16:09	117 15:19 (Rep 8)
31	05:33	06:26		07:14	15:30 (B 01)			08:34	11:22 (Oerzen 1)
	21:17	20:13		16:51	14 15:44 (B 01)			16:10	112 15:19 (Rep 8)
Sonnenscheinstunden	509	458	382	329		261		237	
astr.max.mögl.Beschattung				22		1502		3595	

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s59 - Südergellersen, Poggenpohl 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	08:34	12:32 (Rep 11)   08:05	15:33 (B 01)   07:09	06:55	05:48	05:00
	16:11	104 15:35 (B 01)   17:01	18 15:51 (B 01)   17:56	19:53	20:47	21:35
2	08:34	12:34 (Rep 11)   08:03	15:36 (B 01)   07:07	06:53	05:46	04:59
	16:12	103 15:36 (B 01)   17:03	12 15:48 (B 01)   17:58	19:55	20:48	21:36
3	08:34	12:35 (Rep 11)   08:02	15:41 (B 01)   07:04	06:51	05:44	04:58
	16:14	102 15:38 (B 01)   17:05	3 15:44 (B 01)   18:00	19:56	20:50	21:38
4	08:33	12:35 (Rep 11)   08:00	07:02	06:48	05:42	04:57
	16:15	102 15:38 (B 01)   17:07	18:02	19:58	20:52	21:39
5	08:33	12:37 (Rep 11)   07:58	07:00	06:46	05:40	04:56
	16:16	98 15:40 (B 01)   17:09	18:03	20:00	20:54	21:40
6	08:33	12:37 (Rep 11)   07:56	06:57	06:43	05:38	04:56
	16:17	99 15:41 (B 01)   17:11	18:05	20:02	20:55	21:41
7	08:32	12:38 (Rep 11)   07:55	06:55	06:41	05:36	04:55
	16:19	96 15:42 (B 01)   17:13	18:07	20:04	20:57	21:42
8	08:32	12:40 (Rep 11)   07:53	06:53	06:39	05:34	04:54
	16:20	93 15:44 (B 01)   17:15	18:09	20:05	20:59	21:43
9	08:31	12:41 (Rep 11)   07:51	06:50	06:36	05:32	04:54
	16:21	91 15:46 (B 01)   17:17	18:11	20:07	21:01	21:44
10	08:31	12:42 (Rep 11)   07:49	06:48	06:34	05:30	04:53
	16:23	86 15:47 (B 01)   17:19	18:13	20:09	21:02	21:44
11	08:30	12:44 (Rep 11)   07:47	06:46	06:32	05:29	04:53
	16:24	81 15:49 (B 01)   17:21	18:15	20:11	21:04	21:45
12	08:29	12:46 (Rep 11)   07:45	06:43	06:29	05:27	04:52
	16:26	75 15:50 (B 01)   17:23	18:16	20:13	21:06	21:46
13	08:29	12:48 (Rep 11)   07:43	06:41	06:27	05:25	04:52
	16:27	63 15:51 (B 01)   17:25	18:18	20:14	21:07	21:47
14	08:28	12:52 (Rep 11)   07:41	06:39	06:25	05:23	04:52
	16:29	42 15:52 (B 01)   17:27	18:20	20:16	21:09	21:47
15	08:27	15:22 (B 01)   07:39	06:36	06:22	05:22	04:52
	16:31	31 15:53 (B 01)   17:29	18:22	20:18	21:11	21:48
16	08:26	15:22 (B 01)   07:37	06:34	06:20	05:20	04:52
	16:32	31 15:53 (B 01)   17:31	18:24	20:20	21:12	21:48
17	08:25	15:22 (B 01)   07:35	06:31	06:18	05:18	04:51
	16:34	32 15:54 (B 01)   17:33	18:26	20:22	21:14	21:49
18	08:24	15:23 (B 01)   07:33	06:29	06:16	05:17	04:51
	16:36	32 15:55 (B 01)   17:35	18:27	20:23	21:16	21:49
19	08:23	15:23 (B 01)   07:31	06:27	06:13	05:15	04:51
	16:37	32 15:55 (B 01)   17:37	18:29	20:25	21:17	21:50
20	08:22	15:23 (B 01)   07:29	06:24	06:11	05:14	04:51
	16:39	32 15:55 (B 01)   17:39	18:31	20:27	21:19	21:50
21	08:21	15:24 (B 01)   07:27	06:22	06:09	05:13	04:52
	16:41	31 15:55 (B 01)   17:41	18:33	20:29	21:20	21:50
22	08:19	15:24 (B 01)   07:24	06:19	06:07	05:11	04:52
	16:43	31 15:55 (B 01)   17:42	18:35	20:31	21:22	21:50
23	08:18	15:25 (B 01)   07:22	06:17	06:04	05:10	04:52
	16:45	31 15:56 (B 01)   17:44	18:37	20:32	21:23	21:51
24	08:17	15:26 (B 01)   07:20	06:15	06:02	05:08	04:52
	16:46	30 15:56 (B 01)   17:46	18:38	20:34	21:25	21:51
25	08:16	15:26 (B 01)   07:18	06:12	06:00	05:07	04:53
	16:48	30 15:56 (B 01)   17:48	18:40	20:36	21:26	21:51
26	08:14	15:26 (B 01)   07:16	06:10	05:58	05:06	04:53
	16:50	29 15:55 (B 01)   17:50	18:42	20:38	21:27	21:51
27	08:13	15:27 (B 01)   07:13	06:07	05:56	05:05	04:54
	16:52	28 15:55 (B 01)   17:52	18:44	20:40	21:29	21:51
28	08:11	15:28 (B 01)   07:11	06:05	05:54	05:04	04:54
	16:54	26 15:54 (B 01)   17:54	18:46	20:41	21:30	21:51
29	08:10	15:29 (B 01)	07:02	05:52	05:03	04:55
	16:56	25 15:54 (B 01)	19:47	20:43	21:31	21:50
30	08:08	15:31 (B 01)	07:00	05:50	05:01	04:55
	16:58	22 15:53 (B 01)	19:49	20:45	21:33	21:50
31	08:07	15:32 (B 01)	06:58		05:00	
	17:00	20 15:52 (B 01)	19:51		21:34	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	1728	33				

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

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

## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s59 - Südergellersen, Poggenpohl 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	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	07:16 16:49	08:10 16:06 80
2	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	07:18 16:47	08:11 16:06 86
3	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	07:20 16:45	08:12 16:05 91
4	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	07:22 16:44	08:14 16:04 94
5	04:59 21:48	05:41 21:09	06:34 20:01	07:26 18:49	07:23 16:42	08:15 16:04 96
6	05:00 21:47	05:43 21:07	06:36 19:59	07:28 18:46	07:25 16:40	08:17 16:03 99
7	05:01 21:47	05:44 21:05	06:38 19:56	07:30 18:44	07:27 16:38	08:18 16:03 98
8	05:02 21:46	05:46 21:03	06:39 19:54	07:32 18:42	07:29 16:36	08:19 16:02 103
9	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	07:31 16:35	08:20 16:02 102
10	05:04 21:45	05:49 20:59	06:43 19:49	07:35 18:37	07:33 16:33	08:22 16:02 103
11	05:05 21:44	05:51 20:57	06:44 19:47	07:37 18:35	07:35 16:31	08:23 16:02 103
12	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	07:37 16:30	08:24 16:01 104
13	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	07:38 16:28	08:25 16:01 105
14	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	07:40 16:26	08:26 16:01 105
15	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	07:42 16:25	08:27 16:01 105
16	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	07:44 16:23	08:28 16:01 104
17	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	07:46 16:22	08:28 16:02 104
18	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	07:48 16:20	08:29 16:02 106
19	05:15 21:35	06:05 20:40	06:58 19:27	07:52 18:17	07:49 16:19	08:30 16:02 109
20	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	07:51 16:18	08:31 16:02 109
21	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	07:53 16:16	08:31 16:03 111
22	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	07:55 16:15	08:32 16:03 111
23	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	07:56 16:14	08:32 16:04 111
24	05:22 21:29	06:13 20:29	07:07 19:15	08:01 18:06	07:58 16:13	08:33 16:04 109
25	05:24 21:27	06:15 20:27	07:09 19:13	08:03 17:04	08:00 16:12	08:33 16:05 108
26	05:25 21:26	06:17 20:25	07:10 19:10	08:05 17:01	08:02 16:11	08:33 16:06 103
27	05:27 21:24	06:19 20:22	07:12 19:08	08:07 16:59	08:03 16:10	08:34 16:06 105
28	05:28 21:22	06:20 20:20	07:14 19:06	08:08 16:57	08:05 16:09	08:34 16:07 104
29	05:30 21:21	06:22 20:18	07:16 19:03	08:10 16:55	08:06 16:08	08:34 16:08 104
30	05:31 21:19	06:24 20:15	07:17 19:01	08:12 16:53	08:08 16:07	08:34 16:09 105
31	05:33 21:17	06:26 20:13		07:14 16:51		08:34 16:10 103
Sonnenscheinstunden	509	458	382	329	261	237
astr.max.mögl.Beschattung					704	3180

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

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



Projekt:

Süderheide

Lizenzierter Anwender:

SOWIWAS - Energie GmbH

Watenstedter Straße 11

DE-38384 Gevensleben

+49 0 53 54 / 99 06 - 235

/ gutachten@sowiwas.de

Berechnet:

21.07.2025 15:59/4.1.287

## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s60 - Südergellersen, Poggenpohl 8

## 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	Juli	August	September	Oktober	November	Dezember
1	08:34 12:12 (Rep 11) 16:11 49	08:05 17:01 17:56	07:09 17:56 19:53	06:55 19:53 20:47	05:48 20:47 21:35	05:00 21:35 21:50	04:56 21:50 21:16	05:35 21:16 20:11	06:27 20:11 18:58	07:19 18:58 16:49	07:16 16:49 15:07 (B 01)	08:10 15:07 (B 01) 14:37 (B 01)
2	08:34 12:14 (Rep 11) 16:12 47	08:03 17:03 17:58	07:07 17:58 19:55	06:53 19:55 20:48	05:46 20:48 21:36	04:59 21:36 21:49	04:57 21:49 21:14	05:36 21:14 20:08	06:29 20:08 18:56	07:21 18:56 16:47	07:18 16:47 15:08 (B 01)	08:11 15:08 (B 01) 14:38 (B 01)
3	08:34 12:16 (Rep 11) 16:14 44	08:02 17:05 18:00	07:04 18:00 19:56	06:51 19:56 20:50	05:44 20:50 21:38	04:58 21:38 21:49	04:57 21:49 21:12	05:38 21:12 20:06	06:31 20:06 18:54	07:23 18:54 16:45	07:20 16:45 15:09 (B 01)	08:12 15:09 (B 01) 14:37 (B 01)
4	08:33 12:19 (Rep 11) 16:15 38	08:00 17:07 18:02	07:02 18:02 19:58	06:48 19:58 20:52	05:42 20:52 21:39	04:57 21:39 21:49	04:58 21:49 21:10	05:39 21:10 20:04	06:32 20:04 18:51	07:24 18:51 16:44	07:22 16:44 15:09 (B 01)	08:14 15:09 (B 01) 14:37 (B 01)
5	08:33 12:21 (Rep 11) 16:16 32	07:58 17:09 18:03	07:00 18:03 19:58	06:46 19:58 20:54	05:40 20:54 21:40	04:56 21:40 21:48	04:59 21:48 21:09	05:41 21:09 20:01	06:34 20:01 18:49	07:26 18:49 16:42	07:23 16:42 15:10 (B 01)	08:15 15:10 (B 01) 14:38 (B 01)
6	08:33 12:23 (Rep 11) 16:17 32	07:56 17:11 18:05	06:57 18:05 19:55	06:43 19:55 20:55	05:38 20:55 21:41	04:56 21:41 21:47	05:00 21:47 21:07	05:43 21:07 20:01	06:36 20:01 18:46	07:28 18:46 16:40	07:25 16:40 15:10 (B 01)	08:17 15:10 (B 01) 14:38 (B 01)
7	08:32 12:25 (Rep 11) 16:19 32	07:55 17:13 18:07	06:55 18:07 19:55	06:41 19:55 20:57	05:36 20:57 21:42	04:55 21:42 21:47	05:01 21:47 21:05	05:44 21:05 20:01	06:38 20:01 18:44	07:30 18:44 16:38	07:27 16:38 15:10 (B 01)	08:18 15:10 (B 01) 14:37 (B 01)
8	08:32 12:27 (Rep 11) 16:20 31	07:53 17:15 18:09	06:53 18:09 19:55	06:39 19:55 20:59	05:34 20:59 21:43	04:54 21:43 21:46	05:02 21:46 21:03	05:46 21:03 20:01	06:41 20:01 18:42	07:32 18:42 16:36	07:29 16:36 15:12 (B 01)	08:19 15:12 (B 01) 14:37 (B 01)
9	08:31 12:29 (Rep 11) 16:21 31	07:51 17:17 18:11	06:50 18:11 19:55	06:36 19:55 20:59	05:32 20:59 21:43	04:54 21:43 21:46	05:03 21:46 21:03	05:48 21:03 20:01	06:41 20:01 18:42	07:33 18:42 16:35	07:31 16:35 15:12 (B 01)	08:20 15:12 (B 01) 14:37 (B 01)
10	08:31 12:31 (Rep 11) 16:22 31	07:49 17:19 18:13	06:48 18:13 19:55	06:34 19:55 20:59	05:30 20:59 21:44	04:53 21:44 21:46	05:04 21:46 21:03	05:49 21:03 20:01	06:43 20:01 18:39	07:35 18:39 16:33	07:33 16:33 15:12 (B 01)	08:22 15:12 (B 01) 14:37 (B 01)
11	08:30 12:33 (Rep 11) 16:24 31	07:47 17:21 18:15	06:46 18:15 19:55	06:32 19:55 20:59	05:29 20:59 21:44	04:53 21:44 21:46	05:05 21:46 21:03	05:51 21:03 20:01	06:44 20:01 18:35	07:37 18:35 16:31	07:35 16:31 15:12 (B 01)	08:23 15:12 (B 01) 14:37 (B 01)
12	08:29 12:35 (Rep 11) 16:26 30	07:45 17:23 18:16	06:43 18:16 19:55	06:29 19:55 20:59	05:27 20:59 21:44	04:52 21:44 21:46	05:06 21:46 21:03	05:53 21:03 20:01	06:46 20:01 18:32	07:39 18:32 16:30	07:37 16:30 15:13 (B 01)	08:24 15:13 (B 01) 14:37 (B 01)
13	08:29 12:37 (Rep 11) 16:27 29	07:43 17:25 18:18	06:41 18:18 19:55	06:27 19:55 20:59	05:25 20:59 21:44	04:52 21:44 21:46	05:07 21:46 21:03	05:55 21:03 20:01	06:48 20:01 18:30	07:41 18:30 16:28	07:38 16:28 15:14 (B 01)	08:25 15:14 (B 01) 14:37 (B 01)
14	08:28 12:39 (Rep 11) 16:28 29	07:41 17:27 18:20	06:39 18:20 19:55	06:25 19:55 20:59	05:23 20:59 21:44	04:52 21:44 21:46	05:08 21:46 21:03	05:56 21:03 20:01	06:50 20:01 18:28	07:42 18:28 16:26	07:40 16:26 15:14 (B 01)	08:26 15:14 (B 01) 14:37 (B 01)
15	08:27 12:41 (Rep 11) 16:31 28	07:39 17:29 18:22	06:36 18:22 19:55	06:22 19:55 20:59	05:22 20:59 21:44	04:52 21:44 21:46	05:10 21:46 21:03	05:58 21:03 20:01	06:51 20:01 18:26	07:44 18:26 16:25	07:42 16:25 15:15 (B 01)	08:27 15:15 (B 01) 14:37 (B 01)
16	08:26 12:43 (Rep 11) 16:32 27	07:37 17:31 18:24	06:34 18:24 19:55	06:20 19:55 20:59	05:20 20:59 21:44	04:52 21:44 21:46	05:11 21:46 21:03	06:00 21:03 20:01	06:53 20:01 18:23	07:46 18:23 16:23	07:44 16:23 15:15 (B 01)	08:28 15:15 (B 01) 14:37 (B 01)
17	08:25 12:45 (Rep 11) 16:34 25	07:35 17:33 18:26	06:31 18:26 19:55	06:18 19:55 20:59	05:19 20:59 21:44	04:51 21:44 21:46	05:12 21:46 21:03	06:01 21:03 20:01	06:55 20:01 18:21	07:48 18:21 16:22	07:46 16:22 15:16 (B 01)	08:29 15:16 (B 01) 14:37 (B 01)
18	08:24 12:47 (Rep 11) 16:36 24	07:33 17:35 18:27	06:29 18:27 19:55	06:16 19:55 20:59	05:17 20:59 21:44	04:51 21:44 21:46	05:14 21:46 21:03	06:03 21:03 20:01	06:57 20:01 18:19	07:50 18:19 16:20	07:48 16:20 15:16 (B 01)	08:30 15:16 (B 01) 14:37 (B 01)
19	08:23 12:49 (Rep 11) 16:37 23	07:31 17:37 18:29	06:27 18:29 19:55	06:13 19:55 20:59	05:15 20:59 21:44	04:51 21:44 21:46	05:15 21:46 21:03	06:05 21:03 20:01	06:58 20:01 18:17	07:52 18:17 16:19	07:49 16:19 15:17 (B 01)	08:31 15:17 (B 01) 14:37 (B 01)
20	08:22 12:51 (Rep 11) 16:39 20	07:29 17:39 18:31	06:24 18:31 19:55	06:11 19:55 20:59	05:14 20:59 21:44	04:51 21:44 21:46	05:16 21:46 21:03	06:07 21:03 20:01	07:00 20:01 18:14	07:53 18:14 16:18	07:51 16:18 15:17 (B 01)	08:32 15:17 (B 01) 14:37 (B 01)
21	08:21 12:53 (Rep 11) 16:41 18	07:27 17:41 18:33	06:22 18:33 19:55	06:09 19:55 20:59	05:13 20:59 21:44	04:52 21:44 21:46	05:18 21:46 21:03	06:08 21:03 20:01	07:02 20:01 18:12	07:55 18:12 16:17	07:53 16:17 15:18 (B 01)	08:33 15:18 (B 01) 14:37 (B 01)
22	08:19 12:55 (Rep 11) 16:43 14	07:24 17:42 18:35	06:19 18:35 19:55	06:07 19:55 20:59	05:11 20:59 21:44	04:52 21:44 21:46	05:19 21:46 21:03	06:10 21:03 20:01	07:03 20:01 18:10	07:57 18:10 16:15	07:55 16:15 15:19 (B 01)	08:34 15:19 (B 01) 14:37 (B 01)
23	08:18 12:57 (Rep 11) 16:45 9	07:22 17:44 18:37	06:17 18:37 19:55	06:04 19:55 20:59	05:10 20:59 21:44	04:52 21:44 21:46	05:21 21:46 21:03	06:12 21:03 20:01	07:05 20:01 18:08	07:59 18:08 16:14	07:56 16:14 15:20 (B 01)	08:35 15:20 (B 01) 14:37 (B 01)
24	08:17 12:59 (Rep 11) 16:46 9	07:20 17:46 18:39	06:15 18:39 19:55	06:02 19:55 20:59	05:08 20:59 21:44	04:52 21:44 21:46	05:22 21:46 21:03	06:13 21:03 20:01	07:07 20:01 18:06	08:01 18:06 16:13	07:58 16:13 15:21 (B 01)	08:36 15:21 (B 01) 14:37 (B 01)
25	08:16 13:01 (Rep 11) 16:48 16	07:18 17:48 18:40	06:12 18:40 19:55	06:00 19:55 20:59	05:07 20:59 21:44	04:53 21:44 21:46	05:24 21:46 21:03	06:15 21:03 20:01	07:09 20:01 18:04	08:03 18:04 16:12	07:59 16:12 15:22 (B 01)	08:37 15:22 (B 01) 14:37 (B 01)
26	08:14 13:03 (Rep 11) 16:50 16	07:16 17:50 18:42	06:10 18:42 19:55	05:58 19:55 20:59	05:06 20:59 21:44	04:53 21:44 21:46	05:25 21:46 21:03	06:17 21:03 20:01	07:10 20:01 18:01	08:02 18:01 16:11	08:00 16:11 15:23 (B 01)	08:38 15:23 (B 01) 14:37 (B 01)
27	08:13 13:05 (Rep 11) 16:52 17	07:13 17:52 18:44	06:07 18:44 19:55	05:56 19:55 20:59	05:05 20:59 21:44	04:54 21:44 21:46	05:27 21:46 21:03	06:19 21:03 20:01	07:12 20:01 18:00	08:03 18:00 16:10	08:03 16:10 15:24 (B 01)	08:39 15:24 (B 01) 14:37 (B 01)
28	08:11 13:07 (Rep 11) 16:54 17	07:11 17:54 18:46	06:05 18:46 19:55	05:54 19:55 20:59	05:04 20:59 21:44	04:54 21:44 21:46	05:28 21:46 21:03	06:20 21:03 20:01	07:14 20:01 18:00	08:05 18:00 16:09	08:05 16:09 15:25 (B 01)	08:40 15:25 (B 01) 14:37 (B 01)
29	08:10 13:09 (Rep 11) 16:56 16	07:09 17:57 18:48	06:04 18:48 19:55	05:53 19:55 20:59	05:03 20:59 21:44	04:55 21:44 21:46	05:30 21:46 21:03	06:22 21:03 20:01	07:16 20:01 18:00	08:06 18:00 16:08	08:06 16:08 15:26 (B 01)	08:41 15:26 (B 01) 14:37 (B 01)
30	08:08 13:11 (Rep 11) 16:58 16	07:07 17:59 18:50	06:03 18:50 19:55	05:52 19:55 20:59	05:02 20:59 21:44	04:55 21:44 21:46	05:31 21:46 21:03	06:24 21:03 20:01	07:17 20:01 18:00	08:07 18:00 16:07	08:07 16:07 15:27 (B 01)	08:42 15:27 (B 01) 14:37 (B 01)
31	08:07 13:13 (Rep 11) 17:00 15	07:06 18:01 18:51	06:02 18:51 19:55	05:51 19:55 20:59	05:01 20:59 21:44	04:55 21:44 21:46	05:33 21:46 21:03	06:26 21:03 20:01	07:18 20:01 18:00	08:08 18:00 16:07	08:08 16:07 15:28 (B 01)	08:43 15:28 (B 01) 14:37 (B 01)
Sonnenscheinstunden 253												
astr. max. mögl. Beschattung 675												

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

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

## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s61 - Südergellersen, Schwarzer Weg 2

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10
	16:11	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06
2	08:34	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11
	16:12	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06
3	08:34	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12
	16:14	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05
4	08:34	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14
	16:15	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04
5	08:33	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15
	16:16	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04
6	08:33	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17
	16:17	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03
7	08:32	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18
	16:19	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:57	18:44	16:38	16:03
8	08:32	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19
	16:20	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02
9	08:31	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20
	16:21	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02
10	08:31	07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33	08:22
	16:23	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02
11	08:30	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:45	07:37	07:35	08:23
	16:24	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02
12	08:29	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24
	16:26	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01
13	08:29	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25
	16:27	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01
14	08:28	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26
	16:29	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01
15	08:27	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27
	16:31	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01
16	08:26	07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28
	16:32	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01
17	08:25	07:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	07:46	08:29
	16:34	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02
18	08:24	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29
	16:36	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02
19	08:23	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30
	16:37	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02
20	08:22	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31
	16:39	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02
21	08:21	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31
	16:41	17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17	16:03
22	08:19	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32
	16:43	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03
23	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32
	16:45	17:44	18:37	20:32	21:23	21:52	21:30	20:31	19:18	18:08	16:14	16:04
24	08:17	07:20	06:15	06:02	05:08	04:52	05:22	06:14	07:07	08:01	07:58	08:33
	16:46	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04
25	08:16	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	08:03	08:00	08:33
	16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	18:04	16:12	16:05
26	08:14	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	08:05	08:02	08:33
	16:50	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	18:01	16:11	16:06
27	08:13	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	08:06	08:03	08:34
	16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	18:00	16:10	16:06
28	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	08:08	08:05	08:34
	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	18:00	16:09	16:07
29	08:10		07:03	05:52	05:03	04:55	05:30	06:22	07:16	08:10	08:06	08:34
	16:56		19:47	20:43	21:32	21:50	21:21	20:18	19:03	18:00	16:08	16:08
30	08:08		07:00	05:50	05:01	04:55	05:31	06:24	07:17	08:12	08:08	08:34
	16:58		19:49	20:45	21:33	21:50	21:19	20:15	19:01	18:00	16:07	16:09
31	08:07		06:58		05:00		05:33	06:26		07:14		08:34
	17:00		19:51		21:34		21:17	20:13		18:01		16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s62 - Südergellersen, Schwarzer Weg 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	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11	08:05 17:01	07:09 17:56	06:55 19:53	05:48 20:47	05:00 21:35	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	07:16 16:49	08:10 16:06
2	08:34 16:12	08:03 17:03	07:07 17:58	06:53 19:55	05:46 20:48	04:59 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	07:18 16:47	08:11 16:06
3	08:34 16:14	08:02 17:05	07:04 18:00	06:51 19:56	05:44 20:50	04:58 21:38	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	07:20 16:45	08:12 16:05
4	08:34 16:15	08:00 17:07	07:02 18:02	06:48 19:58	05:42 20:52	04:57 21:39	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	07:22 16:44	08:14 16:04
5	08:33 16:16	07:58 17:09	07:00 18:03	06:46 20:00	05:40 20:54	04:56 21:40	04:59 21:48	05:41 21:09	06:34 20:01	07:26 18:49	07:23 16:42	08:15 16:04
6	08:33 16:17	07:56 17:11	06:57 18:05	06:43 20:02	05:38 20:55	04:56 21:41	05:00 21:48	05:43 21:07	06:36 19:59	07:28 18:46	07:25 16:40	08:17 16:03
7	08:32 16:19	07:55 17:13	06:55 18:07	06:41 20:04	05:36 20:57	04:55 21:42	05:01 21:47	05:44 21:05	06:38 19:57	07:30 18:44	07:27 16:38	08:18 16:03
8	08:32 16:20	07:53 17:15	06:53 18:09	06:39 20:05	05:34 20:59	04:54 21:43	05:02 21:46	05:46 21:03	06:39 19:54	07:32 18:42	07:29 16:36	08:19 16:02
9	08:31 16:21	07:51 17:17	06:50 18:11	06:36 20:07	05:32 21:01	04:54 21:44	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	07:31 16:35	08:20 16:02
10	08:31 16:23	07:49 17:19	06:48 18:13	06:34 20:09	05:30 21:02	04:53 21:44	05:04 21:45	05:50 20:59	06:43 19:49	07:35 18:37	07:33 16:33	08:22 16:02
11	08:30 16:24	07:47 17:21	06:46 18:15	06:32 20:11	05:29 21:04	04:53 21:45	05:05 21:44	05:51 20:57	06:45 19:47	07:37 18:35	07:35 16:31	08:23 16:02
12	08:29 16:26	07:45 17:23	06:43 18:16	06:29 20:13	05:27 21:06	04:52 21:46	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	07:37 16:30	08:24 16:01
13	08:29 16:27	07:43 17:25	06:41 18:18	06:27 20:14	05:25 21:07	04:52 21:47	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	07:39 16:28	08:25 16:01
14	08:28 16:29	07:41 17:27	06:39 18:20	06:25 20:16	05:23 21:09	04:52 21:47	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	07:40 16:26	08:26 16:01
15	08:27 16:31	07:39 17:29	06:36 18:22	06:22 20:18	05:22 21:11	04:52 21:48	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	07:42 16:25	08:27 16:01
16	08:26 16:32	07:37 17:31	06:34 18:24	06:20 20:20	05:20 21:12	04:52 21:48	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	07:44 16:23	08:28 16:01
17	08:25 16:34	07:35 17:33	06:31 18:26	06:18 20:22	05:19 21:14	04:51 21:49	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	07:46 16:22	08:29 16:02
18	08:24 16:36	07:33 17:35	06:29 18:27	06:16 20:23	05:17 21:16	04:51 21:49	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	07:48 16:20	08:29 16:02
19	08:23 16:37	07:31 17:37	06:27 18:29	06:13 20:25	05:15 21:17	04:51 21:50	05:15 21:35	06:05 20:40	06:58 19:27	07:52 18:17	07:49 16:19	08:30 16:02
20	08:22 16:39	07:29 17:39	06:24 18:31	06:11 20:27	05:14 21:19	04:51 21:50	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	07:51 16:18	08:31 16:02
21	08:21 16:41	07:27 17:41	06:22 18:33	06:09 20:29	05:13 21:20	04:52 21:50	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	07:53 16:17	08:31 16:03
22	08:19 16:43	07:24 17:42	06:19 18:35	06:07 20:31	05:11 21:22	04:52 21:50	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	07:55 16:15	08:32 16:03
23	08:18 16:45	07:22 17:44	06:17 18:37	06:04 20:32	05:10 21:23	04:52 21:51	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	07:57 16:14	08:32 16:04
24	08:17 16:46	07:20 17:46	06:15 18:38	06:02 20:34	05:08 21:25	04:52 21:51	05:22 21:29	06:13 20:29	07:07 19:15	08:01 18:06	07:58 16:13	08:33 16:04
25	08:16 16:48	07:18 17:48	06:12 18:40	06:00 20:36	05:07 21:26	04:53 21:51	05:24 21:27	06:15 20:27	07:09 19:13	07:03 17:04	08:00 16:12	08:33 16:05
26	08:14 16:50	07:16 17:50	06:10 18:42	05:58 20:38	05:06 21:27	04:53 21:51	05:25 21:26	06:17 20:25	07:10 19:10	07:05 17:01	08:02 16:11	08:33 16:06
27	08:13 16:52	07:13 17:52	06:07 18:44	05:56 20:40	05:05 21:29	04:54 21:51	05:27 21:24	06:19 20:22	07:12 19:08	07:06 16:59	08:03 16:10	08:34 16:06
28	08:11 16:54	07:11 17:54	06:05 18:46	05:54 20:41	05:04 21:30	04:54 21:51	05:28 21:22	06:20 20:20	07:14 19:06	07:08 16:57	08:05 16:09	08:34 16:07
29	08:10 16:56		07:03 19:47	05:52 20:43	05:03 21:32	04:55 21:50	05:30 21:21	06:22 20:18	07:16 19:03	07:10 16:55	08:06 16:08	08:34 16:08
30	08:08 16:58		07:00 19:49	05:50 20:45	05:01 21:33	04:55 21:50	05:31 21:19	06:24 20:15	07:17 19:01	07:12 16:53	08:08 16:07	08:34 16:09
31	08:07 17:00		06:58 19:51		05:00 21:34		05:33 21:17	06:26 20:13		07:14 16:51		08:34 16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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

## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s63 - Südergellersen, Westergellersen Weg 1

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11	08:05 17:01	07:09 17:56	06:55 19:53	05:48 20:47	05:00 21:35	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	07:16 16:49	08:10 16:06
2	08:34 16:12	08:03 17:03	07:07 17:58	06:53 19:55	05:46 20:48	04:59 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	07:18 16:47	08:11 16:06
3	08:34 16:14	08:02 17:05	07:04 18:00	06:51 19:56	05:44 20:50	04:58 21:38	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	07:20 16:45	08:12 16:05
4	08:34 16:15	08:00 17:07	07:02 18:02	06:48 19:58	05:42 20:52	04:57 21:39	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	07:22 16:44	08:14 16:04
5	08:33 16:16	07:58 17:09	07:00 18:03	06:46 20:00	05:40 20:54	04:56 21:40	04:59 21:48	05:41 21:09	06:34 20:01	07:26 18:49	07:23 16:42	08:15 16:04
6	08:33 16:17	07:56 17:11	06:57 18:05	06:43 20:02	05:38 20:55	04:56 21:41	05:00 21:47	05:43 21:07	06:36 19:59	07:28 18:46	07:25 16:40	08:17 16:03
7	08:32 16:19	07:55 17:13	06:55 18:07	06:41 20:04	05:36 20:57	04:55 21:42	05:01 21:47	05:44 21:05	06:38 19:56	07:30 18:44	07:27 16:38	08:18 16:03
8	08:32 16:20	07:53 17:15	06:53 18:09	06:39 20:05	05:34 20:59	04:54 21:43	05:02 21:46	05:46 21:03	06:39 19:54	07:32 18:42	07:29 16:36	08:19 16:02
9	08:31 16:21	07:51 17:17	06:50 18:11	06:36 20:07	05:32 21:01	04:54 21:44	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	07:31 16:35	08:20 16:02
10	08:31 16:23	07:49 17:19	06:48 18:13	06:34 20:09	05:30 21:02	04:53 21:44	05:04 21:45	05:49 20:59	06:43 19:49	07:35 18:37	07:33 16:33	08:22 16:02
11	08:30 16:24	07:47 17:21	06:46 18:15	06:32 20:11	05:29 21:04	04:53 21:45	05:05 21:44	05:51 20:57	06:44 19:47	07:37 18:35	07:35 16:31	08:23 16:02
12	08:29 16:26	07:45 17:23	06:43 18:16	06:29 20:13	05:27 21:06	04:52 21:46	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	07:37 16:30	08:24 16:01
13	08:29 16:27	07:43 17:25	06:41 18:18	06:27 20:14	05:25 21:07	04:52 21:47	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	07:39 16:28	08:25 16:01
14	08:28 16:29	07:41 17:27	06:39 18:20	06:25 20:16	05:23 21:09	04:52 21:47	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	07:40 16:26	08:26 16:01
15	08:27 16:31	07:39 17:29	06:36 18:22	06:22 20:18	05:22 21:11	04:52 21:48	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	07:42 16:25	08:27 16:01
16	08:26 16:32	07:37 17:31	06:34 18:24	06:20 20:20	05:20 21:12	04:52 21:48	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	07:44 16:23	08:28 16:01
17	08:25 16:34	07:35 17:33	06:31 18:26	06:18 20:22	05:18 21:14	04:51 21:49	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	07:46 16:22	08:29 16:02
18	08:24 16:36	07:33 17:35	06:29 18:27	06:16 20:23	05:17 21:16	04:51 21:49	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	07:48 16:20	08:29 16:02
19	08:23 16:37	07:31 17:37	06:27 18:29	06:13 20:25	05:15 21:17	04:51 21:50	05:15 21:35	06:05 20:40	06:58 19:27	07:52 18:17	07:49 16:19	08:30 16:02
20	08:22 16:39	07:29 17:39	06:24 18:31	06:11 20:27	05:14 21:19	04:51 21:50	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	07:51 16:18	08:31 16:02
21	08:21 16:41	07:27 17:41	06:22 18:33	06:09 20:29	05:13 21:20	04:52 21:50	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	07:53 16:16	08:31 16:03
22	08:19 16:43	07:24 17:42	06:19 18:35	06:07 20:31	05:11 21:22	04:52 21:50	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	07:55 16:15	08:32 16:03
23	08:18 16:45	07:22 17:44	06:17 18:37	06:04 20:32	05:10 21:23	04:52 21:51	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	07:57 16:14	08:32 16:04
24	08:17 16:46	07:20 17:46	06:15 18:38	06:02 20:34	05:08 21:25	04:52 21:51	05:22 21:29	06:13 20:29	07:07 19:15	08:01 18:06	07:58 16:13	08:33 16:04
25	08:16 16:48	07:18 17:48	06:12 18:40	06:00 20:36	05:07 21:26	04:53 21:51	05:24 21:27	06:15 20:27	07:09 19:13	07:03 17:04	08:00 16:12	08:33 16:05
26	08:14 16:50	07:16 17:50	06:10 18:42	05:58 20:38	05:06 21:27	04:53 21:51	05:25 21:26	06:17 20:25	07:10 19:10	07:05 17:01	08:02 16:11	08:33 16:06
27	08:13 16:52	07:13 17:52	06:07 18:44	05:56 20:40	05:05 21:29	04:54 21:51	05:27 21:24	06:19 20:22	07:12 19:08	07:06 16:59	08:03 16:10	08:34 16:06
28	08:11 16:54	07:11 17:54	06:05 18:46	05:54 20:41	05:04 21:30	04:54 21:51	05:28 21:22	06:20 20:20	07:14 19:06	07:08 16:57	08:05 16:09	08:34 16:07
29	08:10 16:56		07:03 19:47	05:52 20:43	05:03 21:32	04:55 21:50	05:30 21:21	06:22 20:18	07:16 19:03	07:10 16:55	08:06 16:08	08:34 16:08
30	08:08 16:58		07:00 19:49	05:50 20:45	05:01 21:33	04:55 21:50	05:31 21:19	06:24 20:15	07:17 19:01	07:12 16:53	08:08 16:07	08:34 16:09
31	08:07 17:00		06:58 19:51		05:00 21:34		05:33 21:17	06:26 20:13		07:14 16:51		08:34 16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s64 - Südergellersen, Westergellersen Weg 4

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10
	16:11	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06
2	08:34	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11
	16:12	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06
3	08:34	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12
	16:14	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05
4	08:34	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14
	16:15	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04
5	08:33	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15
	16:16	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04
6	08:33	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17
	16:17	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03
7	08:32	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18
	16:19	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03
8	08:32	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19
	16:20	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02
9	08:31	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20
	16:21	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02
10	08:31	07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	07:33	08:22
	16:23	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02
11	08:30	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35	08:23
	16:24	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02
12	08:29	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24
	16:26	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01
13	08:29	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25
	16:27	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01
14	08:28	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26
	16:29	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01
15	08:27	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27
	16:31	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01
16	08:26	07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28
	16:32	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01
17	08:25	07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46	08:29
	16:34	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02
18	08:24	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29
	16:36	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02
19	08:23	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30
	16:37	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02
20	08:22	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31
	16:39	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02
21	08:21	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31
	16:41	17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16	16:03
22	08:19	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32
	16:43	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03
23	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32
	16:45	17:44	18:37	20:32	21:23	21:52	21:30	20:31	19:18	18:08	16:14	16:04
24	08:17	07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	08:33
	16:46	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04
25	08:16	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	08:03	08:00	08:33
	16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	18:04	16:12	16:05
26	08:14	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	08:05	08:02	08:33
	16:50	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	18:01	16:11	16:06
27	08:13	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	08:06	08:03	08:34
	16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	18:00	16:10	16:06
28	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	08:08	08:05	08:34
	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	18:00	16:09	16:07
29	08:10		07:03	05:52	05:03	04:55	05:30	06:22	07:16	08:10	08:06	08:34
	16:56		19:47	20:43	21:32	21:50	21:21	20:18	19:03	18:00	16:08	16:08
30	08:08		07:00	05:50	05:01	04:55	05:31	06:24	07:17	08:12	08:08	08:34
	16:58		19:49	20:45	21:33	21:50	21:19	20:15	19:01	18:00	16:07	16:09
31	08:07		06:58		05:00		05:33	06:26		07:14		08:34
	17:00		19:51		21:34		21:17	20:13		18:01		16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s65 - Südergellersen, Wetzter Weg 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	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11 45	09:43 (Oerzen 1) 11:05 (Rep 11) 17:01	08:05 17:56	06:55 19:53	05:48 20:47	05:00 21:35	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	07:16 16:49	08:10 16:06
2	08:34 16:13 42	09:44 (Oerzen 1) 11:05 (Rep 11) 17:03	08:03 17:58	06:53 19:55	05:46 20:48	04:59 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	07:18 16:47	08:11 16:06
3	08:34 16:14 41	09:45 (Oerzen 1) 11:05 (Rep 11) 17:05	08:02 18:00	06:51 19:56	05:44 20:50	04:58 21:38	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	07:20 16:45	08:12 16:05
4	08:34 16:15 38	09:46 (Oerzen 1) 11:04 (Rep 11) 17:07	08:00 18:02	06:48 19:58	05:42 20:52	04:57 21:39	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	07:22 16:44	08:14 16:04
5	08:33 16:16 36	09:47 (Oerzen 1) 11:04 (Rep 11) 17:09	07:58 18:03	06:46 20:00	05:40 20:54	04:56 21:40	04:59 21:48	05:41 21:09	06:34 20:01	07:26 18:49	07:23 16:42	08:15 16:04
6	08:33 16:17 32	09:47 (Oerzen 1) 11:03 (Rep 11) 17:11	07:56 18:05	06:43 20:02	05:38 20:55	04:56 21:41	05:00 21:47	05:43 21:07	06:36 19:59	07:28 18:46	07:25 16:40	08:17 16:03
7	08:32 16:19 26	09:48 (Oerzen 1) 11:01 (Rep 11) 17:13	07:55 18:07	06:41 20:04	05:36 20:57	04:55 21:42	05:01 21:47	05:44 21:05	06:38 19:57	07:30 18:44	07:27 16:38	08:18 16:03
8	08:32 16:20 17	09:49 (Oerzen 1) 11:00 (Rep 11) 17:15	07:53 18:09	06:39 20:05	05:34 20:59	04:54 21:43	05:02 21:46	05:46 21:03	06:39 19:54	07:32 18:42	07:29 16:36	08:19 16:02
9	08:31 16:21 15	09:50 (Oerzen 1) 11:00 (Rep 11) 17:17	07:51 18:11	06:36 20:07	05:32 21:01	04:54 21:44	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	07:31 16:35	08:20 16:02
10	08:31 16:23 12	09:52 (Oerzen 1) 11:04 (Rep 11) 17:19	07:49 18:13	06:34 20:09	05:30 21:02	04:53 21:44	05:04 21:45	05:50 20:59	06:43 19:49	07:35 18:37	07:33 16:33	08:22 16:02
11	08:30 16:24 9	09:54 (Oerzen 1) 11:03 (Rep 11) 17:21	07:47 18:15	06:32 20:11	05:29 21:04	04:53 21:45	05:05 21:44	05:51 20:57	06:45 19:47	07:37 18:35	07:35 16:31	08:23 16:02
12	08:29 16:26 3	09:57 (Oerzen 1) 11:00 (Rep 11) 17:23	07:45 18:16	06:29 20:13	05:27 21:06	04:52 21:46	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	07:37 16:30	08:24 16:01
13	08:29 16:27 14	09:58 (Oerzen 1) 11:01 (Rep 11) 17:25	07:43 18:18	06:27 20:14	05:25 21:07	04:52 21:47	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	07:39 16:28	08:25 16:01
14	08:28 16:28 15	09:59 (Oerzen 1) 11:02 (Rep 11) 17:27	07:41 18:20	06:25 20:16	05:23 21:09	04:52 21:47	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	07:40 16:26	08:26 16:01
15	08:27 16:31 16	10:00 (Oerzen 1) 11:03 (Rep 11) 17:29	07:39 18:22	06:22 20:18	05:22 21:11	04:52 21:48	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	07:42 16:25	08:27 16:01
16	08:26 16:32 17	10:01 (Oerzen 1) 11:04 (Rep 11) 17:31	07:37 18:24	06:20 20:20	05:20 21:12	04:52 21:48	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	07:44 16:23	08:28 16:01
17	08:25 16:34 18	10:02 (Oerzen 1) 11:05 (Rep 11) 17:33	07:35 18:26	06:18 20:22	05:19 21:14	04:51 21:49	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	07:46 16:22	08:29 16:02
18	08:24 16:36 19	10:03 (Oerzen 1) 11:06 (Rep 11) 17:35	07:33 18:27	06:16 20:23	05:17 21:16	04:51 21:49	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	07:48 16:21	08:30 16:02
19	08:23 16:37 20	10:04 (Oerzen 1) 11:07 (Rep 11) 17:37	07:31 18:29	06:13 20:25	05:15 21:17	04:51 21:50	05:15 21:35	06:05 20:40	06:58 19:27	07:52 18:17	07:49 16:19	08:31 16:02
20	08:22 16:39 21	10:05 (Oerzen 1) 11:08 (Rep 11) 17:39	07:29 18:31	06:11 20:27	05:14 21:19	04:51 21:50	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	07:51 16:18	08:32 16:02
21	08:21 16:41 22	10:06 (Oerzen 1) 11:09 (Rep 11) 17:41	07:27 18:33	06:09 20:29	05:13 21:20	04:52 21:50	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	07:53 16:17	08:33 16:03
22	08:20 16:43 23	10:07 (Oerzen 1) 11:10 (Rep 11) 17:42	07:24 18:35	06:07 20:31	05:11 21:22	04:52 21:50	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	07:55 16:15	08:34 16:03
23	08:19 16:45 24	10:08 (Oerzen 1) 11:11 (Rep 11) 17:44	07:22 18:37	06:04 20:32	05:10 21:23	04:52 21:51	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	07:57 16:14	08:35 16:04
24	08:18 16:46 25	10:09 (Oerzen 1) 11:12 (Rep 11) 17:46	07:20 18:38	06:02 20:34	05:08 21:25	04:52 21:51	05:22 21:29	06:14 20:29	07:07 19:15	08:01 18:06	07:58 16:13	08:36 16:05
25	08:17 16:48 26	10:10 (Oerzen 1) 11:13 (Rep 11) 17:48	07:18 18:40	06:00 20:36	05:07 21:26	04:53 21:51	05:24 21:27	06:15 20:27	07:09 19:13	08:03 17:04	08:00 16:12	08:37 16:06
26	08:16 16:50 27	10:11 (Oerzen 1) 11:14 (Rep 11) 17:50	07:16 18:42	05:58 20:38	05:06 21:27	04:54 21:51	05:25 21:26	06:17 20:25	07:10 19:10	08:05 17:01	08:02 16:11	08:38 16:07
27	08:15 16:52 28	10:12 (Oerzen 1) 11:15 (Rep 11) 17:52	07:13 18:44	05:56 20:40	05:05 21:29	04:54 21:52	05:27 21:24	06:19 20:22	07:12 19:08	08:06 16:59	08:03 16:10	08:39 16:08
28	08:14 16:54 29	10:13 (Oerzen 1) 11:16 (Rep 11) 17:54	07:11 18:46	05:54 20:41	05:04 21:30	04:54 21:51	05:28 21:22	06:20 20:20	07:14 19:06	08:08 16:57	08:05 16:09	08:40 16:08
29	08:13 16:56 30	10:14 (Oerzen 1) 11:17 (Rep 11) 17:55	07:09 18:47	05:52 20:43	05:03 21:32	04:55 21:52	05:30 21:21	06:22 20:18	07:16 19:03	08:10 16:55	08:06 16:08	08:41 16:09
30	08:12 16:58 31	10:15 (Oerzen 1) 11:18 (Rep 11) 17:56	07:07 18:49	05:50 20:45	05:01 21:33	04:55 21:53	05:31 21:19	06:24 20:15	07:17 19:01	08:12 16:53	08:08 16:07	08:42 16:10
31	08:11 17:00	10:16 (Oerzen 1) 11:19 (Rep 11)	07:05 18:51	05:48 20:46	05:00 21:34	04:56 21:54	05:32 21:17	06:26 20:13	07:18 16:51	08:14 16:51	08:10 16:09	08:43 16:11
Sonnenscheinstunden	253		275	419	491	506	509	458	382	329	261	1310
astr.max.mögl.Beschattung	316											

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

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



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s66 - Südergellersen, Wetzter Weg 6

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11 16:13	09:13 (Oerzen 1) 13:46 (B 01) 13:47 (B 01)	08:05 17:02 17:03	07:09 17:56 17:58	06:55 19:53 19:55	05:48 20:47 20:48	05:00 21:35 21:36	04:56 21:50 21:49	05:35 21:16 21:14	06:27 20:11 20:08	07:19 18:58 18:56	08:10 16:49 16:47
2	08:34 16:14 16:13	09:14 (Oerzen 1) 13:47 (B 01) 13:47 (B 01)	08:03 17:05 17:03	07:07 18:00 18:02	06:53 19:56 19:58	05:46 20:50 20:52	04:59 21:38 21:39	04:57 21:49 21:49	05:36 21:12 21:10	06:29 20:06 20:04	07:21 18:54 18:51	08:11 16:45 16:44
3	08:34 16:14 16:13	09:14 (Oerzen 1) 13:47 (B 01) 13:47 (B 01)	08:02 17:05 17:03	07:04 18:00 18:02	06:51 19:56 19:58	05:44 20:50 20:52	04:58 21:38 21:39	04:57 21:49 21:49	05:38 21:12 21:10	06:31 20:06 20:04	07:23 18:54 18:51	08:12 16:45 16:44
4	08:34 16:15 16:16	09:14 (Oerzen 1) 13:46 (B 01) 13:46 (B 01)	08:00 17:07 17:09	07:02 18:02 18:03	06:48 19:58 20:00	05:42 20:52 20:54	04:57 21:39 21:40	04:58 21:49 21:48	05:39 21:10 21:09	06:32 20:04 20:01	07:24 18:51 18:49	08:14 16:44 16:42
5	08:33 16:16 16:16	09:15 (Oerzen 1) 13:46 (B 01) 13:46 (B 01)	07:58 17:09 17:10	07:00 18:03 18:03	06:46 19:58 20:00	05:40 20:54 20:56	04:56 21:40 21:40	04:59 21:48 21:49	05:41 21:09 21:08	06:34 20:01 20:01	07:26 18:49 18:48	08:15 16:42 16:40
6	08:33 16:17 16:17	09:14 (Oerzen 1) 13:45 (B 01) 13:45 (B 01)	07:56 17:11 17:11	06:57 18:05 18:05	06:43 19:55 19:55	05:38 20:55 20:55	04:56 21:41 21:41	05:00 21:47 21:47	05:43 21:07 21:07	06:36 20:01 20:01	07:28 18:46 18:46	08:17 16:40 16:40
7	08:32 16:19 16:19	09:14 (Oerzen 1) 13:44 (B 01) 13:44 (B 01)	07:55 17:13 17:13	06:55 18:07 18:07	06:41 19:57 19:57	05:36 20:57 20:57	04:55 21:42 21:42	05:01 21:47 21:47	05:44 21:05 21:05	06:38 20:01 20:01	07:30 18:44 18:44	08:18 16:38 16:38
8	08:32 16:20 16:20	09:15 (Oerzen 1) 13:44 (B 01) 13:44 (B 01)	07:53 17:15 17:15	06:53 18:09 18:09	06:39 19:55 19:55	05:34 20:55 20:55	04:54 21:43 21:43	05:02 21:46 21:46	05:46 21:03 21:03	06:39 20:01 20:01	07:32 18:42 18:42	08:19 16:36 16:36
9	08:31 16:21 16:21	09:15 (Oerzen 1) 13:43 (B 01) 13:43 (B 01)	07:51 17:17 17:17	06:50 18:11 18:11	06:36 19:57 19:57	05:32 20:57 20:57	04:54 21:44 21:44	05:03 21:45 21:45	05:48 21:01 21:01	06:41 20:01 20:01	07:33 18:39 18:39	08:20 16:35 16:35
10	08:31 16:23 16:23	09:15 (Oerzen 1) 13:41 (B 01) 13:41 (B 01)	07:49 17:19 17:19	06:48 18:13 18:13	06:34 19:59 19:59	05:30 21:02 21:02	04:53 21:44 21:44	05:04 21:45 21:45	05:50 20:59 20:59	06:43 20:01 20:01	07:35 18:37 18:37	08:22 16:33 16:33
11	08:30 16:24 16:24	09:15 (Oerzen 1) 13:42 (Rep 11) 13:42 (Rep 11)	07:47 17:21 17:21	06:46 18:15 18:15	06:32 19:59 19:59	05:29 21:04 21:04	04:53 21:45 21:45	05:05 21:46 21:46	05:51 20:57 20:57	06:45 20:01 20:01	07:37 18:35 18:35	08:23 16:31 16:31
12	08:29 16:26 16:26	09:16 (Oerzen 1) 13:43 (Rep 11) 13:43 (Rep 11)	07:45 17:23 17:23	06:43 18:16 18:16	06:29 19:57 19:57	05:27 21:06 21:06	04:52 21:46 21:46	05:06 21:43 21:43	05:53 20:55 20:55	06:46 20:01 20:01	07:39 18:32 18:32	08:24 16:30 16:30
13	08:29 16:27 16:27	09:17 (Oerzen 1) 13:44 (Rep 11) 13:44 (Rep 11)	07:43 17:25 17:25	06:41 18:18 18:18	06:27 19:57 19:57	05:25 21:07 21:07	04:52 21:47 21:47	05:07 21:42 21:42	05:55 20:55 20:55	06:48 20:01 20:01	07:41 18:30 18:30	08:25 16:28 16:28
14	08:28 16:29 16:29	09:16 (Oerzen 1) 13:43 (Rep 11) 13:43 (Rep 11)	07:41 17:27 17:27	06:39 18:20 18:20	06:25 19:57 19:57	05:23 21:09 21:09	04:52 21:47 21:47	05:08 21:41 21:41	05:56 20:51 20:51	06:50 20:01 20:01	07:42 18:28 18:28	08:26 16:26 16:26
15	08:27 16:31 16:31	09:17 (Oerzen 1) 13:43 (Rep 11) 13:43 (Rep 11)	07:39 17:29 17:29	06:36 18:22 18:22	06:22 19:57 19:57	05:22 21:11 21:11	04:52 21:48 21:48	05:10 21:40 21:40	05:58 20:49 20:49	06:51 20:01 20:01	07:44 18:26 18:26	08:27 16:25 16:25
16	08:26 16:32 16:32	09:17 (Oerzen 1) 13:43 (Rep 11) 13:43 (Rep 11)	07:37 17:31 17:31	06:34 18:24 18:24	06:20 19:57 19:57	05:20 21:12 21:12	04:52 21:48 21:48	05:11 21:39 21:39	06:00 20:47 20:47	06:53 20:01 20:01	07:46 18:23 18:23	08:28 16:23 16:23
17	08:25 16:34 16:34	09:18 (Oerzen 1) 13:43 (Rep 11) 13:43 (Rep 11)	07:35 17:33 17:33	06:31 18:26 18:26	06:18 19:57 19:57	05:19 21:14 21:14	04:51 21:49 21:49	05:12 21:38 21:38	06:01 20:44 20:44	06:55 20:01 20:01	07:48 18:21 18:21	08:29 16:22 16:22
18	08:24 16:36 16:36	09:19 (Oerzen 1) 13:43 (Rep 11) 13:43 (Rep 11)	07:33 17:35 17:35	06:29 18:27 18:27	06:16 19:57 19:57	05:17 21:16 21:16	04:51 21:49 21:49	05:14 21:37 21:37	06:03 20:42 20:42	06:57 20:01 20:01	07:50 18:19 18:19	08:30 16:21 16:21
19	08:23 16:37 16:37	09:20 (Oerzen 1) 13:43 (Rep 11) 13:43 (Rep 11)	07:31 17:37 17:37	06:27 18:29 18:29	06:13 19:57 19:57	05:15 21:17 21:17	04:51 21:50 21:50	05:15 21:35 21:35	06:05 20:40 20:40	06:58 20:01 20:01	07:52 18:17 18:17	08:30 16:20 16:20
20	08:22 16:39 16:39	09:20 (Oerzen 1) 13:43 (Rep 11) 13:43 (Rep 11)	07:29 17:39 17:39	06:24 18:31 18:31	06:11 19:57 19:57	05:14 21:19 21:19	04:52 21:50 21:50	05:16 21:34 21:34	06:07 20:38 20:38	07:00 20:01 20:01	07:53 18:14 18:14	08:31 16:18 16:18
21	08:21 16:41 16:41	09:21 (Oerzen 1) 13:43 (Rep 11) 13:43 (Rep 11)	07:27 17:41 17:41	06:22 18:33 18:33	06:09 19:57 19:57	05:13 21:20 21:20	04:52 21:50 21:50	05:18 21:33 21:33	06:08 20:36 20:36	07:02 20:01 20:01	07:55 18:12 18:12	08:31 16:17 16:17
22	08:19 16:43 16:43	09:22 (Oerzen 1) 13:42 (Rep 11) 13:42 (Rep 11)	07:24 17:42 17:42	06:19 18:35 18:35	06:07 19:57 19:57	05:11 21:22 21:22	04:52 21:50 21:50	05:19 21:31 21:31	06:10 20:34 20:34	07:03 20:01 20:01	07:57 18:10 18:10	08:32 16:15 16:15
23	08:18 16:45 16:45	09:22 (Oerzen 1) 13:42 (Rep 11) 13:42 (Rep 11)	07:22 17:44 17:44	06:17 18:37 18:37	06:04 19:57 19:57	05:10 21:23 21:23	04:52 21:51 21:51	05:21 21:30 21:30	06:12 20:31 20:31	07:05 20:01 20:01	07:59 18:08 18:08	08:32 16:14 16:14
24	08:17 16:46 16:46	09:24 (Oerzen 1) 13:41 (Rep 11) 13:41 (Rep 11)	07:20 17:46 17:46	06:15 18:38 18:38	06:02 19:57 19:57	05:08 21:25 21:25	04:52 21:51 21:51	05:22 21:29 21:29	06:14 20:29 20:29	07:07 20:01 20:01	08:01 18:06 18:06	08:33 16:13 16:13
25	08:16 16:48 16:48	09:25 (Oerzen 1) 13:41 (Rep 11) 13:41 (Rep 11)	07:18 17:48 17:48	06:12 18:40 18:40	06:00 19:57 19:57	05:07 21:26 21:26	04:53 21:51 21:51	05:24 21:27 21:27	06:15 20:27 20:27	07:09 20:01 20:01	08:03 18:04 18:04	08:33 16:12 16:12
26	08:14 16:50 16:50	09:26 (Oerzen 1) 13:40 (Rep 11) 13:40 (Rep 11)	07:16 17:50 17:50	06:10 18:42 18:42	05:58 19:57 19:57	05:06 21:27 21:27	04:53 21:51 21:51	05:25 21:26 21:26	06:17 20:25 20:25	07:10 20:01 20:01	08:05 18:03 18:03	08:33 16:11 16:11
27	08:13 16:52 16:52	09:28 (Oerzen 1) 13:37 (Rep 11) 13:37 (Rep 11)	07:13 17:52 17:52	06:07 18:44 18:44	05:56 19:57 19:57	05:05 21:29 21:29	04:54 21:51 21:51	05:27 21:24 21:24	06:19 20:22 20:22	07:12 20:01 20:01	08:06 18:03 18:03	08:34 16:10 16:10
28	08:11 16:54 16:54	09:31 (Oerzen 1) 13:31 (Rep 11) 13:31 (Rep 11)	07:11 17:54 17:54	06:05 18:46 18:46	05:54 19:57 19:57	05:04 21:30 21:30	04:54 21:51 21:51	05:28 21:22 21:22	06:20 20:20 20:20	07:14 20:01 20:01	08:08 18:05 18:05	08:34 16:09 16:09
29	08:10 16:56 16:56	10:23 (Rep 11) 10:23 (Rep 11) 10:23 (Rep 11)		07:03 19:47 19:47	05:52 20:43 20:43	05:03 21:32 21:32	04:55 21:50 21:50	05:30 21:21 21:21	06:22 20:18 20:18	07:16 20:01 20:01	08:10 18:06 18:06	08:34 16:08 16:08
30	08:08 16:58 16:58			07:00 19:49 19:49	05:50 20:45 20:45	05:02 21:33 21:33	04:55 21:50 21:50	05:31 21:19 21:19	06:24 20:15 20:15	07:17 20:01 20:01	08:12 18:07 18:07	08:34 16:07 16:07
31	08:07 17:00 17:00			06:58 19:51 19:51	05:01 21:34 21:34	05:01 21:34 21:34	05:33 21:17 21:17	06:26 20:13 20:13	06:26 20:13 20:13	07:14 20:01 20:01	08:14 18:08 18:08	08:34 16:07 16:07
Sonnenscheinstunden	253											
astr.max.mögl.Beschattung	2109	275	367	419	491	506	509	458	382	329	261	237

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s67 - Südergellersen, In de Masch 8

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
1	08:34	14:45 (B 01)	08:05	07:09	06:55	05:48	04:59	04:56	05:35	06:27	07:19	07:16	08:10											
2	16:11	15	15:00 (B 01)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06										
	08:34		14:47 (B 01)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11										
3	16:12	13	15:00 (B 01)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06										
	08:34		14:48 (B 01)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12										
4	16:14	12	15:00 (B 01)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05										
	08:33		14:49 (B 01)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14										
5	16:15	10	14:59 (B 01)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04										
	08:33		14:51 (B 01)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15										
6	16:16	8	14:59 (B 01)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04										
	08:33		14:54 (B 01)	07:56	06:57	06:43	05:38	04:55	05:00	05:43	06:36	07:28	07:25	08:17										
7	16:17	2	14:56 (B 01)	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03										
	08:32			07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18									14:38 (B 01)	
8	16:19			17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03	7								14:45 (B 01)	
	08:32			07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19									14:37 (B 01)	
9	16:20			17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02	10								14:47 (B 01)	
	08:31			07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20									14:36 (B 01)	
10	16:21			17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	12								14:48 (B 01)	
	08:31			07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	07:33	08:22									14:36 (B 01)	
11	16:23			17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02	13								14:49 (B 01)	
	08:30			07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35	08:23									14:35 (B 01)	
12	16:24			17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	15								14:50 (B 01)	
	08:29			07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24									14:36 (B 01)	
13	16:26			17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	16								14:52 (B 01)	
	08:29			07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:38	08:25									14:36 (B 01)	
14	16:27			17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	17								14:53 (B 01)	
	08:28			07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26									14:36 (B 01)	
15	16:29			17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	18								14:54 (B 01)	
	08:27			07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27									14:36 (B 01)	
16	16:31			17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	18								14:54 (B 01)	
	08:26			07:37	06:34	06:20	05:20	04:51	05:11	06:00	06:53	07:46	07:44	08:28									14:36 (B 01)	
17	16:32			17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	18								14:54 (B 01)	
	08:25			07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46	08:29									14:36 (B 01)	
18	16:34			17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02	19								14:55 (B 01)	
	08:24			07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29									14:37 (B 01)	
19	16:36			17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02	19								14:56 (B 01)	
	08:23			07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30									14:37 (B 01)	
20	16:37			17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02	20								14:57 (B 01)	
	08:22			07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31									14:37 (B 01)	
21	16:39			17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02	20								14:57 (B 01)	
	08:21			07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31									14:38 (B 01)	
22	16:41			17:40	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16	16:03	20								14:58 (B 01)	
	08:19			07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32									14:38 (B 01)	
23	16:43			17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03	20								14:58 (B 01)	
	08:18			07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32									14:39 (B 01)	
24	16:45			17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04	20								14:59 (B 01)	
	08:17			07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	08:33									14:39 (B 01)	
25	16:46			17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04	20								14:59 (B 01)	
	08:16			07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	08:03	08:00	08:33									14:40 (B 01)	
26	16:48			17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	18:04	16:12	16:05	19								14:59 (B 01)	
	08:14			07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	08:05	08:02	08:33									14:41 (B 01)	
27	16:50			17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	18:01	16:11	16:06	19								15:00 (B 01)	
	08:13			07:13	06:07	05:56	05:05	04:53	05:27	06:19	07:12	08:06	08:03	08:34									14:41 (B 01)	
28	16:52			17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	18:00	16:10	16:06	19								15:00 (B 01)	
	08:11			07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	08:08	08:05	08:34									14:42 (B 01)	
29	16:54			17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	18:00	16:10	16:07	18								15:00 (B 01)	
	08:10			07:02	05:52	05:02	04:55	05:30	06:22	07:16	08:10	08:06	08:34									14:43 (B 01)		
30	16:56			19:47	20:43	21:32	21:50	21:21	20:18	19:03	18:00	16:10	16:08	16:08	17								15:00 (B 01)	
	08:08			07:00	05:50	05:01	04:55	05:31	06:24	07:17	08:11	08:08	08:34									14:44 (B 01)		
31	16:58			19:49	20:45	21:33	21:50	21:19	20:15	19:01	18:00	16:10	16:07	16:09	17								15:01 (B 01)	
	08:07			06:58	05:48	05:00	04:55	05:33	06:26	07:19	08:13	08:10	08:34									14:45 (B 01)		
17:00			19:51	20:47	21:34	21:51	21:17	20:13	19:00	18:00	17:00	16:10	16:10	16								15:01 (B 01)		
Sonnenscheinstunden	253		275	367	419	491	506	509	458	382	329	261	237											
astr.max.mögl.Beschattung	60													427										

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s68 - Wetzen, Zum Lerchenberg 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	08:34 16:12	08:05 17:02	07:09 17:56	06:56 19:53	05:48 20:47		05:00 21:35
2	08:34 16:13	08:03 17:04	07:07 17:58	06:53 19:55	05:46 20:49		04:59 21:36
3	08:34 16:14	08:02 17:06	07:04 18:00	06:51 19:57	05:44 20:50		04:58 21:38
4	08:34 16:15	08:00 17:08	07:02 18:02	06:48 19:58	05:42 20:52		04:57 21:39
5	08:33 16:16	07:58 17:10	07:00 18:04	06:46 20:00	05:40 20:54		04:57 21:40
6	08:33 16:18	07:57 17:12	06:58 18:06	06:44 20:02	05:38 20:56		04:56 21:41
7	08:32 16:19	07:55 17:13	06:55 18:07	06:41 20:04	05:36 20:57		04:55 21:42
8	08:32 16:20	07:53 17:15	06:53 18:09	06:39 20:06	05:34 20:59	06:00 (B 03)	04:55 21:43
9	08:31 16:22	07:51 17:17	06:51 18:11	06:37 20:07	05:32 21:01	05:59 (B 03)	04:54 21:44
10	08:31 16:23	07:49 17:19	06:48 18:13	06:34 20:09	05:31 21:02	06:02 (B 03)	04:54 21:44
11	08:30 16:25	07:47 17:21	06:46 18:15	06:32 20:11	05:29 21:04	05:55 (B 03)	04:53 21:45
12	08:29 16:26	07:45 17:23	06:44 18:17	06:30 20:13	05:27 21:06	06:02 (B 03)	04:53 21:46
13	08:29 16:28	07:43 17:25	06:41 18:19	06:27 20:15	05:25 21:08	05:52 (B 06)	04:53 21:47
14	08:28 16:29	07:41 17:27	06:39 18:20	06:25 20:16	05:24 21:09	06:02 (B 03)	04:52 21:47
15	08:27 16:31	07:39 17:29	06:36 18:22	06:23 20:18	05:22 21:11	05:49 (B 06)	04:52 21:48
16	08:26 16:33	07:37 17:31	06:34 18:24	06:20 20:20	05:20 21:12	06:01 (B 03)	04:52 21:48
17	08:25 16:34	07:35 17:33	06:32 18:26	06:18 20:22	05:19 21:14	05:46 (B 06)	04:52 21:49
18	08:24 16:36	07:33 17:35	06:29 18:28	06:16 20:24	05:17 21:16	06:00 (B 06)	04:52 21:49
19	08:23 16:38	07:31 17:37	06:27 18:30	06:14 20:25	05:16 21:17	05:51 (B 06)	04:52 21:50
20	08:22 16:40	07:29 17:39	06:24 18:31	06:11 20:27	05:14 21:19	06:01 (B 06)	04:52 21:50
21	08:21 16:41	07:27 17:41	06:22 18:33	06:09 20:29	05:13 21:20	05:43 (B 06)	04:52 21:50
22	08:20 16:43	07:25 17:43	06:20 18:35	06:07 20:31	05:11 21:22	06:01 (B 06)	04:52 21:50
23	08:18 16:45	07:22 17:45	06:17 18:37	06:05 20:33	05:10 21:23	05:44 (B 06)	04:52 21:51
24	08:17 16:47	07:20 17:47	06:15 18:39	06:03 20:34	05:09 21:25	06:02 (B 06)	04:53 21:51
25	08:16 16:49	07:18 17:48	06:12 18:40	06:00 20:36	05:08 21:26	06:01 (B 06)	04:53 21:51
26	08:14 16:50	07:16 17:50	06:10 18:42	05:58 20:38	05:06 21:28	05:44 (B 06)	04:53 21:51
27	08:13 16:52	07:14 17:52	06:08 18:44	05:56 20:40	05:05 21:29	06:01 (B 06)	04:54 21:51
28	08:11 16:54	07:11 17:54	06:05 18:46	05:54 20:41	05:04 21:30	05:33 (B 04)	04:54 21:51
29	08:10 16:56		07:03 19:48	05:52 20:43	05:03 21:32	06:00 (B 06)	04:55 21:50
30	08:08 16:58		07:00 19:49	05:50 20:45	05:02 21:33	05:31 (B 04)	04:56 21:50
31	08:07 17:00		06:58 19:51		05:01 21:34	05:59 (B 06)	
Sonnenscheinstunden	253	275	367	419	491	506	394
astr.max.mögl.Beschattung					333		

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)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------

## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s68 - Wetzen, Zum Lerchenberg 5

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober	November	Dezember
1	04:56	05:30 (B 04)	05:35	06:05 (B 03)	06:28	07:19	07:16	08:10
	21:50	13 05:43 (B 04)	21:16	8 06:13 (B 03)	20:11	18:59	16:50	16:07
2	04:57	05:30 (B 04)	05:37	06:06 (B 03)	06:29	07:21	07:18	08:11
	21:49	14 05:44 (B 04)	21:14	7 06:13 (B 03)	20:09	18:56	16:48	16:06
3	04:58	05:31 (B 04)	05:38	06:08 (B 03)	06:31	07:23	07:20	08:13
	21:49	14 05:45 (B 04)	21:12	5 06:13 (B 03)	20:06	18:54	16:46	16:05
4	04:59	05:31 (B 04)	05:40	06:09 (B 03)	06:33	07:25	07:22	08:14
	21:49	14 05:45 (B 04)	21:10	3 06:12 (B 03)	20:04	18:51	16:44	16:05
5	04:59	05:32 (B 04)	05:41		06:34	07:26	07:24	08:15
	21:48	14 05:46 (B 04)	21:09		20:01	18:49	16:42	16:04
6	05:00	05:32 (B 04)	05:43		06:36	07:28	07:25	08:17
	21:48	13 05:45 (B 04)	21:07		19:59	18:47	16:40	16:04
7	05:01	05:33 (B 04)	05:45		06:38	07:30	07:27	08:18
	21:47	12 05:45 (B 04)	21:05		19:57	18:44	16:38	16:03
8	05:02	05:34 (B 04)	05:46		06:40	07:32	07:29	08:19
	21:46	12 05:46 (B 04)	21:03		19:54	18:42	16:37	16:03
9	05:03	05:35 (B 04)	05:48		06:41	07:34	07:31	08:21
	21:45	13 06:02 (B 06)	21:01		19:52	18:40	16:35	16:02
10	05:04	05:36 (B 04)	05:50		06:43	07:35	07:33	08:22
	21:45	16 06:04 (B 06)	20:59		19:49	18:37	16:33	16:02
11	05:05	05:37 (B 04)	05:52		06:45	07:37	07:35	08:23
	21:44	17 06:05 (B 06)	20:57		19:47	18:35	16:31	16:02
12	05:06	05:38 (B 04)	05:53		06:46	07:39	07:37	08:24
	21:43	18 06:06 (B 06)	20:55		19:45	18:33	16:30	16:02
13	05:08	05:39 (B 04)	05:55		06:48	07:41	07:39	08:25
	21:42	19 06:07 (B 06)	20:53		19:42	18:30	16:28	16:02
14	05:09	05:40 (B 04)	05:57		06:50	07:43	07:40	08:26
	21:41	19 06:08 (B 06)	20:51		19:40	18:28	16:27	16:02
15	05:10	05:42 (B 04)	05:58		06:52	07:44	07:42	08:27
	21:40	18 06:09 (B 06)	20:49		19:37	18:26	16:25	16:02
16	05:11	05:43 (B 04)	06:00		06:53	07:46	07:44	08:28
	21:39	19 06:10 (B 06)	20:47		19:35	18:24	16:24	16:02
17	05:13	05:44 (B 04)	06:02		06:55	07:48	07:46	08:29
	21:38	17 06:10 (B 06)	20:45		19:33	18:21	16:22	16:02
18	05:14	05:53 (B 06)	06:03		06:57	07:50	07:48	08:29
	21:37	17 06:10 (B 06)	20:42		19:30	18:19	16:21	16:02
19	05:15	05:54 (B 06)	06:05		06:58	07:52	07:50	08:30
	21:35	17 06:11 (B 06)	20:40		19:28	18:17	16:19	16:02
20	05:17	05:54 (B 06)	06:07		07:00	07:54	07:51	08:31
	21:34	17 06:11 (B 06)	20:38		19:25	18:15	16:18	16:03
21	05:18	05:53 (B 06)	06:09		07:02	07:55	07:53	08:31
	21:33	18 06:11 (B 06)	20:36		19:23	18:12	16:17	16:03
22	05:20	05:53 (B 06)	06:10		07:04	07:57	07:55	08:32
	21:31	18 06:11 (B 06)	20:34		19:20	18:10	16:16	16:04
23	05:21	05:54 (B 06)	06:12		07:05	07:59	07:57	08:32
	21:30	18 06:12 (B 06)	20:31		19:18	18:08	16:14	16:04
24	05:22	05:54 (B 06)	06:14		07:07	08:01	07:58	08:33
	21:29	17 06:11 (B 06)	20:29		19:16	18:06	16:13	16:05
25	05:24	05:55 (B 06)	06:16		07:09	07:03	08:00	08:33
	21:27	17 06:12 (B 06)	20:27		19:13	17:04	16:12	16:05
26	05:25	05:56 (B 06)	06:17		07:11	07:05	08:02	08:33
	21:26	15 06:11 (B 06)	20:25		19:11	17:02	16:11	16:06
27	05:27	05:57 (B 06)	06:19		07:12	07:07	08:03	08:34
	21:24	13 06:10 (B 06)	20:22		19:08	17:00	16:10	16:07
28	05:29	05:59 (B 06)	06:21		07:14	07:08	08:05	08:34
	21:22	13 06:12 (B 03)	20:20		19:06	16:58	16:09	16:08
29	05:30	06:00 (B 06)	06:22		07:16	07:10	08:07	08:34
	21:21	12 06:12 (B 03)	20:18		19:03	16:56	16:08	16:09
30	05:32	06:02 (B 06)	06:24		07:18	07:12	08:08	08:34
	21:19	11 06:13 (B 03)	20:16		19:01	16:54	16:07	16:09
31	05:33	06:03 (B 06)	06:26			07:14		08:34
	21:18	10 06:13 (B 03)	20:13			16:52		16:10
Sonnenscheinstunden		509	458		382	329	262	237
astr.max.mögl.Beschattung		475	23					

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s69 - Wetzen, Zum Lerchenberg 10

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:34 16:12	08:05 17:02	07:09 17:56	06:56 19:53	05:48 20:47	05:00 21:35	05:35 (B 03) 05:46 (B 03)	04:56 21:50	05:28 (B 06) 05:43 (B 06)	05:35 21:16	06:28 20:11	07:19 18:59	07:16 16:50	08:10 16:07
2	08:34 16:13	08:03 17:04	07:07 17:58	06:53 19:55	05:46 20:49	04:59 21:36	05:35 (B 03) 05:45 (B 03)	04:57 21:49	05:29 (B 06) 05:43 (B 06)	05:37 21:14	06:29 20:09	07:21 18:56	07:18 16:48	08:11 16:06
3	08:34 16:14	08:02 17:06	07:04 18:00	06:51 19:57	05:44 20:50	04:58 21:38	05:28 (B 06) 05:44 (B 03)	04:58 21:49	05:30 (B 06) 05:43 (B 06)	05:38 21:12	06:31 20:06	07:23 18:54	07:20 16:46	08:13 16:05
4	08:34 16:15	08:00 17:08	07:02 18:02	06:48 19:58	05:42 20:52	04:57 21:39	05:28 (B 06) 05:45 (B 03)	04:59 21:49	05:31 (B 06) 05:43 (B 06)	05:40 21:10	06:33 20:04	07:25 18:51	07:22 16:44	08:14 16:05
5	08:33 16:16	07:58 17:10	07:00 18:04	06:46 20:00	05:40 20:54	04:57 21:40	05:27 (B 06) 05:43 (B 03)	04:59 21:48	05:32 (B 06) 05:43 (B 06)	05:41 21:09	06:34 20:01	07:26 18:49	07:24 16:42	08:15 16:04
6	08:33 16:18	07:57 17:12	06:58 18:06	06:44 20:02	05:38 20:56	04:56 21:41	05:26 (B 06) 05:42 (B 03)	05:00 21:48	05:32 (B 06) 05:42 (B 06)	05:43 21:07	06:36 19:59	07:28 18:47	07:25 16:40	08:17 16:04
7	08:32 16:19	07:55 17:13	06:55 18:07	06:41 20:04	05:36 20:57	04:55 21:42	05:26 (B 06) 05:37 (B 06)	05:01 21:47	05:33 (B 06) 05:49 (B 03)	05:45 21:05	06:38 19:57	07:30 18:44	07:27 16:38	08:18 16:03
8	08:32 16:20	07:53 17:15	06:53 18:09	06:39 20:06	05:34 20:59	04:55 21:43	05:26 (B 06) 05:38 (B 06)	05:02 21:46	05:34 (B 06) 05:51 (B 03)	05:46 21:03	06:40 19:54	07:32 18:42	07:29 16:37	08:19 16:03
9	08:31 16:22	07:51 17:17	06:51 18:11	06:37 20:07	05:32 21:01	04:54 21:44	05:25 (B 06) 05:38 (B 06)	05:03 21:45	05:35 (B 06) 05:52 (B 03)	05:48 21:01	06:41 19:52	07:34 18:40	07:31 16:35	08:20 16:02
10	08:31 16:23	07:49 17:19	06:48 18:13	06:34 20:09	05:31 21:02	04:54 21:44	05:25 (B 06) 05:39 (B 06)	05:04 21:45	05:36 (B 06) 05:52 (B 03)	05:50 20:59	06:43 19:49	07:35 18:37	07:33 16:33	08:22 16:02
11	08:30 16:25	07:47 17:21	06:46 18:15	06:32 20:11	05:29 21:04	04:53 21:45	05:24 (B 06) 05:38 (B 06)	05:05 21:44	05:42 (B 03) 05:53 (B 03)	05:52 20:57	06:45 19:47	07:37 18:35	07:35 16:31	08:23 16:02
12	08:29 16:26	07:45 17:23	06:43 18:17	06:30 20:13	05:27 21:06	04:53 21:46	05:24 (B 06) 05:39 (B 06)	05:06 21:43	05:42 (B 03) 05:54 (B 03)	05:53 20:55	06:46 19:45	07:39 18:33	07:37 16:30	08:24 16:02
13	08:29 16:28	07:43 17:25	06:41 18:19	06:27 20:15	05:25 21:07	04:53 21:47	05:24 (B 06) 05:40 (B 06)	05:08 21:42	05:42 (B 03) 05:54 (B 03)	05:55 20:53	06:48 19:42	07:41 18:30	07:39 16:28	08:25 16:02
14	08:28 16:29	07:41 17:27	06:39 18:20	06:25 20:16	05:24 21:09	04:52 21:47	05:24 (B 06) 05:40 (B 06)	05:09 21:41	05:41 (B 03) 05:54 (B 03)	05:57 20:51	06:50 19:40	07:43 18:28	07:40 16:27	08:26 16:02
15	08:27 16:31	07:39 17:29	06:36 18:22	06:23 20:18	05:22 21:11	04:52 21:48	05:24 (B 06) 05:41 (B 06)	05:08 21:40	05:42 (B 03) 05:55 (B 03)	05:58 20:49	06:52 19:37	07:42 18:26	07:42 16:25	08:27 16:02
16	08:26 16:33	07:37 17:31	06:34 18:24	06:20 20:20	05:20 21:12	04:52 21:48	05:24 (B 06) 05:41 (B 06)	05:11 21:39	05:43 (B 03) 05:56 (B 03)	06:00 20:47	06:53 19:35	07:46 18:24	07:44 16:24	08:28 16:02
17	08:25 16:34	07:35 17:33	06:32 18:26	06:18 20:22	05:19 21:14	04:52 21:49	05:24 (B 06) 05:41 (B 06)	05:13 21:38	05:44 (B 03) 05:56 (B 03)	06:02 20:45	06:55 19:33	07:48 18:21	07:46 16:22	08:29 16:02
18	08:24 16:36	07:33 17:35	06:29 18:28	06:16 20:24	05:17 21:16	04:52 21:49	05:24 (B 06) 05:42 (B 06)	05:14 21:37	05:45 (B 03) 05:55 (B 03)	06:03 20:42	06:57 19:30	07:50 18:19	07:48 16:21	08:29 16:02
19	08:23 16:38	07:31 17:37	06:27 18:29	06:14 20:25	05:16 21:17	04:52 21:50	05:24 (B 06) 05:42 (B 06)	05:15 21:35	05:47 (B 03) 05:56 (B 03)	06:05 20:40	06:58 19:28	07:52 18:17	07:50 16:19	08:30 16:02
20	08:22 16:39	07:29 17:39	06:24 18:31	06:11 20:27	05:14 21:19	04:52 21:50	05:24 (B 06) 05:41 (B 03)	05:17 21:50	05:48 (B 03) 05:56 (B 03)	06:07 20:38	07:00 19:25	07:54 18:15	07:51 16:18	08:31 16:03
21	08:21 16:41	07:27 17:41	06:22 18:33	06:09 20:29	05:13 21:20	04:52 21:50	05:24 (B 06) 05:45 (B 03)	05:18 21:50	05:49 (B 03) 05:57 (B 03)	06:09 20:36	07:02 19:23	07:55 18:12	07:53 16:17	08:31 16:03
22	08:20 16:43	07:25 17:43	06:20 18:35	06:07 20:31	05:11 21:22	04:52 21:50	05:24 (B 06) 05:46 (B 03)	05:19 21:50	05:50 (B 03) 05:58 (B 03)	06:10 20:34	07:04 19:20	07:57 18:10	07:55 16:16	08:32 16:04
23	08:18 16:45	07:22 17:45	06:17 18:37	06:05 20:33	05:10 21:23	04:52 21:51	05:39 (B 03) 05:46 (B 03)	04:52 21:51	05:52 (B 03) 05:59 (B 03)	06:12 20:31	07:05 19:18	07:59 18:08	07:57 16:14	08:32 16:04
24	08:17 16:47	07:20 17:47	06:15 18:39	06:03 20:34	05:09 21:25	04:53 21:51	05:37 (B 03) 05:46 (B 03)	04:53 21:51	05:53 (B 03) 05:59 (B 03)	06:14 20:29	07:07 19:16	08:01 18:06	07:58 16:13	08:33 16:05
25	08:16 16:49	07:18 17:48	06:12 18:40	06:00 20:36	05:08 21:26	04:53 21:51	05:36 (B 03) 05:46 (B 03)	04:53 21:51	05:54 (B 03) 05:59 (B 03)	06:15 20:27	07:09 19:13	07:03 18:04	08:00 16:12	08:33 16:05
26	08:14 16:50	07:16 17:50	06:10 18:42	05:58 20:38	05:06 21:28	04:53 21:51	05:35 (B 03) 05:46 (B 03)	04:53 21:51	05:54 (B 03) 05:59 (B 03)	06:16 20:25	07:11 19:11	07:05 18:02	08:02 16:11	08:33 16:06
27	08:13 16:52	07:14 17:52	06:08 18:44	05:56 20:40	05:05 21:29	04:54 21:51	05:34 (B 03) 05:46 (B 03)	04:54 21:51	05:54 (B 03) 05:59 (B 03)	06:17 20:22	07:12 19:08	07:07 18:00	08:03 16:10	08:34 16:07
28	08:11 16:54	07:11 17:54	06:05 18:46	05:54 20:41	05:04 21:30	04:54 21:51	05:33 (B 03) 05:46 (B 03)	04:54 21:51	05:54 (B 03) 05:59 (B 03)	06:18 20:20	07:14 19:06	07:08 18:00	08:05 16:09	08:34 16:08
29	08:10 16:56		07:03 19:48	05:52 20:43	05:03 21:32	04:55 21:50	05:33 (B 03) 05:46 (B 03)	04:55 21:50	05:54 (B 03) 05:59 (B 03)	06:22 20:18	07:16 19:03	07:08 18:00	08:06 16:09	08:34 16:08
30	08:08 16:58		07:00 19:49	05:50 20:45	05:02 21:33	04:56 21:50	05:33 (B 03) 05:46 (B 03)	04:56 21:50	05:54 (B 03) 05:59 (B 03)	06:24 20:16	07:18 19:01	07:12 18:00	08:08 16:07	08:34 16:09
31	08:07 17:00		06:58 19:51		05:01 21:34	04:54 21:50	05:34 (B 03) 05:46 (B 03)	04:54 21:50	05:55 (B 03) 05:59 (B 03)	06:26 20:13	07:14 19:02	07:14 18:00	08:34 16:10	
Sonnenscheinstunden	253	275	367	419	491	506		509	458	382	329	262	237	
astr.max.mögl.Beschattung					112	459		256						

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

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

## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s70 - Wetzen, Zum Lerchenberg 37

## 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	08:34	08:05	07:09	06:56		05:48		06:13 (B 06)	05:00
	16:12	17:02	17:56	19:53		20:47	14	06:27 (B 06)	21:35
2	08:34	08:03	07:07	06:53		05:46		06:11 (B 06)	04:59
	16:13	17:04	17:58	19:55		20:49	17	06:28 (B 07)	21:37
3	08:34	08:02	07:05	06:51		05:44		06:11 (B 06)	04:58
	16:14	17:06	18:00	19:57		20:50	20	06:31 (B 07)	21:38
4	08:34	08:00	07:02	06:48		05:42		06:11 (B 06)	04:57
	16:15	17:08	18:02	19:58		20:52	21	06:32 (B 07)	21:39
5	08:33	07:58	07:00	06:46		05:40		06:12 (B 06)	04:57
	16:16	17:10	18:04	20:00		20:54	22	06:34 (B 07)	21:40
6	08:33	07:57	06:58	06:44		05:38		06:12 (B 07)	04:56
	16:18	17:12	18:06	20:02		20:56	23	06:35 (B 07)	21:41
7	08:32	07:55	06:55	06:41		05:36		06:11 (B 07)	04:55
	16:19	17:13	18:07	20:04		20:57	24	06:35 (B 07)	21:42
8	08:32	07:53	06:53	06:39		05:34		06:10 (B 07)	04:55
	16:20	17:15	18:09	20:06		20:59	25	06:35 (B 07)	21:43
9	08:31	07:51	06:51	06:37		05:32		06:10 (B 07)	04:54
	16:22	17:17	18:11	20:07		21:01	26	06:36 (B 07)	21:44
10	08:31	07:49	06:48	06:34		05:31		05:57 (B 04)	04:54
	16:23	17:19	18:13	20:09		21:02	29	06:36 (B 07)	21:44
11	08:30	07:47	06:46	06:32		05:29		05:55 (B 04)	04:53
	16:25	17:21	18:15	20:11		21:04	32	06:36 (B 07)	21:45
12	08:29	07:45	06:44	06:30		05:27		05:54 (B 04)	04:53
	16:26	17:23	18:17	20:13		21:06	34	06:37 (B 07)	21:46
13	08:29	07:43	06:41	06:27		05:25		05:52 (B 04)	04:53
	16:28	17:25	18:19	20:15		21:08	36	06:37 (B 07)	21:47
14	08:28	07:41	06:39	06:25		05:24		05:51 (B 04)	04:52
	16:29	17:27	18:20	20:16		21:09	38	06:37 (B 07)	21:47
15	08:27	07:39	06:36	06:23		05:22		05:49 (B 04)	04:52
	16:31	17:29	18:22	20:18		21:11	39	06:37 (B 07)	21:48
16	08:26	07:37	06:34	06:20		05:20		05:48 (B 04)	04:52
	16:33	17:31	18:24	20:20		21:12	40	06:37 (B 07)	21:48
17	08:25	07:35	06:32	06:18		05:19		05:48 (B 04)	04:52
	16:34	17:33	18:26	20:22		21:14	38	06:36 (B 07)	21:49
18	08:24	07:33	06:29	06:16		05:17		05:49 (B 04)	04:52
	16:36	17:35	18:28	20:24		21:16	35	06:36 (B 07)	21:49
19	08:23	07:31	06:27	06:14		05:16		05:50 (B 04)	04:52
	16:38	17:37	18:30	20:25		21:17	33	06:36 (B 07)	21:50
20	08:22	07:29	06:24	06:11		05:14		05:42 (B 05)	04:52
	16:40	17:39	18:31	20:27		21:19	31	06:35 (B 07)	21:50
21	08:21	07:27	06:22	06:09		05:13		05:41 (B 05)	04:52
	16:41	17:41	18:33	20:29		21:20	29	06:35 (B 07)	21:50
22	08:20	07:25	06:20	06:07		05:11		05:40 (B 05)	04:52
	16:43	17:43	18:35	20:31		21:22	30	06:35 (B 07)	21:51
23	08:18	07:22	06:17	06:05		05:10		05:39 (B 05)	04:52
	16:45	17:45	18:37	20:33		21:23	30	06:34 (B 07)	21:51
24	08:17	07:20	06:15	06:03		05:09		05:37 (B 05)	04:53
	16:47	17:47	18:39	20:34		21:25	30	06:33 (B 07)	21:51
25	08:16	07:18	06:12	06:00		05:08		05:36 (B 05)	04:53
	16:49	17:48	18:40	20:36		21:26	30	06:32 (B 07)	21:51
26	08:14	07:16	06:10	05:58		05:06		05:35 (B 05)	04:53
	16:50	17:50	18:42	20:38		21:28	29	06:31 (B 07)	21:51
27	08:13	07:14	06:08	05:56		05:05		05:34 (B 05)	04:54
	16:52	17:52	18:44	20:40	4	06:25 (B 06)	28	06:30 (B 07)	21:51
28	08:11	07:11	06:05	05:54		05:04		05:33 (B 05)	04:54
	16:54	17:54	18:46	20:41	7	06:26 (B 06)	28	06:29 (B 07)	21:51
29	08:10		07:03	05:52		05:03		05:32 (B 05)	04:55
	16:56		19:48	20:43	10	06:27 (B 06)	25	06:27 (B 07)	21:50
30	08:08		07:00	05:50		05:02		05:32 (B 05)	04:56
	16:58		19:49	20:45	12	06:27 (B 06)	16	05:48 (B 05)	21:50
31	08:07		06:58			05:01		05:33 (B 05)	
	17:00		19:51			21:34	16	05:49 (B 05)	
Sonnenscheinstunden	253	275	367	419		491		506	
astr.max.mögl.Beschattung				33		868		191	

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

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



## SHADOW - Kalender

Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand Schattenrezeptor: s70 - Wetzen, Zum Lerchenberg 37

## Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember	
1	04:56	05:43 (B 05)	05:35	06:05 (B 04)	06:28	07:19	07:16	08:10			
	21:50	9 05:52 (B 05)	21:16	33 06:47 (B 07)	20:11	18:59	16:50	16:07			
2	04:57	05:42 (B 05)	05:37	06:06 (B 04)	06:29	07:21	07:18	08:11			
	21:50	10 05:52 (B 05)	21:14	32 06:47 (B 07)	20:09	18:56	16:48	16:06			
3	04:58	05:42 (B 05)	05:38	06:08 (B 04)	06:31	07:23	07:20	08:13			
	21:49	11 05:53 (B 05)	21:12	29 06:47 (B 07)	20:06	18:54	16:46	16:05			
4	04:59	05:42 (B 05)	05:40	06:20 (B 07)	06:33	07:25	07:22	08:14			
	21:49	11 05:53 (B 05)	21:11	26 06:46 (B 07)	20:04	18:51	16:44	16:05			
5	04:59	05:42 (B 05)	05:41	06:21 (B 07)	06:34	07:26	07:24	08:15			
	21:48	12 05:54 (B 05)	21:09	25 06:46 (B 07)	20:01	18:49	16:42	16:04			
6	05:00	05:41 (B 05)	05:43	06:22 (B 07)	06:36	07:28	07:25	08:17			
	21:48	13 05:54 (B 05)	21:07	23 06:45 (B 07)	19:59	18:47	16:40	16:04			
7	05:01	05:41 (B 05)	05:45	06:22 (B 07)	06:38	07:30	07:27	08:18			
	21:47	14 05:55 (B 05)	21:05	22 06:44 (B 07)	19:57	18:44	16:38	16:03			
8	05:02	05:41 (B 05)	05:46	06:21 (B 06)	06:40	07:32	07:29	08:19			
	21:46	14 05:55 (B 05)	21:03	22 06:43 (B 07)	19:54	18:42	16:37	16:03			
9	05:03	05:41 (B 05)	05:48	06:20 (B 06)	06:41	07:34	07:31	08:21			
	21:45	15 05:56 (B 05)	21:01	21 06:41 (B 07)	19:52	18:40	16:35	16:02			
10	05:04	05:41 (B 05)	05:50	06:20 (B 06)	06:43	07:35	07:33	08:22			
	21:45	15 05:56 (B 05)	20:59	19 06:39 (B 07)	19:49	18:37	16:33	16:02			
11	05:05	05:41 (B 05)	05:52	06:20 (B 06)	06:45	07:37	07:35	08:23			
	21:44	15 05:56 (B 05)	20:57	16 06:36 (B 06)	19:47	18:35	16:31	16:02			
12	05:06	05:41 (B 05)	05:53	06:22 (B 06)	06:46	07:39	07:37	08:24			
	21:43	16 05:57 (B 05)	20:55	14 06:36 (B 06)	19:45	18:33	16:30	16:02			
13	05:08	05:41 (B 05)	05:55	06:24 (B 06)	06:48	07:41	07:39	08:25			
	21:42	16 05:57 (B 05)	20:53	12 06:36 (B 06)	19:42	18:30	16:28	16:02			
14	05:09	05:41 (B 05)	05:57	06:25 (B 06)	06:50	07:43	07:40	08:26			
	21:41	22 06:35 (B 07)	20:51	9 06:34 (B 06)	19:40	18:28	16:27	16:02			
15	05:10	05:42 (B 05)	05:58	06:27 (B 06)	06:52	07:44	07:42	08:27			
	21:40	26 06:38 (B 07)	20:49	7 06:34 (B 06)	19:37	18:26	16:25	16:02			
16	05:11	05:43 (B 05)	06:00	06:28 (B 06)	06:53	07:46	07:44	08:28			
	21:39	28 06:39 (B 07)	20:47	4 06:32 (B 06)	19:35	18:24	16:24	16:02			
17	05:13	05:44 (B 05)	06:02		06:55	07:48	07:46	08:29			
	21:38	29 06:40 (B 07)	20:45		19:33	18:21	16:22	16:02			
18	05:14	05:45 (B 05)	06:03		06:57	07:50	07:48	08:29			
	21:37	30 06:41 (B 07)	20:42		19:30	18:19	16:21	16:02			
19	05:15	05:47 (B 05)	06:05		06:58	07:52	07:50	08:30			
	21:35	30 06:43 (B 07)	20:40		19:28	18:17	16:19	16:02			
20	05:17	05:48 (B 05)	06:07		07:00	07:54	07:51	08:31			
	21:34	31 06:44 (B 07)	20:38		19:25	18:15	16:18	16:03			
21	05:18	05:49 (B 05)	06:09		07:02	07:55	07:53	08:31			
	21:33	30 06:44 (B 07)	20:36		19:23	18:12	16:17	16:03			
22	05:20	05:50 (B 05)	06:10		07:04	07:57	07:55	08:32			
	21:31	29 06:44 (B 07)	20:34		19:20	18:10	16:16	16:04			
23	05:21	05:52 (B 05)	06:12		07:05	07:59	07:57	08:32			
	21:30	29 06:46 (B 07)	20:32		19:18	18:08	16:14	16:04			
24	05:22	05:53 (B 05)	06:14		07:07	08:01	07:58	08:33			
	21:29	34 06:46 (B 07)	20:29		19:16	18:06	16:13	16:05			
25	05:24	06:00 (B 04)	06:16		07:09	07:03	08:00	08:33			
	21:27	35 06:47 (B 07)	20:27		19:13	17:04	16:12	16:05			
26	05:25	05:59 (B 04)	06:17		07:11	07:05	08:02	08:34			
	21:26	37 06:47 (B 07)	20:25		19:11	17:02	16:11	16:06			
27	05:27	05:58 (B 04)	06:19		07:12	07:07	08:03	08:34			
	21:24	39 06:47 (B 07)	20:22		19:08	17:00	16:10	16:07			
28	05:29	05:59 (B 04)	06:21		07:14	07:08	08:05	08:34			
	21:23	38 06:47 (B 07)	20:20		19:06	16:58	16:09	16:08			
29	05:30	06:00 (B 04)	06:22		07:16	07:10	08:07	08:34			
	21:21	38 06:47 (B 07)	20:18		19:03	16:56	16:08	16:09			
30	05:32	06:02 (B 04)	06:24		07:18	07:12	08:08	08:34			
	21:19	37 06:48 (B 07)	20:16		19:01	16:54	16:07	16:09			
31	05:33	06:03 (B 04)	06:26			07:14		08:34			
	21:18	35 06:47 (B 07)	20:13			16:52		16:10			
Sonnenscheinstunden	509		458		382	329	262	237			
astr.max.mögl.Beschattung	748		314								

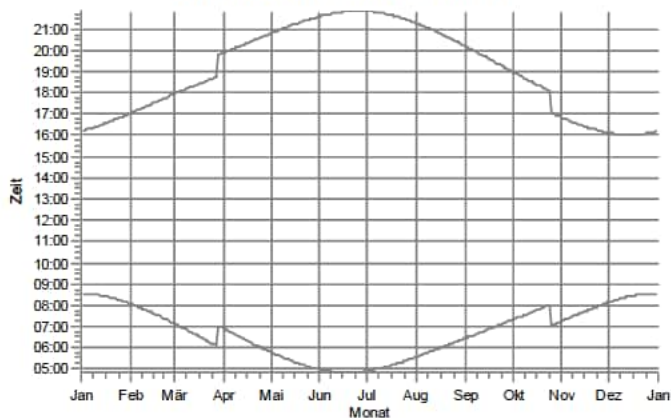
Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

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

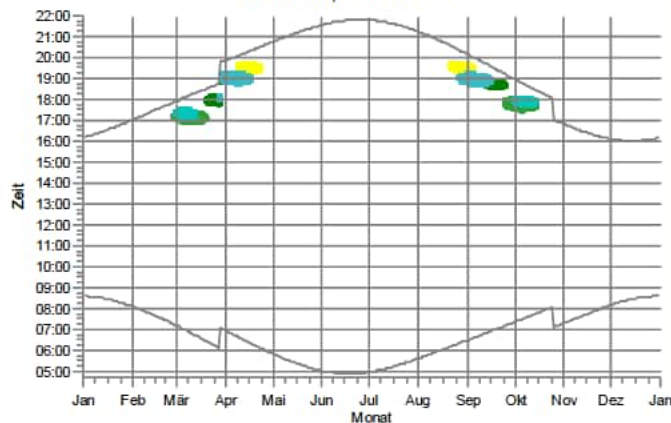
## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand

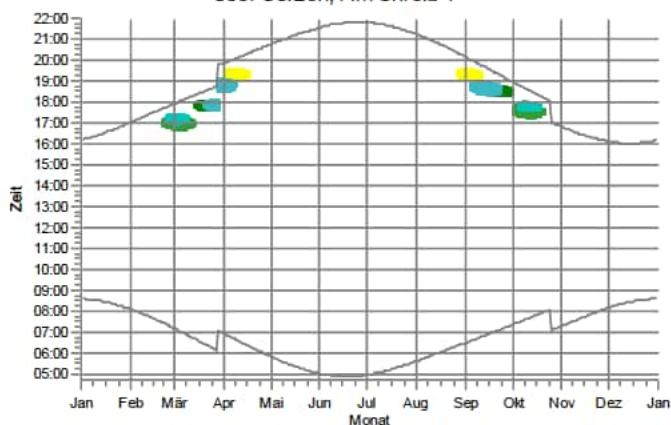
s01: Neu Oerzen, Soltauer Straße 1



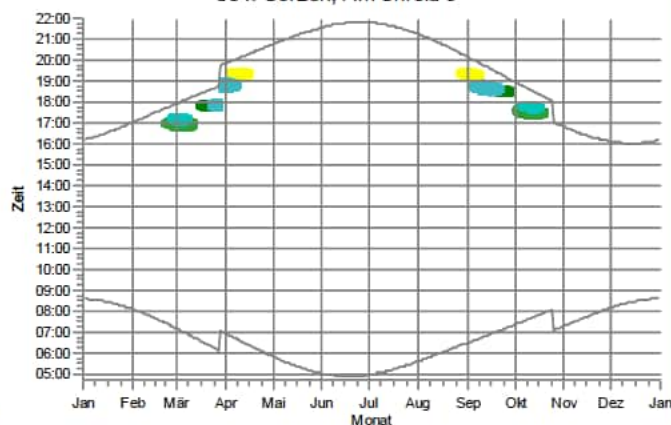
s02: Oerzen, Am Ohfeld 1



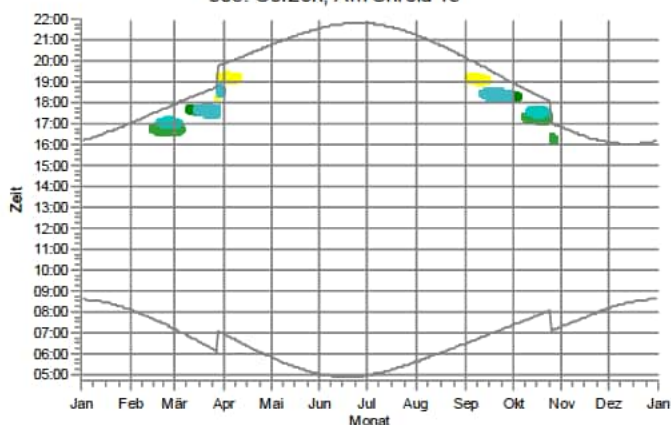
s03: Oerzen, Am Ohfeld 4



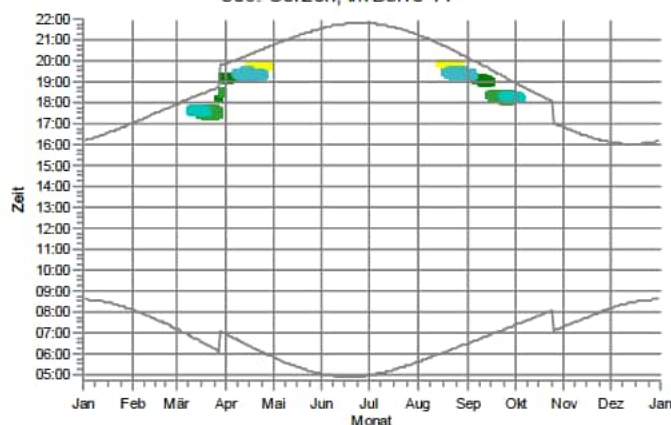
s04: Oerzen, Am Ohfeld 9



s05: Oerzen, Am Ohfeld 15



s06: Oerzen, Im Dorfe 14



WEA

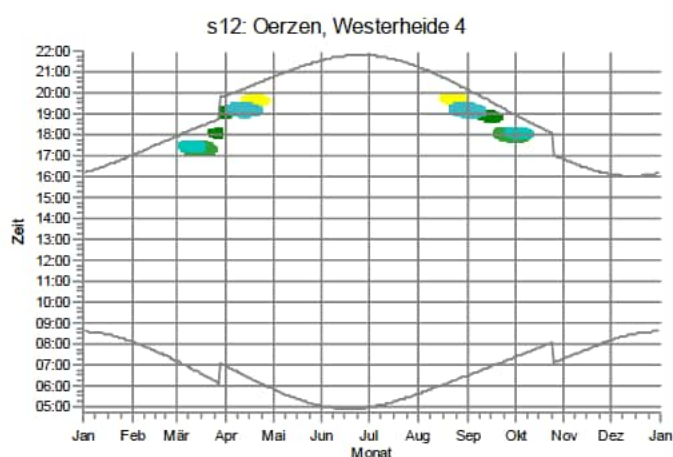
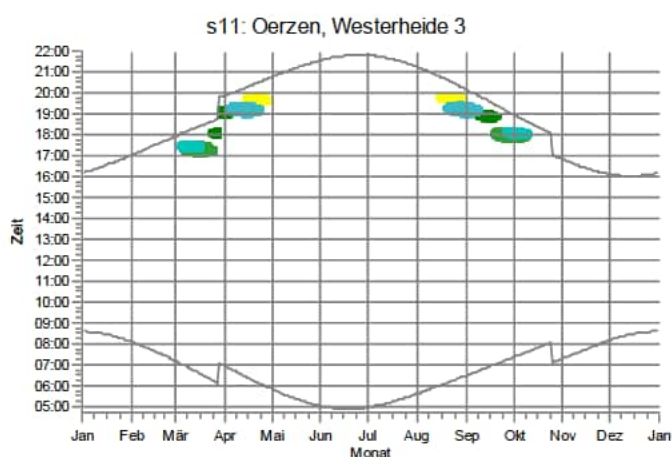
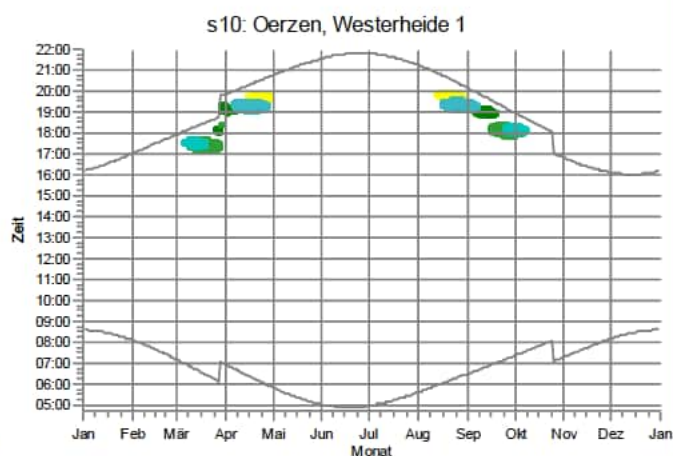
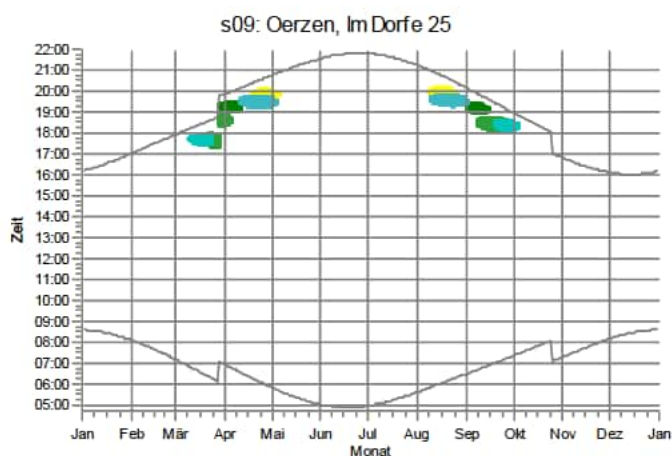
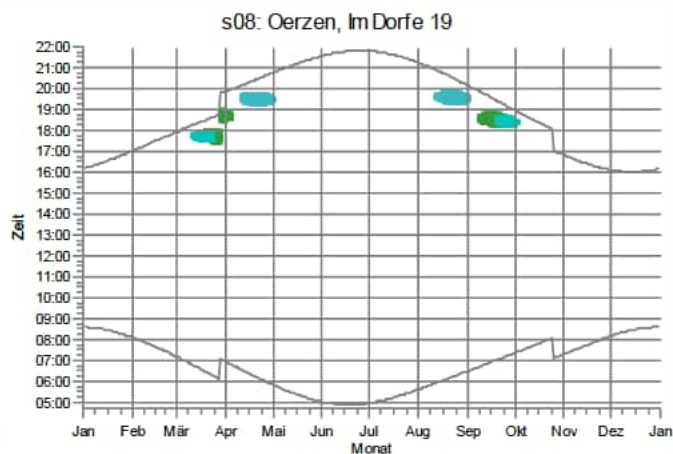
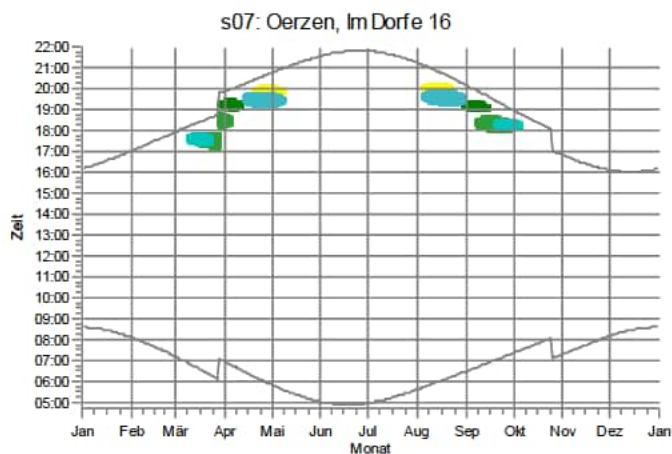
Rep 10: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (332)  
Rep 11: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (333)  
Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)

Oerzen 2: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (80)  
Oerzen 3: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (81)



## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



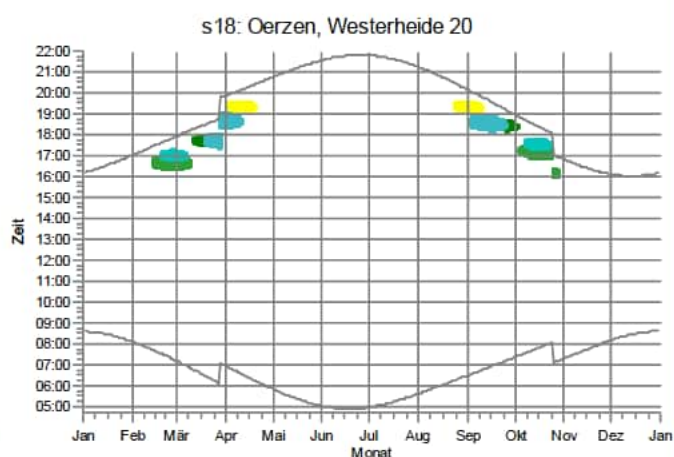
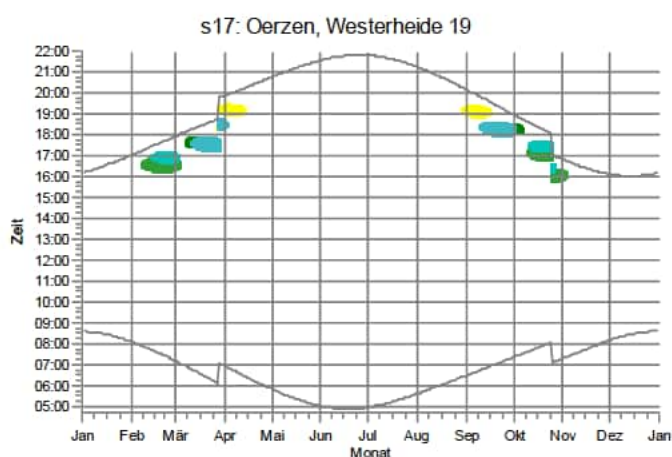
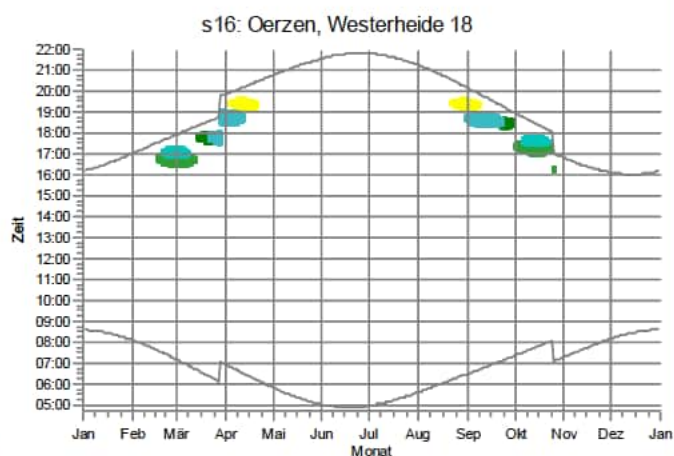
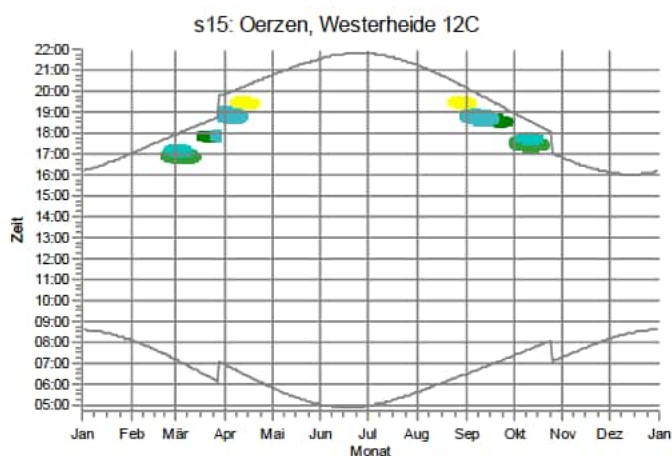
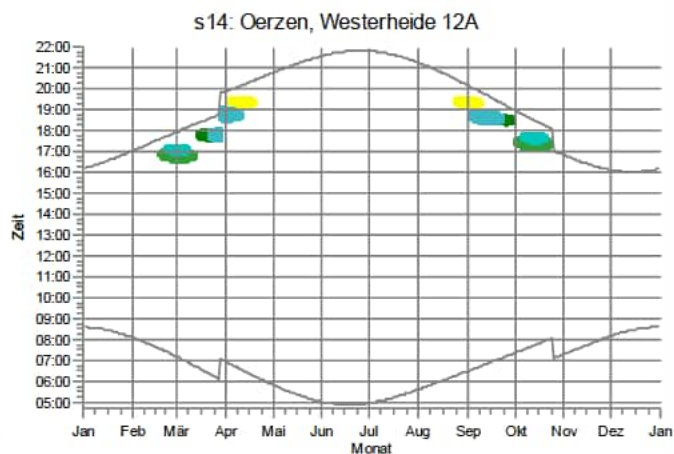
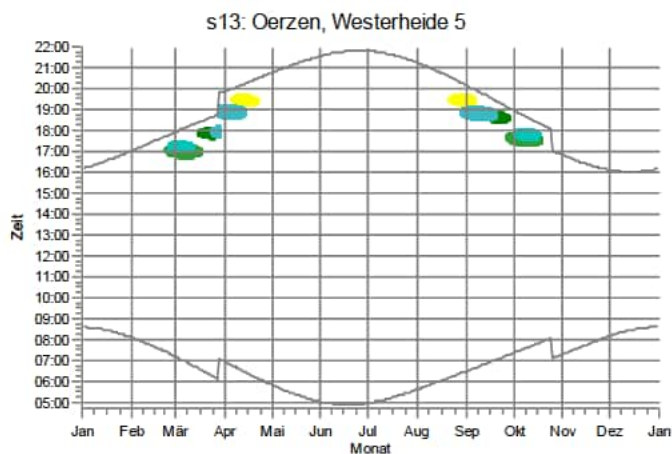
WEA

Rep 10: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (332)  
Rep 11: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (333)  
Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)

Oerzen 2: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (80)  
Oerzen 3: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (81)

## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



WEA

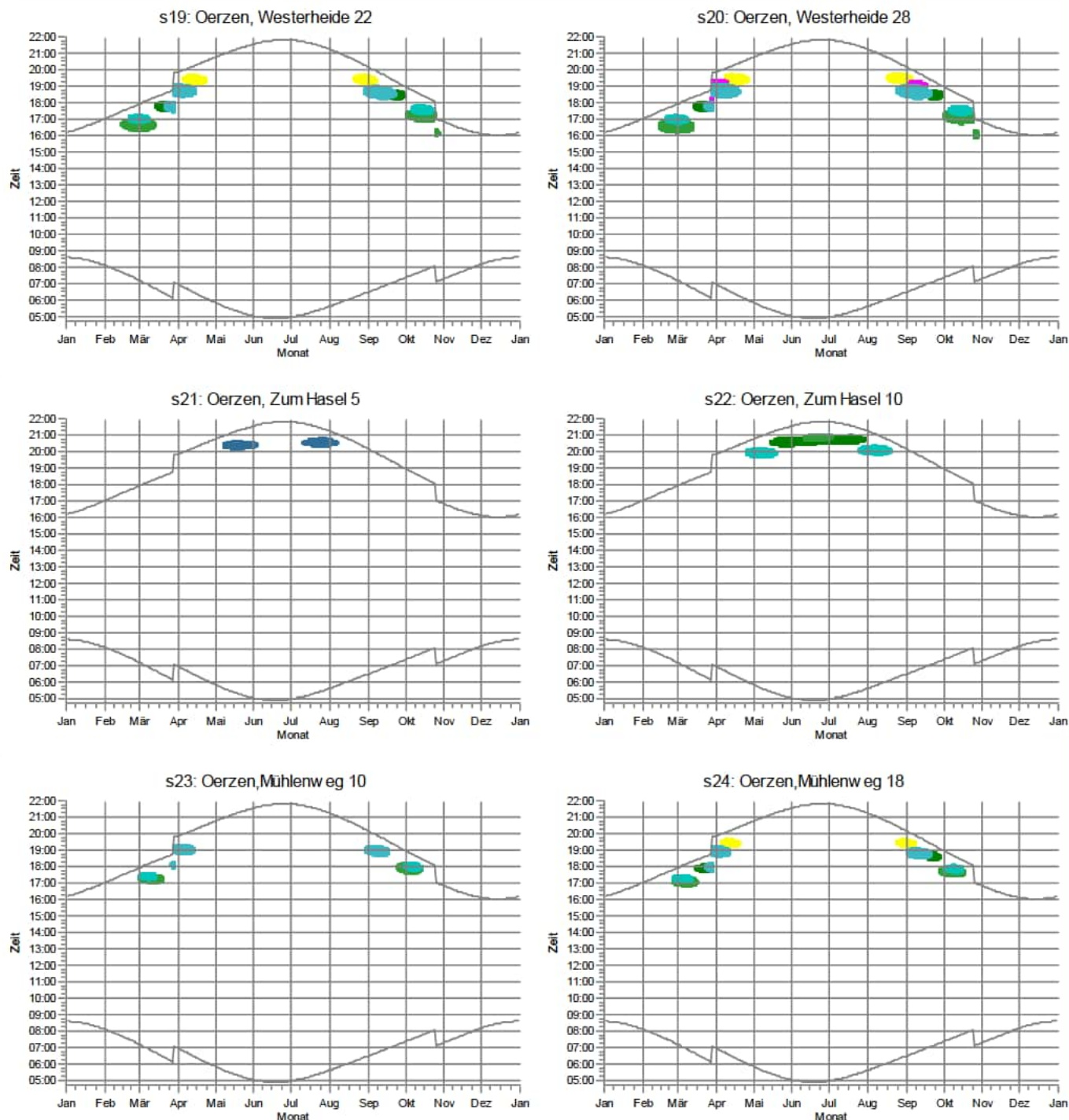
Rep 10: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (332)  
Rep 11: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (333)  
Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)

Oerzen 2: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (80)  
Oerzen 3: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (81)



## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



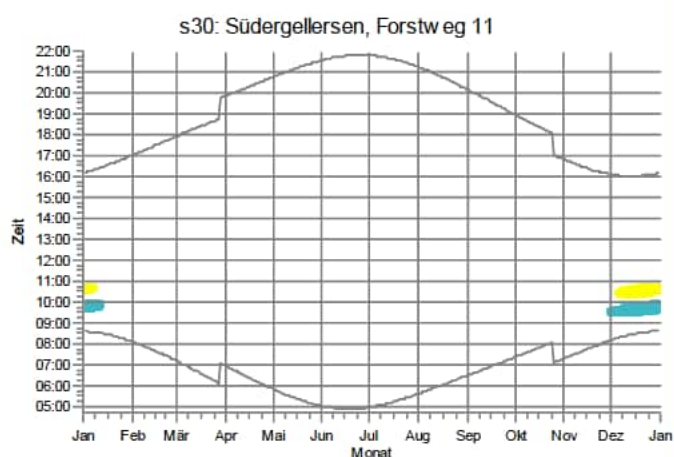
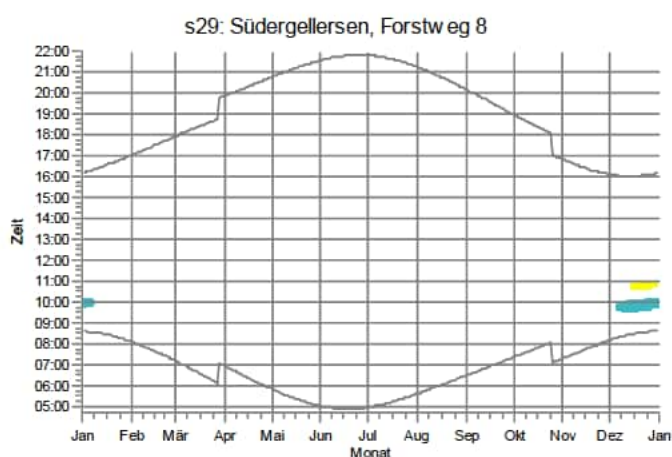
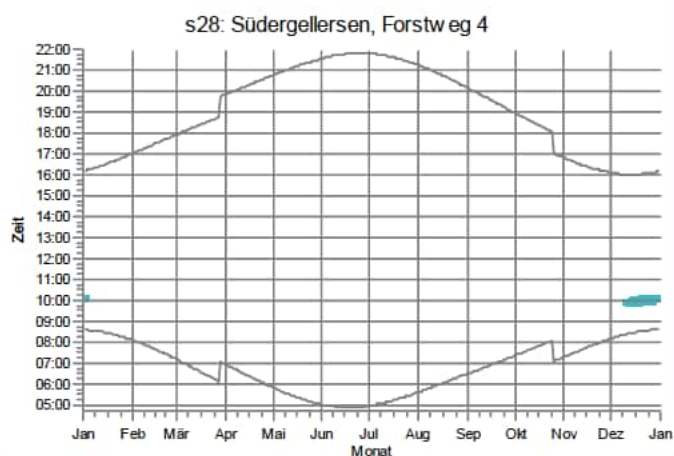
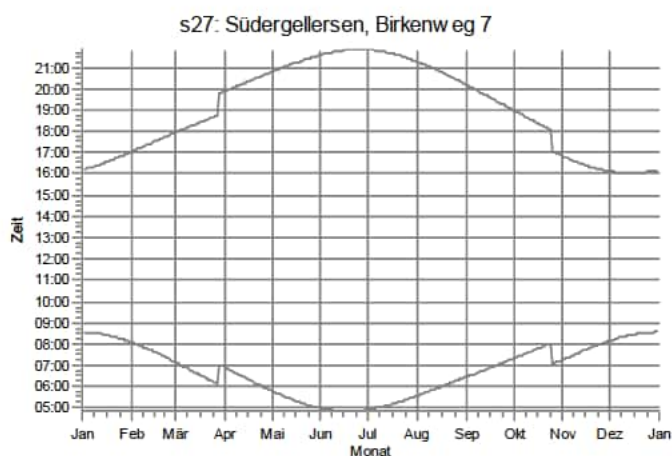
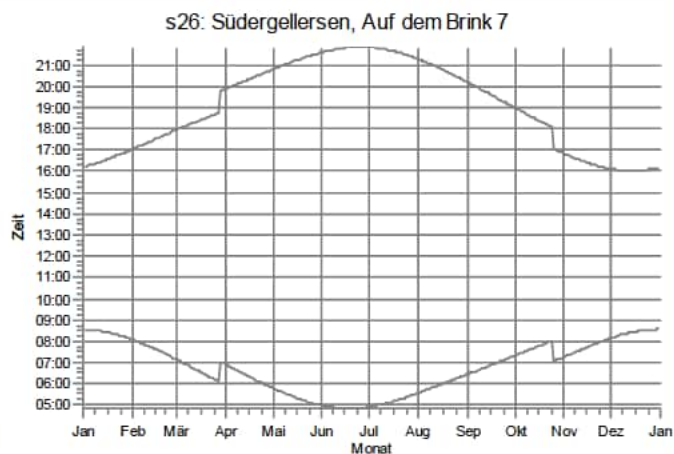
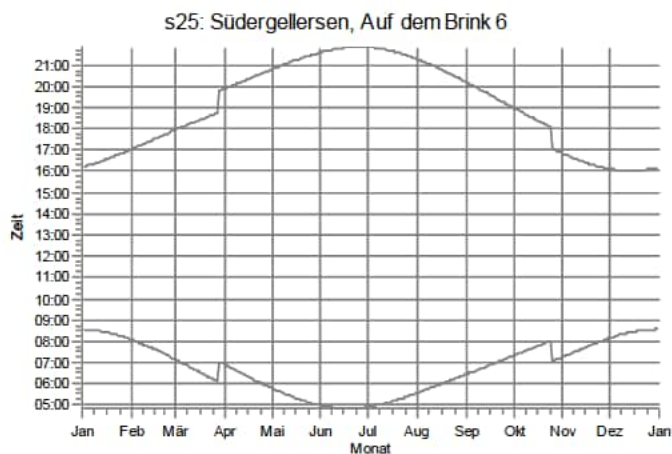
WEA

Rep 10: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (332)  
Rep 11: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (333)  
Rep 9: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (331)  
Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)

Oerzen 2: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (80)  
Oerzen 3: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (81)  
Oerzen 4: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (82)

## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



WEA

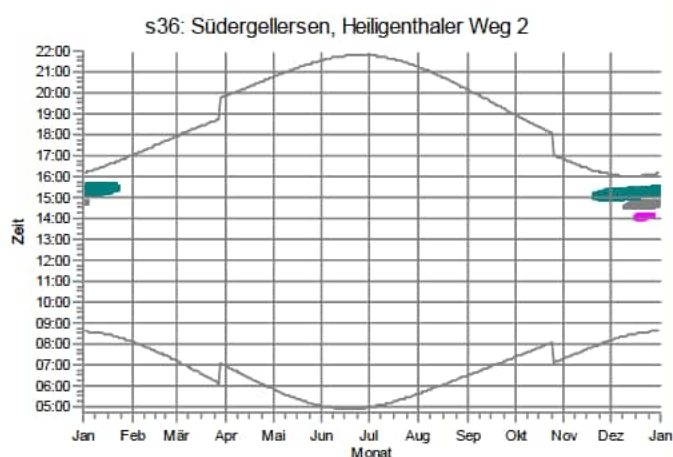
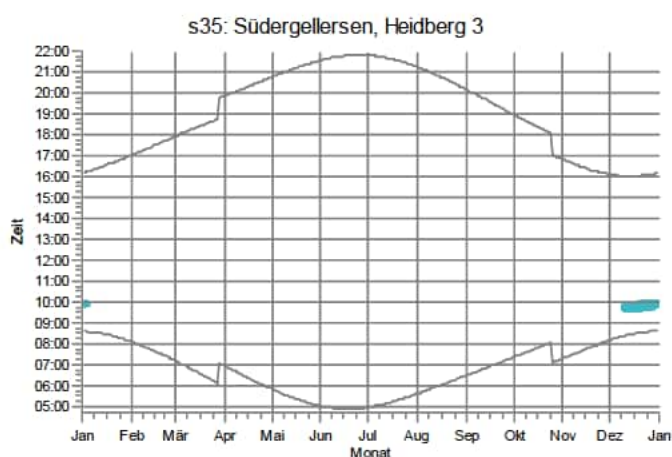
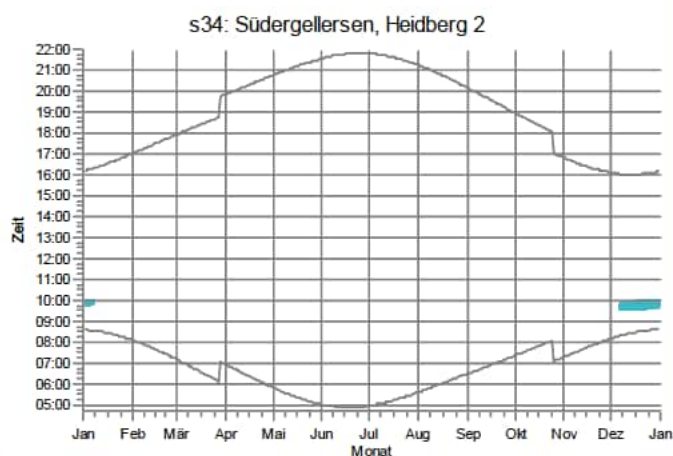
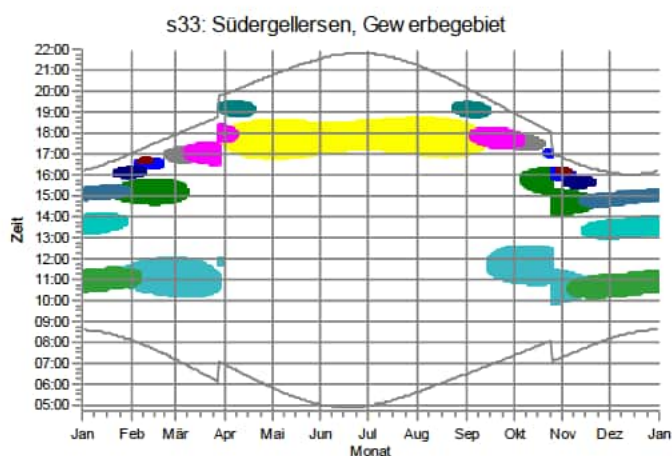
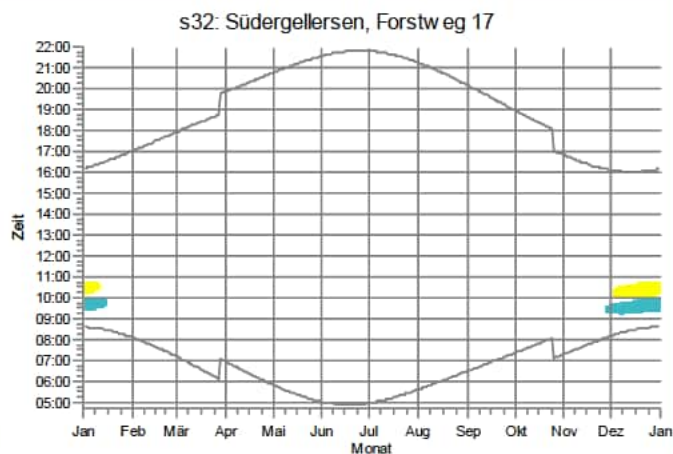
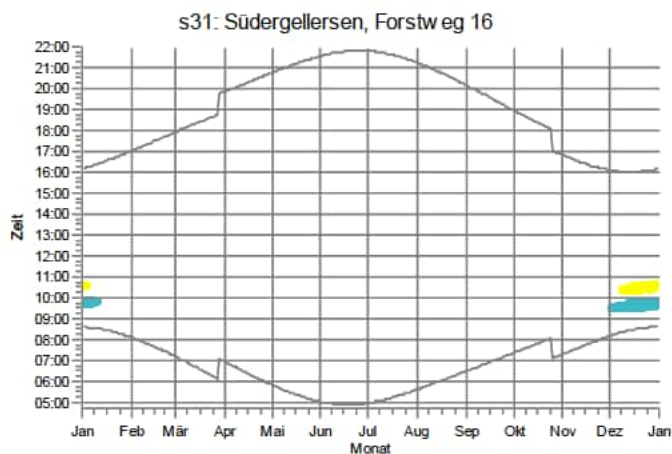
Rep 11: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (333)

Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)



## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



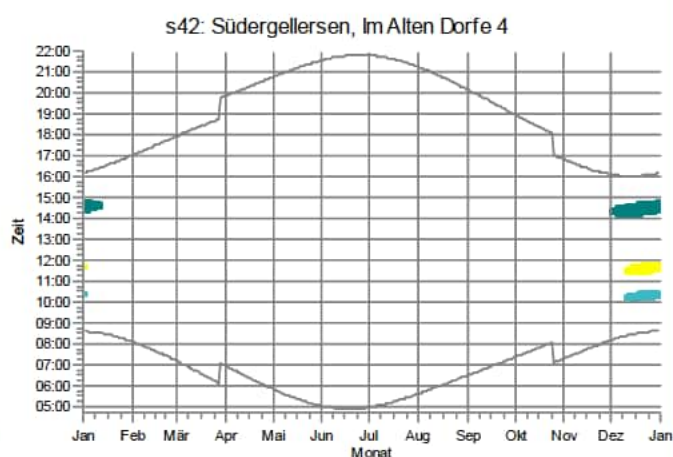
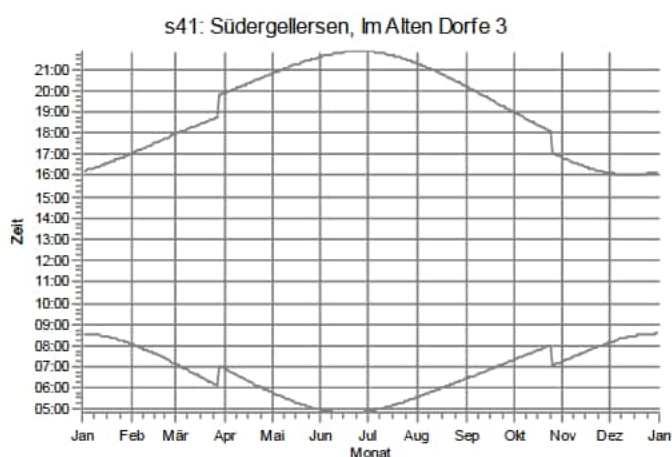
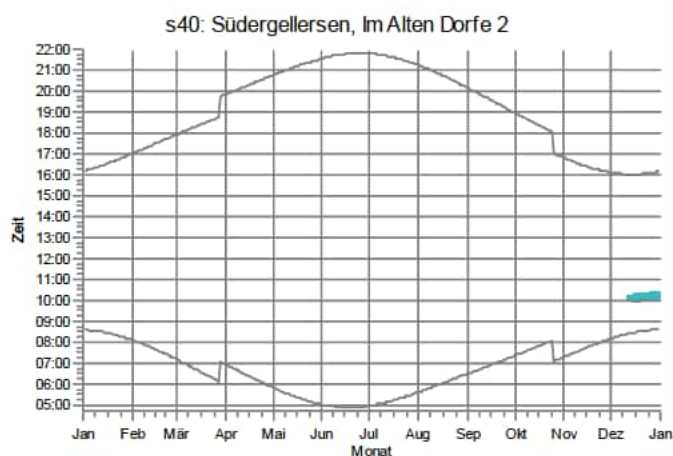
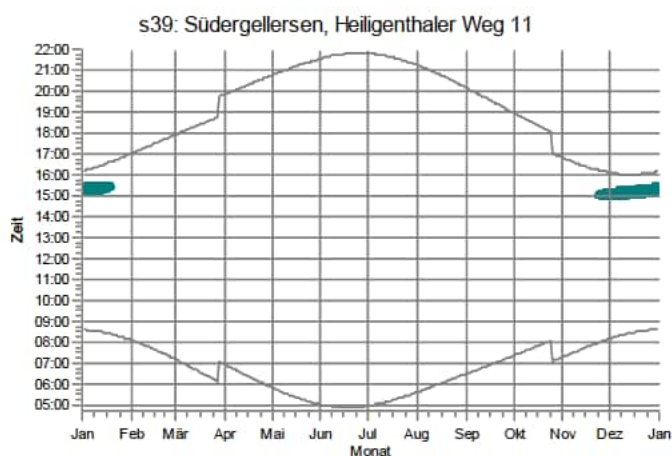
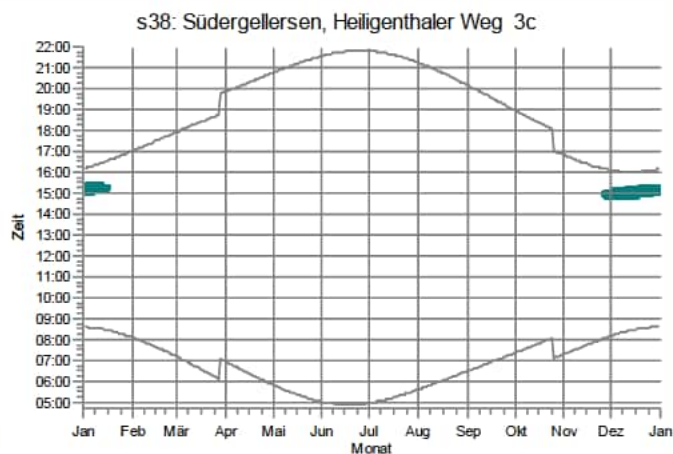
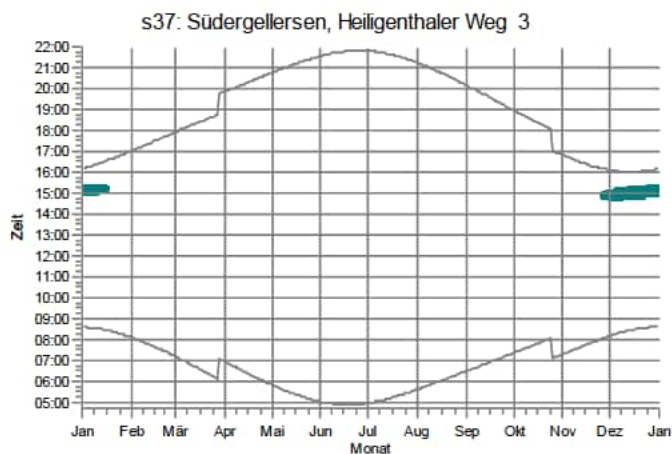
WEA

Rep 10: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (332)  
Rep 11: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (333)  
Rep 5: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (329)  
Rep 8: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (330)  
Rep 9: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (331)  
B 01: NORDEX N149/4.0-4.5 4500 149.0 I-I NH: 125,0 m (Ges:199,5 m) (101)

B 02: NORDEX N131/3300 DE 3300 131.0 I-I NH: 134,0 m (Ges:199,5 m) (120)  
B 03: GE WIND ENERGY GE 2.75-120 2750 120.0 I-I NH: 139,0 m (Ges:199,0 m) (94)  
Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)  
Oerzen 2: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (80)  
Oerzen 3: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (81)  
Oerzen 4: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (82)

## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



WEA

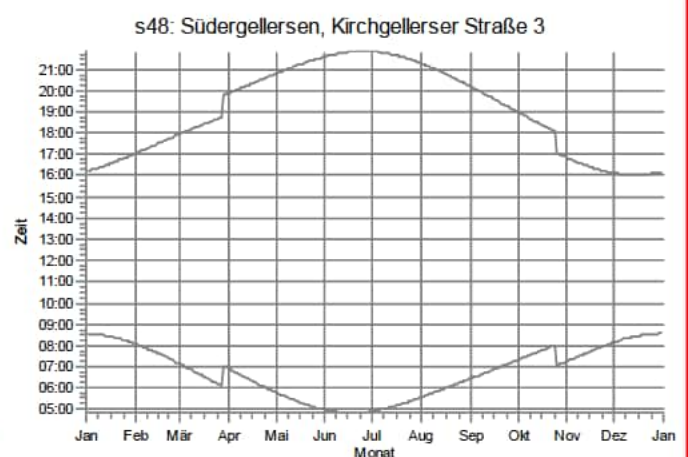
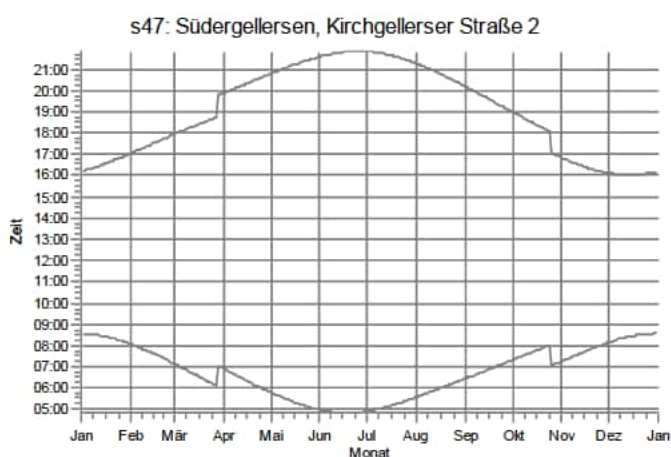
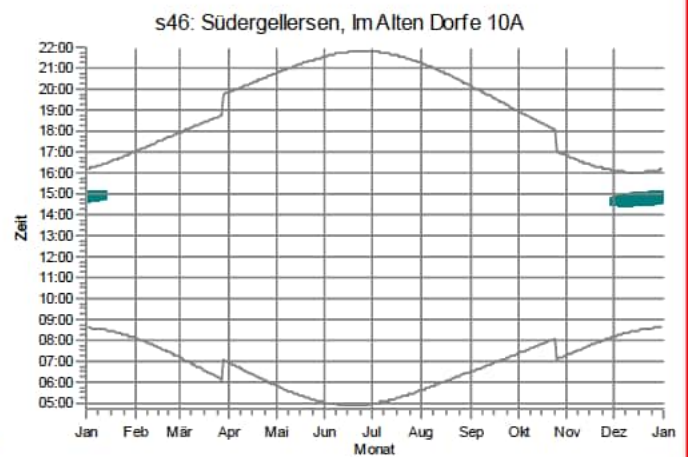
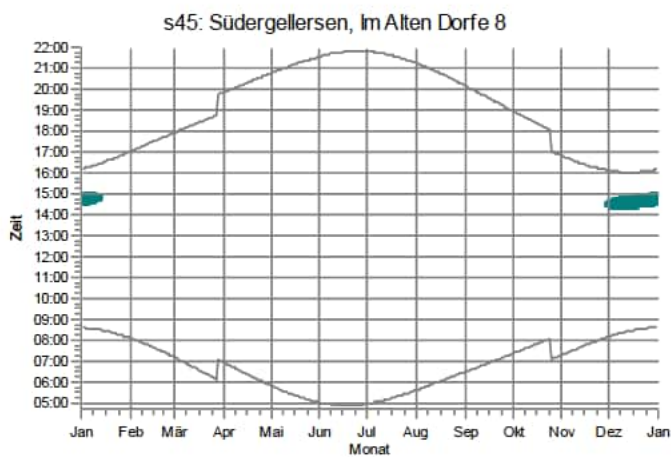
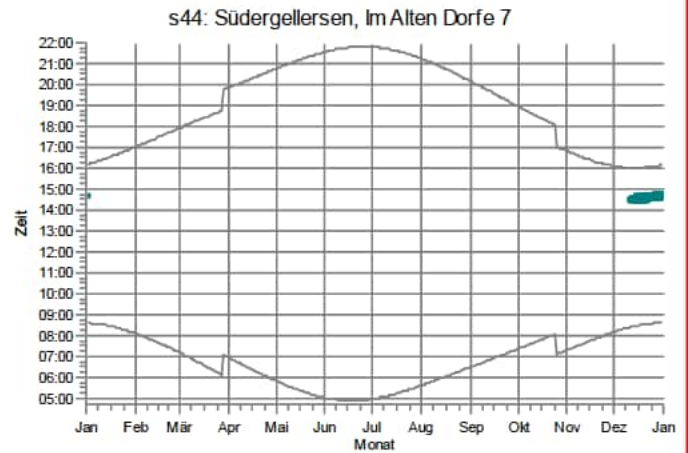
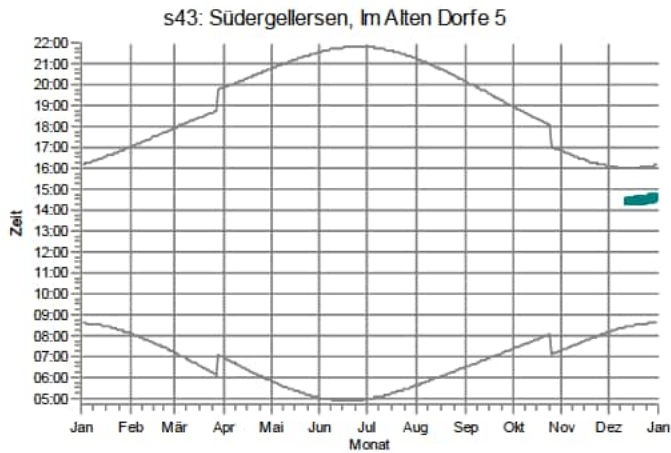
Rep 11: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (333)  
B 01: NORDEX N149/4.0-4.5 4500 149.0 I01 NH: 125,0 m (Ges:199,5 m) (101)

Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)



## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand

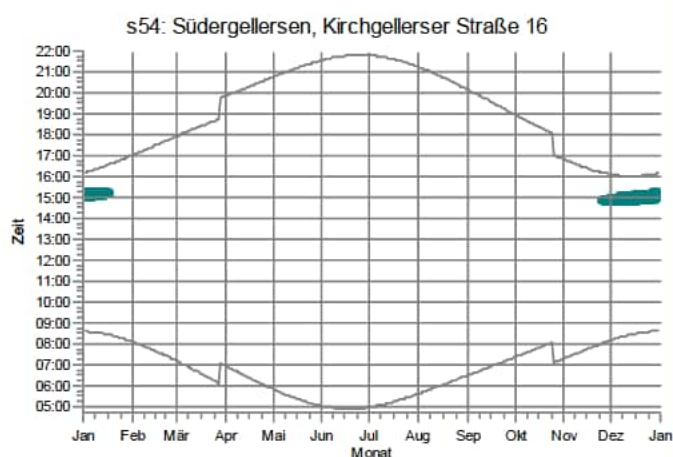
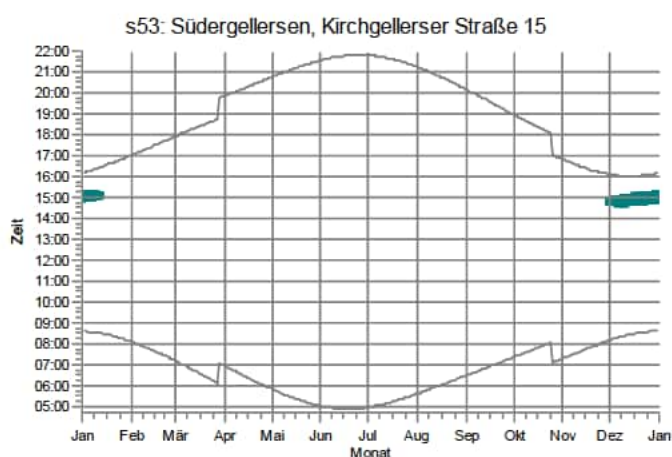
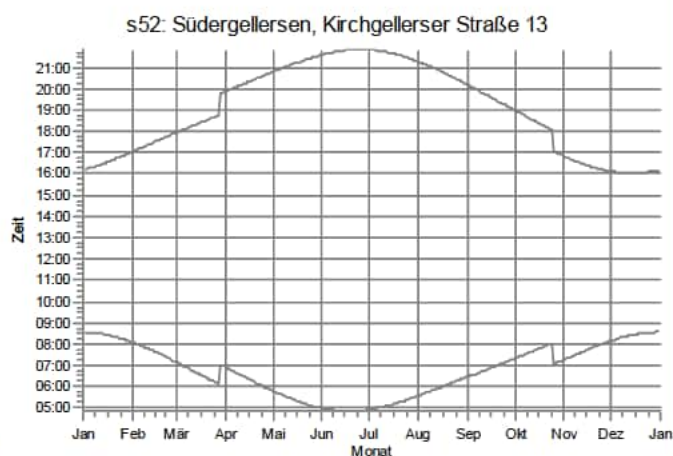
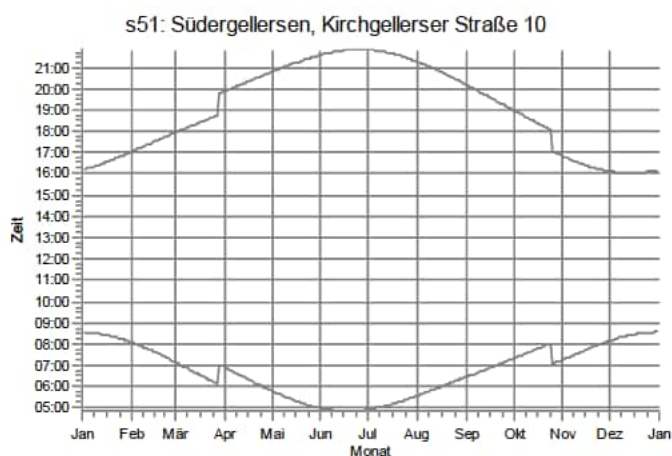
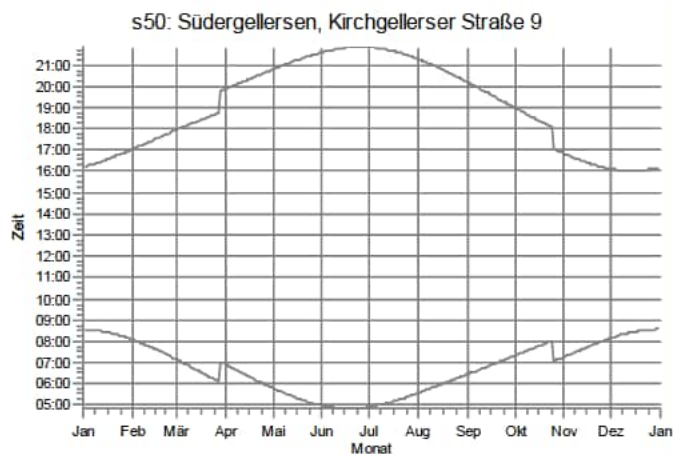
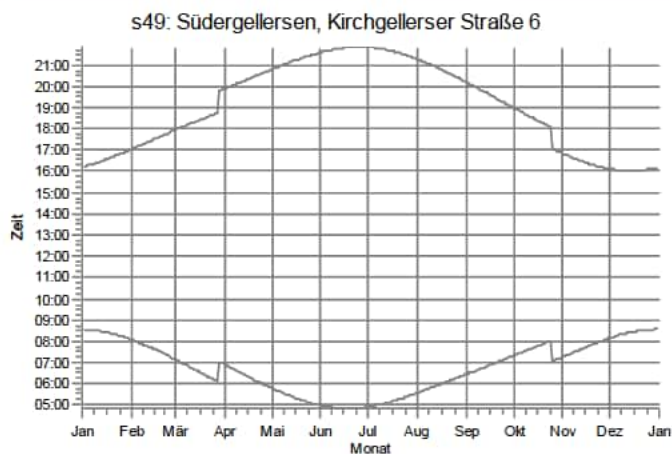


WEA

B 01: NORDEX N149/4.0-4.5 4500 149.0 101 NH: 125,0 m (Ges:199,5 m) (101)

## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



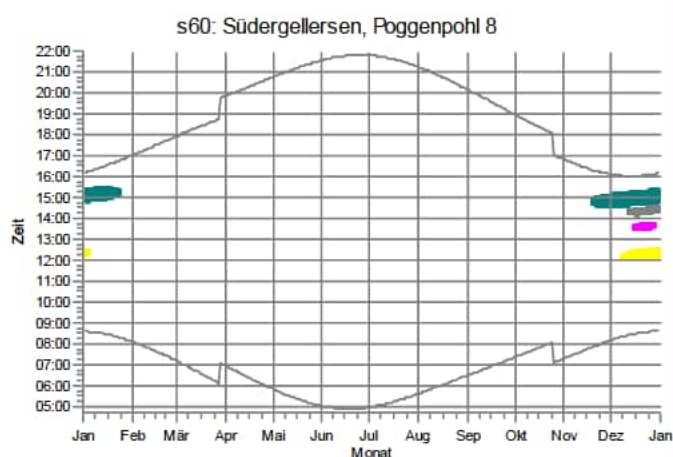
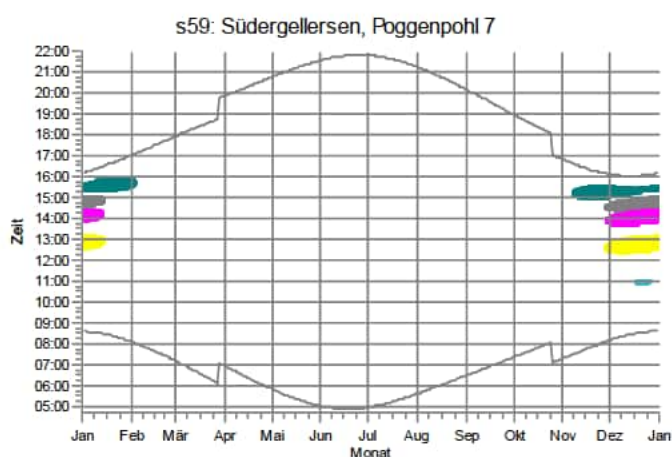
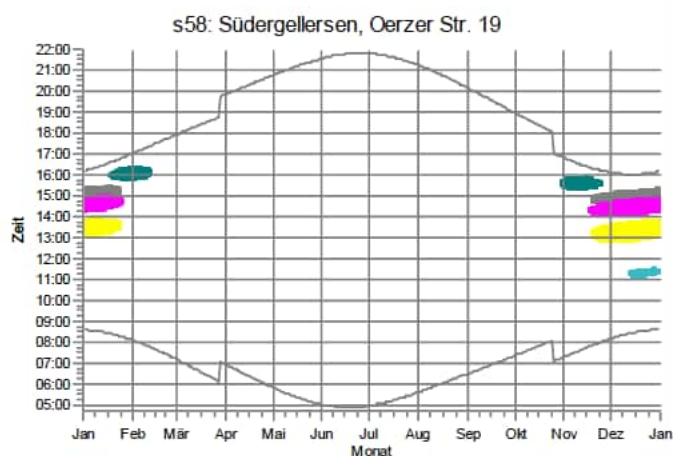
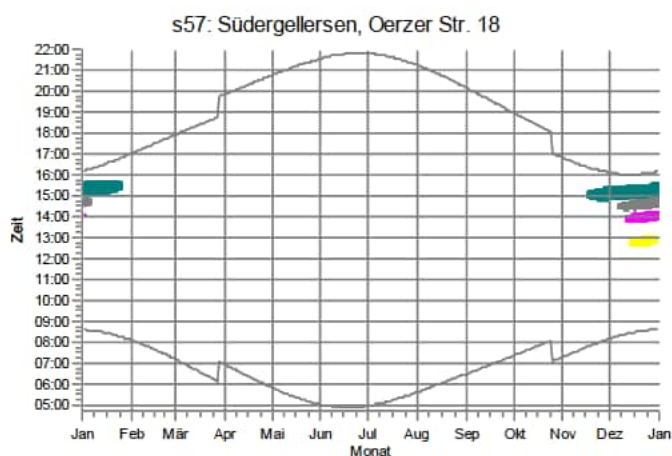
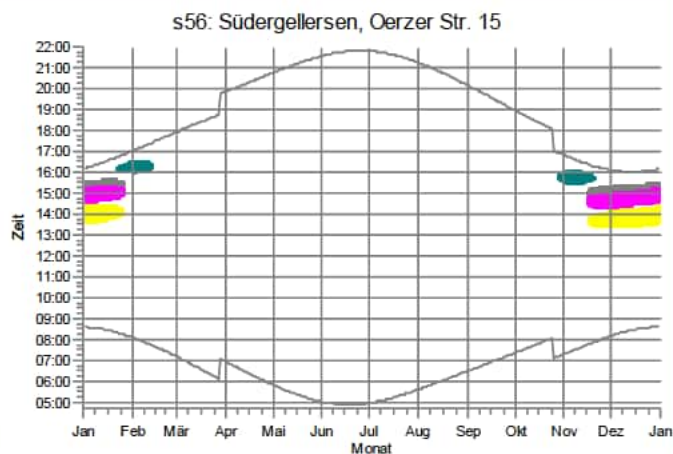
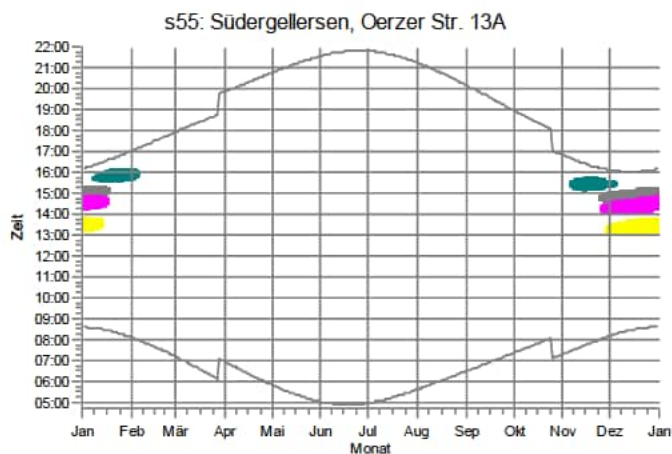
WEA

B 01: NORDEX N149/4.0-4.5 4500 149.0 101 NH: 125,0 m (Ges:199,5 m) (101)



## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



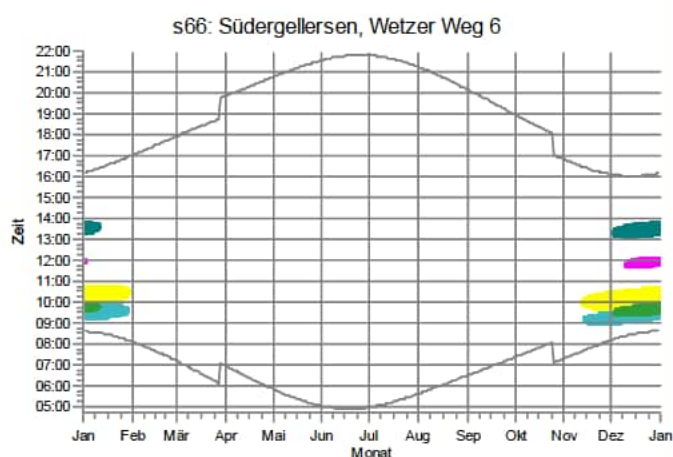
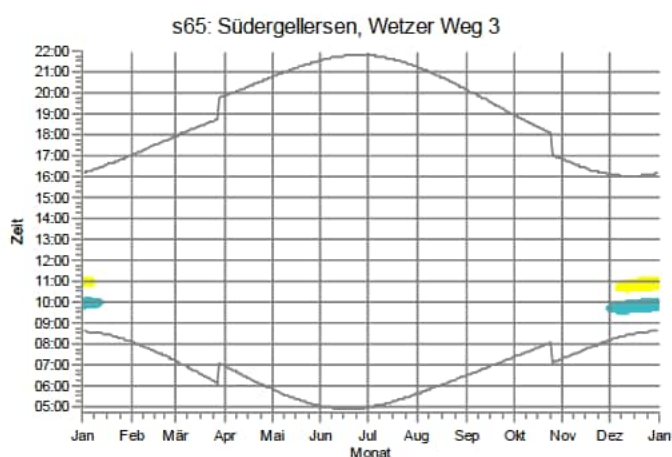
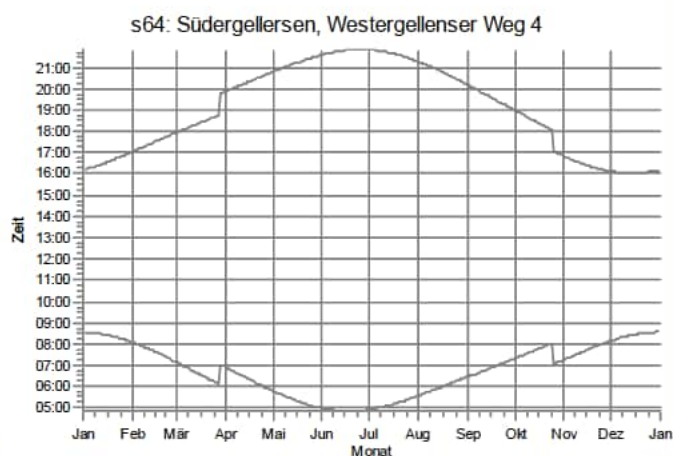
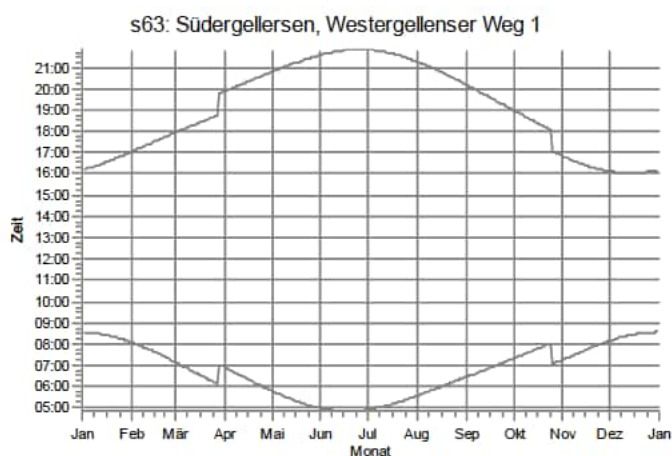
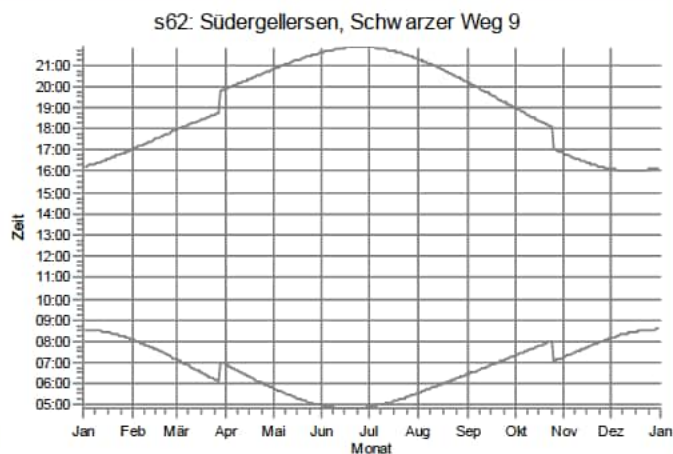
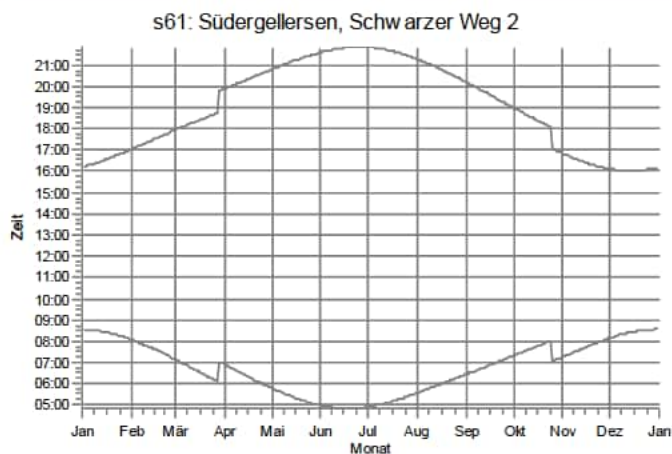
WEA

Rep 11: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (333)  
Rep 8: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (330)  
Rep 9: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (331)

B 01: NORDEX N149/4.0-4.5 4500 149.0 I-I NH: 125,0 m (Ges:199,5 m) (101)  
Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)

## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



WEA

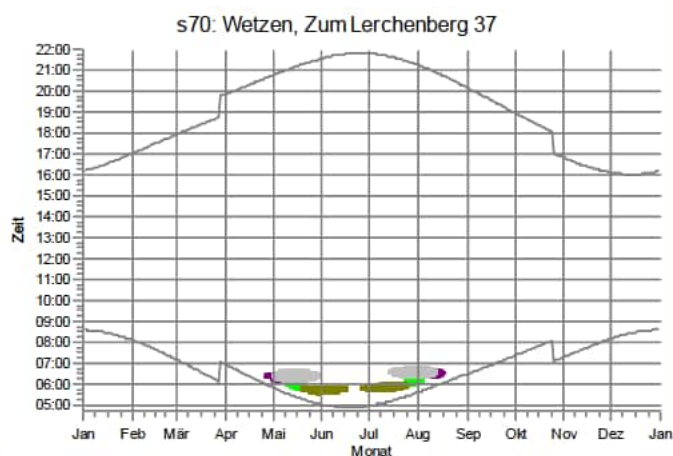
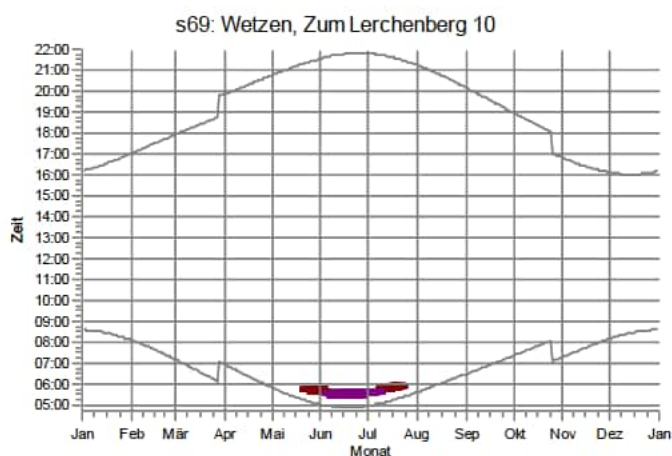
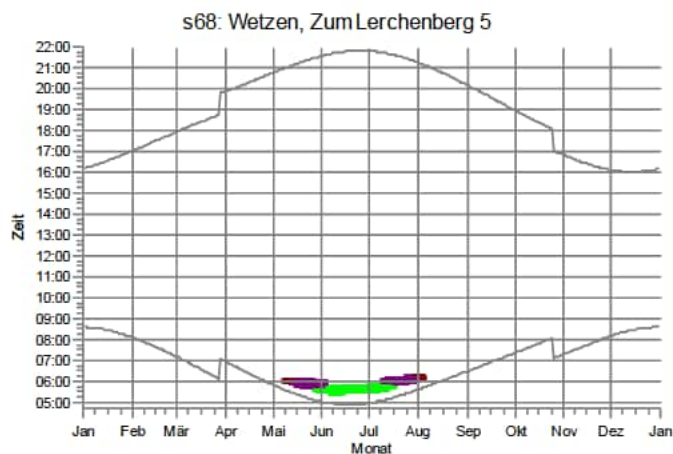
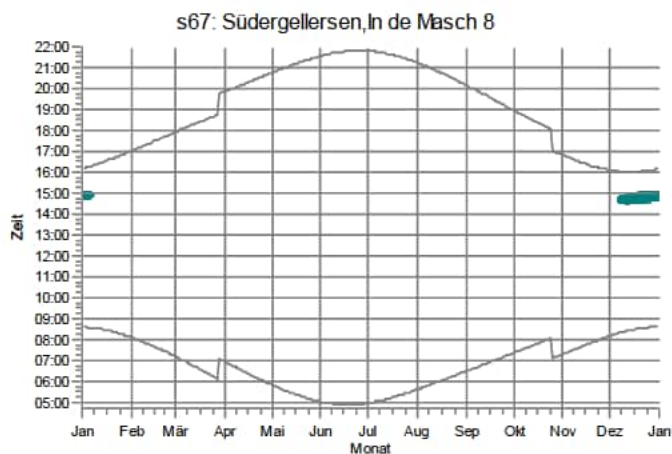
Rep 11: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (333)  
Rep 9: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (331)  
B 01: NORDEX N149/4.0-4.5 4500 149.0 I-I NH: 125,0 m (Ges:199,5 m) (101)

Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)  
Oerzen 2: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (80)



## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



### WEA

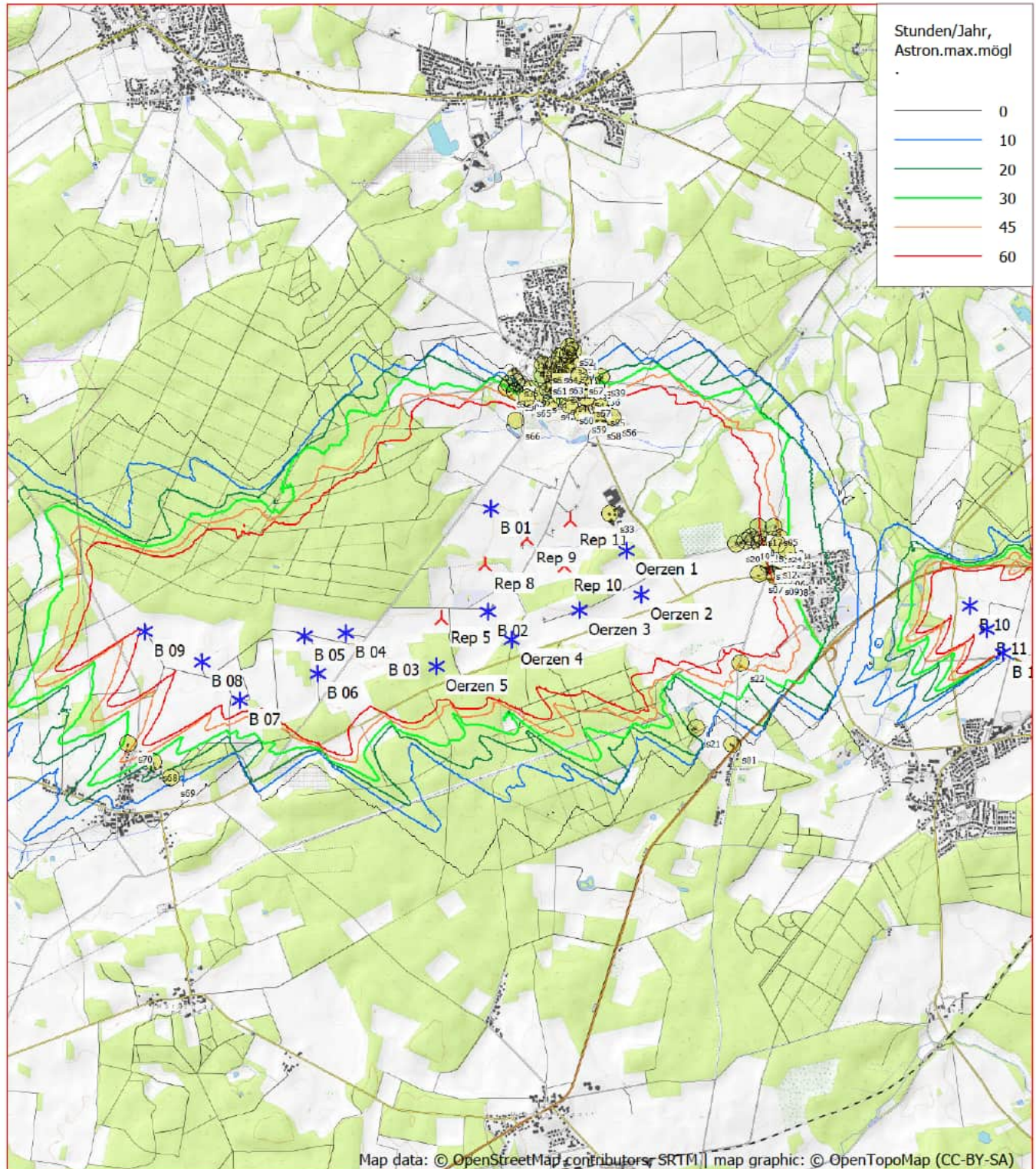
B 01: NORDEX N149/4.0-4.5 4500 149.0 IOI NH: 125,0 m (Ges:199,5 m) (101)  
B 03: GE WIND ENERGY GE 2.75-120 2750 120.0 IOI NH: 139,0 m (Ges:199,0 m) (94)  
B 04: GE WIND ENERGY GE 2.75-120 2750 120.0 IOI NH: 139,0 m (Ges:199,0 m) (95)

B 05: GE WIND ENERGY GE 2.75-120 2750 120.0 IOI NH: 139,0 m (Ges:199,0 m) (96)  
B 06: GE WIND ENERGY GE 2.75-120 2750 120.0 IOI NH: 139,0 m (Ges:199,0 m) (97)  
B 07: GE WIND ENERGY GE 2.75-120 2750 120.0 IOI NH: 139,0 m (Ges:199,0 m) (98)



## SHADOW - Karte

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



0 500 1000 1500 2000 m

Karte: OpenTopoMap.org, Maßstab 1:50.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 586.120,0 Nord: 5.894.340,0

⚡ Neue WEA    ⚙ Existierende WEA    📍 Schattenrezeptor

Höhe der Schattenkarte: Höhenlinien: CONTOURLINE\_ONLINEDATA\_0.wpo (1)

Zeitschritt: 2 Minuten, Schrittweite: 2 Tag(e), Kartenaufösung: 20 m, Sichtbarkeit Auflösung: 5 m, Augenhöhe: 1,5 m



## **Berechnung: Zusatzbelastung Repowering 5x N175**

Hauptergebnis	4 Seiten
Grafischer Kalender	12 Seiten
Karte	1 Seite

## SHADOW - Hauptergebnis

**Berechnung:** Zusatzbelastung Repowering 5x N175

### 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 Sonneneinstrahlungsrichtung

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:

DHM: Höhenlinien: CONTOURLINE\_ONLINEDATA\_0.wpo (1)

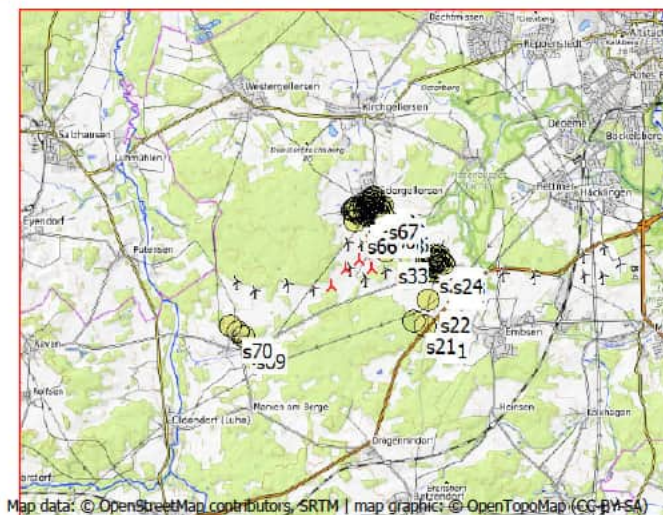
Rasterauflösung: 1,0 m

Alle Koordinatenangaben in:

UTM (north)-ETRS89 Zone: 32

### WEA

	Ost	Nord	Z	Beschreibung	WEA-Typ			Nenn- leistung	Rotor- durch- messer	NH	Schattendaten	
					Aktu- ell	Hersteller	Typ				Beschatt.- Bereich	U/min
			[m]					[kW]	[m]	[m]	[m]	[U/min]
Rep 10	586.619,0	5.894.596,4	42,4	NORDEX N175/6.X 6800 1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Rep 11	586.661,3	5.895.000,3	44,3	NORDEX N175/6.X 6800 1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Rep 5	585.563,4	5.894.124,0	45,0	NORDEX N175/6.X 6800 1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Rep 8	585.927,2	5.894.596,0	48,8	NORDEX N175/6.X 6800 1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Rep 9	586.287,4	5.894.833,5	45,0	NORDEX N175/6.X 6800 1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8

Maßstab 1:200.000  
▲ Neue WEA  
● Schattenrezeptor

### Schattenrezeptor-Eingabe

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
				[m]	[m]	[m]	[m]	[°]		[m]
s01	Neu Oerzen, Soltauer Straße 1	588.101,7	5.893.084,2	46,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s02	Oerzen, Am Ohfeld 1	588.404,8	5.894.762,2	45,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s03	Oerzen, Am Ohfeld 4	588.478,4	5.894.877,5	40,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s04	Oerzen, Am Ohfeld 9	588.431,5	5.894.865,5	40,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s05	Oerzen, Am Ohfeld 15	588.429,4	5.894.972,8	43,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s06	Oerzen, Im Dorfe 14	588.496,1	5.894.607,3	48,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s07	Oerzen, Im Dorfe 16	588.303,1	5.894.557,6	47,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s08	Oerzen, Im Dorfe 19	588.526,8	5.894.534,4	50,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s09	Oerzen, Im Dorfe 25	588.443,9	5.894.543,8	50,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s10	Oerzen, Westerheide 1	588.389,1	5.894.636,1	49,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s11	Oerzen, Westerheide 3	588.370,1	5.894.675,9	47,7	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s12	Oerzen, Westerheide 4	588.427,4	5.894.685,8	48,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s13	Oerzen, Westerheide 5	588.381,0	5.894.813,7	42,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s14	Oerzen, Westerheide 12A	588.325,0	5.894.865,9	42,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s15	Oerzen, Westerheide 12C	588.306,5	5.894.823,7	44,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s16	Oerzen, Westerheide 18	588.256,0	5.894.856,0	45,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s17	Oerzen, Westerheide 19	588.291,4	5.894.974,5	48,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s18	Oerzen, Westerheide 20	588.229,9	5.894.881,8	47,7	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s19	Oerzen, Westerheide 22	588.185,2	5.894.847,2	46,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s20	Oerzen, Westerheide 28	588.102,7	5.894.823,3	42,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s21	Oerzen, Zum Hasel 5	587.786,3	5.893.215,0	57,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s22	Oerzen, Zum Hasel 10	588.158,0	5.893.781,7	45,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s23	Oerzen, Mühlenweg 10	588.545,4	5.894.776,2	44,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s24	Oerzen, Mühlenweg 18	588.468,7	5.894.823,3	42,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s25	Südergellersen, Auf dem Brink 6	586.477,5	5.896.246,7	67,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0

(Fortsetzung nächste Seite)...



**SHADOW - Hauptergebnis****Berechnung: Zusatzbelastung Repowering 5x N175**

...(Fortsetzung von vorheriger Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
				[m]	[m]	[m]	[m]	[°]		[m]
s26	Südergellersen, Auf dem Brink 7	586.498,2	5.896.189,4	65,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s27	Südergellersen, Birkenweg 7	586.547,8	5.896.410,5	65,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s28	Südergellersen, Forstweg 4	586.302,3	5.896.127,2	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s29	Südergellersen, Forstweg 8	586.230,1	5.896.140,7	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s30	Südergellersen, Forstweg 11	586.166,4	5.896.101,6	63,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s31	Südergellersen, Forstweg 16	586.112,1	5.896.167,0	64,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s32	Südergellersen, Forstweg 17	586.094,1	5.896.128,7	62,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s33	Südergellersen, Gewerbegebiet	587.007,3	5.895.062,8	43,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s34	Südergellersen, Heidberg 2	586.177,4	5.896.183,9	66,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s35	Südergellersen, Heidberg 3	586.154,2	5.896.223,0	66,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s36	Südergellersen, Heiligenthaler Weg 2	586.863,9	5.896.155,5	55,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s37	Südergellersen, Heiligenthaler Weg 3	586.792,8	5.896.190,0	58,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s38	Südergellersen, Heiligenthaler Weg 3c	586.833,1	5.896.217,7	58,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s39	Südergellersen, Heiligenthaler Weg 11	586.911,1	5.896.239,1	52,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s40	Südergellersen, Im Alten Dorfe 2	586.402,6	5.896.082,0	64,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s41	Südergellersen, Im Alten Dorfe 3	586.453,7	5.896.115,5	65,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s42	Südergellersen, Im Alten Dorfe 4	586.480,0	5.896.021,4	61,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s43	Südergellersen, Im Alten Dorfe 5	586.561,2	5.896.156,3	63,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s44	Südergellersen, Im Alten Dorfe 7	586.616,6	5.896.197,1	62,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s45	Südergellersen, Im Alten Dorfe 8	586.561,9	5.896.067,6	60,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s46	Südergellersen, Im Alten Dorfe 10A	586.625,5	5.896.101,5	60,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s47	Südergellersen, Kirchgellerser Straße 2	586.638,0	5.896.277,9	62,7	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s48	Südergellersen, Kirchgellerser Straße 3	586.594,8	5.896.327,3	63,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s49	Südergellersen, Kirchgellerser Straße 6	586.637,2	5.896.375,2	63,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s50	Südergellersen, Kirchgellerser Straße 9	586.617,5	5.896.432,1	64,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s51	Südergellersen, Kirchgellerser Straße 10	586.660,0	5.896.465,5	63,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s52	Südergellersen, Kirchgellerser Straße 13	586.632,2	5.896.499,1	64,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s53	Südergellersen, Kirchgellerser Straße 15	586.747,3	5.896.191,6	60,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s54	Südergellersen, Kirchgellerser Straße 16	586.731,0	5.896.121,0	59,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s55	Südergellersen, Oerzer Str. 13A	586.909,5	5.895.981,7	53,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s56	Südergellersen, Oerzer Str. 15	587.010,6	5.895.899,8	50,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s57	Südergellersen, Oerzer Str. 18	586.781,3	5.896.062,2	56,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s58	Südergellersen, Oerzer Str. 19	586.879,7	5.895.864,2	49,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s59	Südergellersen, Poggenpohl 7	586.751,1	5.895.922,0	55,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s60	Südergellersen, Poggenpohl 8	586.640,6	5.895.995,8	58,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s61	Südergellersen, Schwarzer Weg 2	586.403,0	5.896.246,5	71,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s62	Südergellersen, Schwarzer Weg 9	586.404,8	5.896.338,8	69,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s63	Südergellersen, Westergellerser Weg 1	586.545,3	5.896.256,4	63,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s64	Südergellersen, Westergellerser Weg 4	586.498,9	5.896.338,8	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s65	Südergellersen, Wetzter Weg 3	586.268,4	5.896.052,0	63,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s66	Südergellersen, Wetzter Weg 6	586.172,4	5.895.854,5	57,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s67	Südergellersen, In de Masch 8	586.717,4	5.896.250,8	61,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s68	Wetzen, Zum Lerchenberg 10	583.085,3	5.892.839,1	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s69	Wetzen, Zum Lerchenberg 5	583.242,4	5.892.711,0	60,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s70	Wetzen, Zum Lerchenberg 37	582.866,7	5.892.994,9	69,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0

**Berechnungsergebnisse**

Schattenrezeptor

**astron. max. mögl. Beschattungsdauer**

Nr.	Name	Stunden/Jahr [h/a]	Schattentage/Jahr [d/a]	Max.Schattendauer/Tag [h/d]
s01	Neu Oerzen, Soltauer Straße 1	0:00	0	0:00
s02	Oerzen, Am Ohfeld 1	17:41	61	0:23
s03	Oerzen, Am Ohfeld 4	15:56	56	0:22
s04	Oerzen, Am Ohfeld 9	16:55	58	0:23
s05	Oerzen, Am Ohfeld 15	16:19	57	0:23
s06	Oerzen, Im Dorfe 14	16:02	59	0:22
s07	Oerzen, Im Dorfe 16	21:28	69	0:24
s08	Oerzen, Im Dorfe 19	0:00	0	0:00
s09	Oerzen, Im Dorfe 25	17:24	63	0:23
s10	Oerzen, Westerheide 1	18:20	64	0:23

(Fortsetzung nächste Seite)...



**SHADOW - Hauptergebnis****Berechnung: Zusatzbelastung Repowering 5x N175**

...(Fortsetzung von vorheriger Seite)

Nr.	Name	astron. max. mögl. Beschattungsdauer		
		Stunden/Jahr [h/a]	Schattentage/Jahr [d/a]	Max.Schattendauer/Tag [h/d]
s11	Oerzen, Westerheide 3	18:45	63	0:24
s12	Oerzen, Westerheide 4	17:14	60	0:23
s13	Oerzen, Westerheide 5	18:04	61	0:23
s14	Oerzen, Westerheide 12A	19:12	62	0:24
s15	Oerzen, Westerheide 12C	19:42	63	0:24
s16	Oerzen, Westerheide 18	20:59	66	0:25
s17	Oerzen, Westerheide 19	19:07	63	0:25
s18	Oerzen, Westerheide 20	21:24	65	0:25
s19	Oerzen, Westerheide 22	23:01	68	0:27
s20	Oerzen, Westerheide 28	33:57	88	0:30
s21	Oerzen, Zum Hasel 5	0:00	0	0:00
s22	Oerzen, Zum Hasel 10	26:11	76	0:25
s23	Oerzen, Mühlenweg 10	0:00	0	0:00
s24	Oerzen, Mühlenweg 18	16:11	58	0:22
s25	Südergellersen, Auf dem Brink 6	0:00	0	0:00
s26	Südergellersen, Auf dem Brink 7	0:00	0	0:00
s27	Südergellersen, Birkenweg 7	0:00	0	0:00
s28	Südergellersen, Forstweg 4	0:00	0	0:00
s29	Südergellersen, Forstweg 8	2:23	15	0:12
s30	Südergellersen, Forstweg 11	12:28	36	0:26
s31	Südergellersen, Forstweg 16	7:51	28	0:21
s32	Südergellersen, Forstweg 17	14:18	39	0:28
s33	Südergellersen, Gewerbegebiet	377:57	307	1:43
s34	Südergellersen, Heidberg 2	0:00	0	0:00
s35	Südergellersen, Heidberg 3	0:00	0	0:00
s36	Südergellersen, Heilighenthaler Weg 2	6:38	26	0:24
s37	Südergellersen, Heilighenthaler Weg 3	0:00	0	0:00
s38	Südergellersen, Heilighenthaler Weg 3c	0:00	0	0:00
s39	Südergellersen, Heilighenthaler Weg 11	0:00	0	0:00
s40	Südergellersen, Im Alten Dorfe 2	0:00	0	0:00
s41	Südergellersen, Im Alten Dorfe 3	0:00	0	0:00
s42	Südergellersen, Im Alten Dorfe 4	6:22	24	0:20
s43	Südergellersen, Im Alten Dorfe 5	0:00	0	0:00
s44	Südergellersen, Im Alten Dorfe 7	0:00	0	0:00
s45	Südergellersen, Im Alten Dorfe 8	0:00	0	0:00
s46	Südergellersen, Im Alten Dorfe 10A	0:00	0	0:00
s47	Südergellersen, Kirchgellerser Straße 2	0:00	0	0:00
s48	Südergellersen, Kirchgellerser Straße 3	0:00	0	0:00
s49	Südergellersen, Kirchgellerser Straße 6	0:00	0	0:00
s50	Südergellersen, Kirchgellerser Straße 9	0:00	0	0:00
s51	Südergellersen, Kirchgellerser Straße 10	0:00	0	0:00
s52	Südergellersen, Kirchgellerser Straße 13	0:00	0	0:00
s53	Südergellersen, Kirchgellerser Straße 15	0:00	0	0:00
s54	Südergellersen, Kirchgellerser Straße 16	0:00	0	0:00
s55	Südergellersen, Oerzer Str. 13A	66:04	54	1:34
s56	Südergellersen, Oerzer Str. 15	102:41	72	1:38
s57	Südergellersen, Oerzer Str. 18	15:37	30	0:50
s58	Südergellersen, Oerzer Str. 19	107:22	68	1:51
s59	Südergellersen, Poggenpohl 7	62:25	48	1:38
s60	Südergellersen, Poggenpohl 8	14:55	28	0:49
s61	Südergellersen, Schwarzer Weg 2	0:00	0	0:00
s62	Südergellersen, Schwarzer Weg 9	0:00	0	0:00
s63	Südergellersen, Westergellersen Weg 1	0:00	0	0:00
s64	Südergellersen, Westergellersen Weg 4	0:00	0	0:00
s65	Südergellersen, Wetzter Weg 3	12:22	34	0:27
s66	Südergellersen, Wetzter Weg 6	56:26	78	1:04
s67	Südergellersen, In de Masch 8	0:00	0	0:00
s68	Wetzen, Zum Lerchenberg 5	0:00	0	0:00
s69	Wetzen, Zum Lerchenberg 10	0:00	0	0:00
s70	Wetzen, Zum Lerchenberg 37	0:00	0	0:00



**SHADOW - Hauptergebnis****Berechnung: Zusatzbelastung Repowering 5x N175**

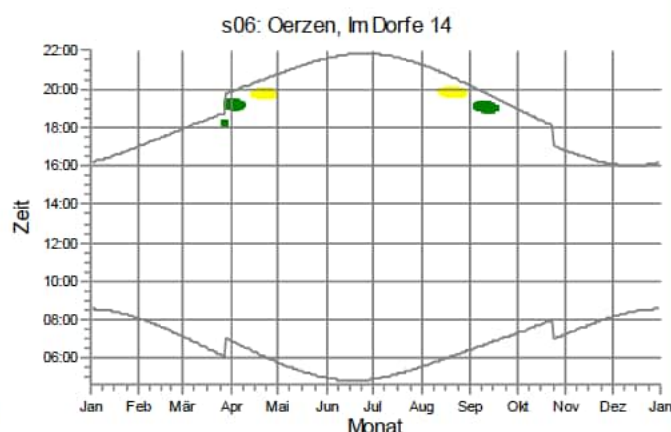
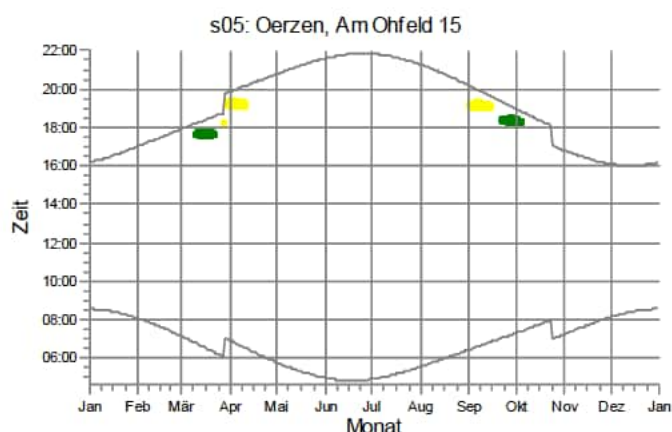
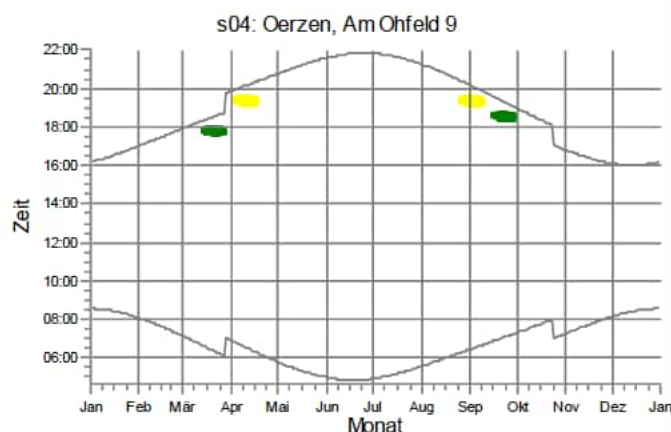
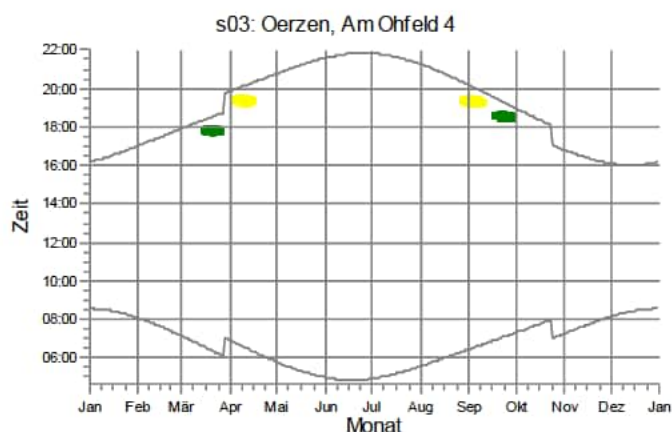
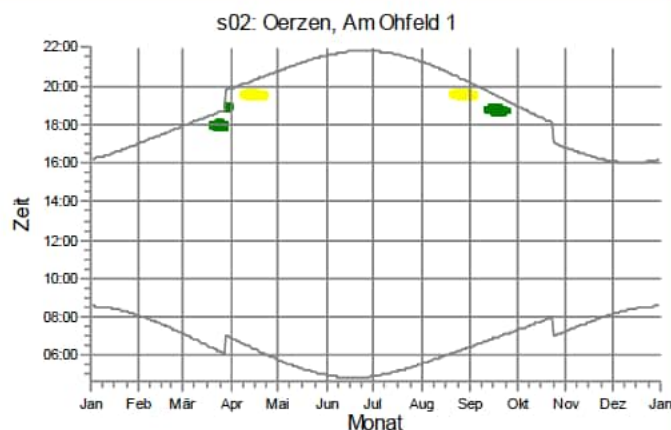
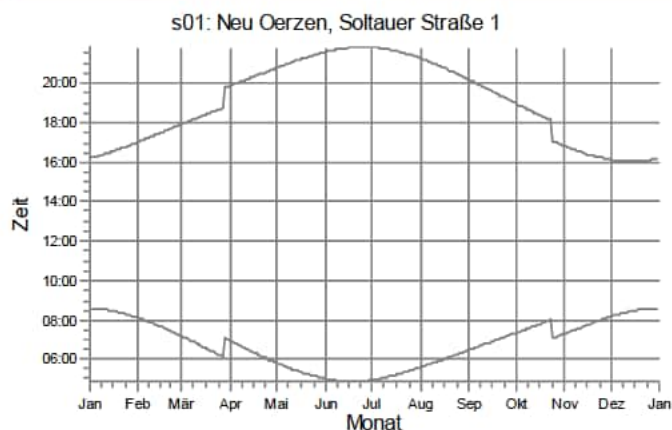
Gesamtdauer Beschattung an Rezeptoren pro WEA

Nr.	Name	Maximal [h/a]
Rep 10	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (332)	142:32
Rep 11	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)	462:12
Rep 5	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (329)	10:50
Rep 8	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (330)	76:51
Rep 9	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (331)	134:59

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

## SHADOW - Grafischer Kalender

**Berechnung:** Zusatzbelastung Repowering 5x N175



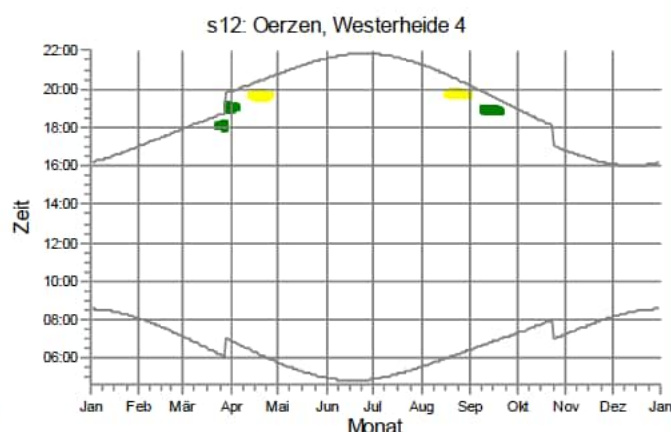
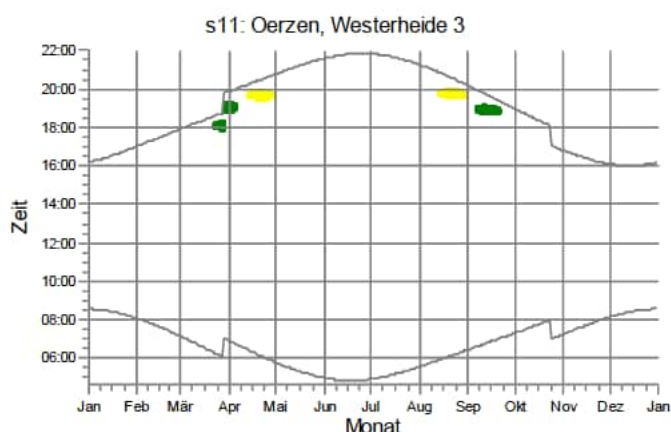
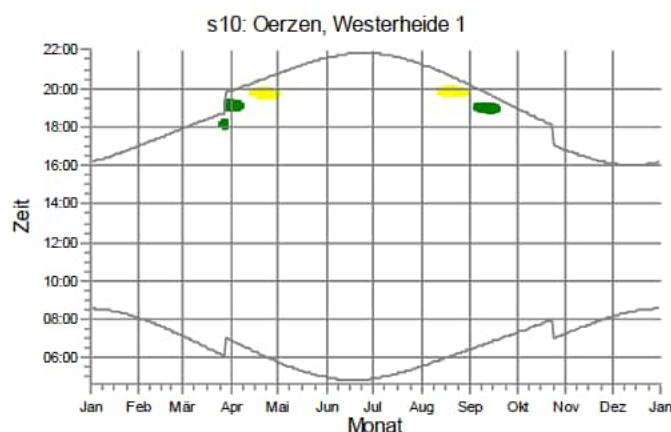
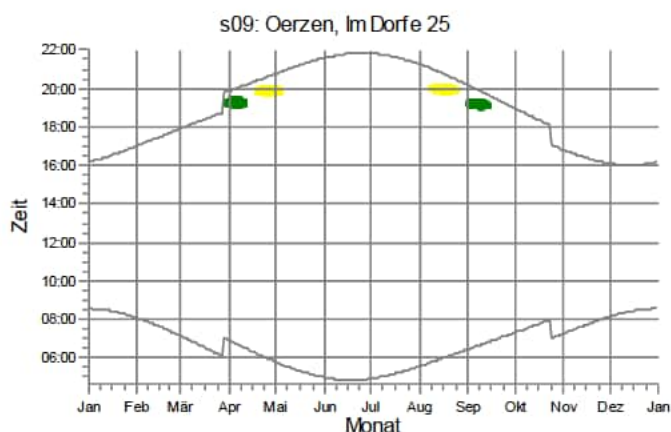
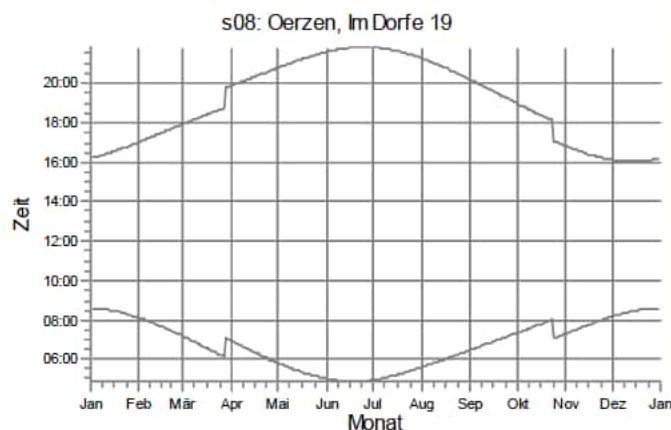
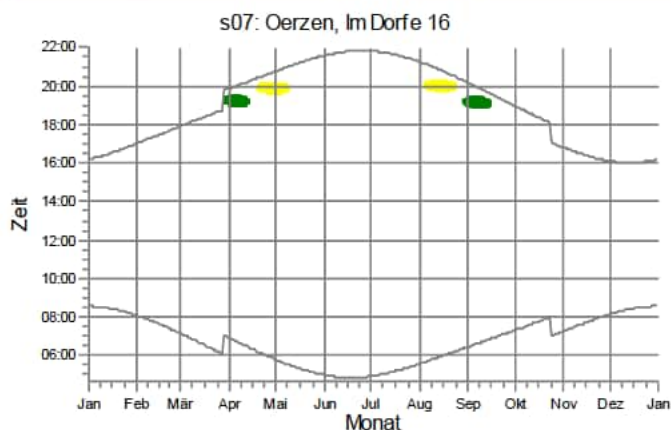
WEA

- Rep 10: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (332)
- Rep 11: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)



## SHADOW - Grafischer Kalender

**Berechnung:** Zusatzbelastung Repowering 5x N175

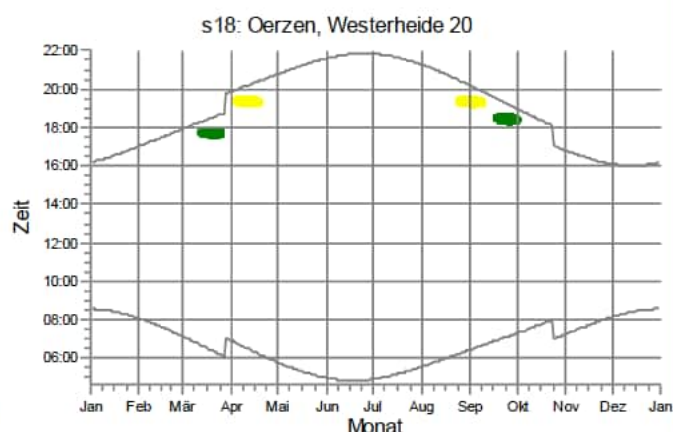
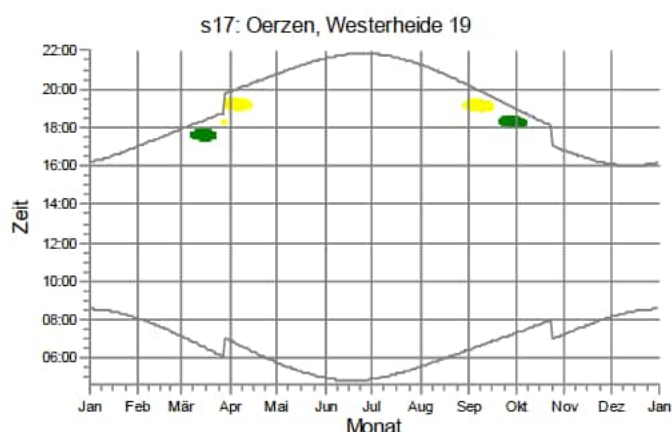
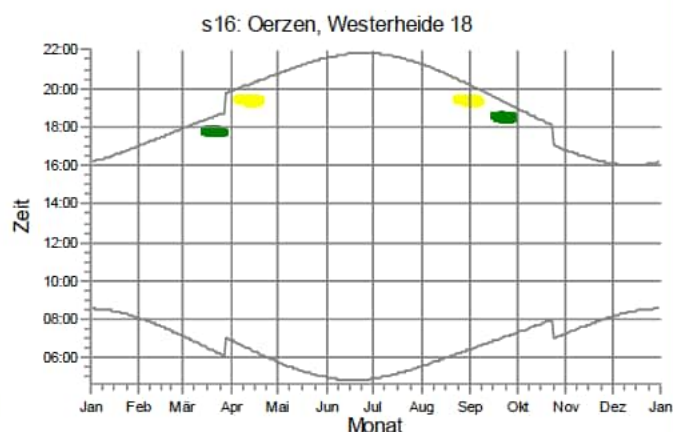
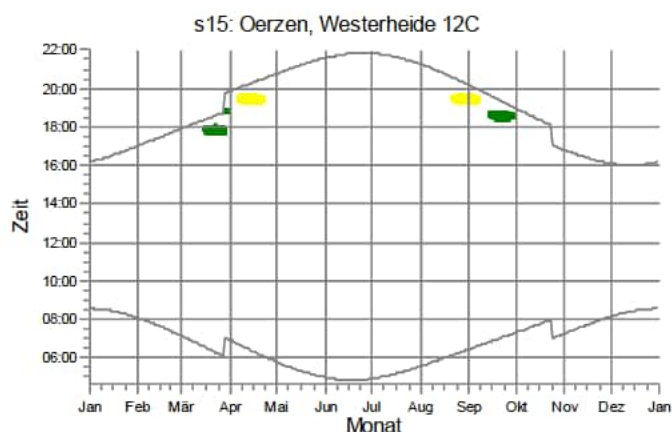
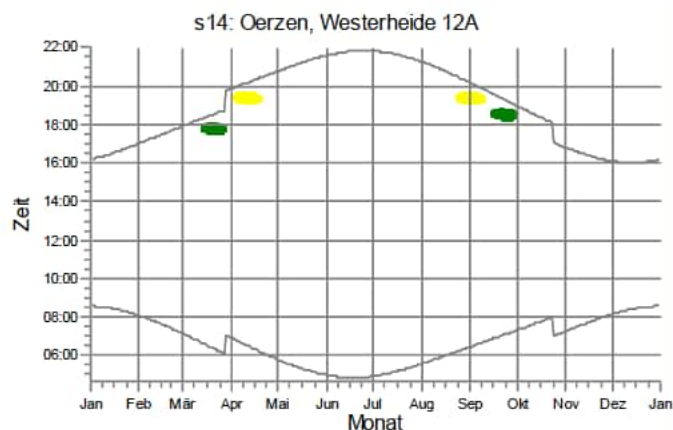
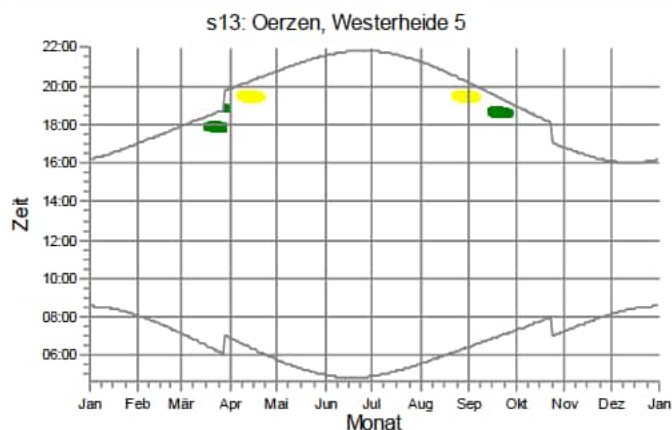


WEA

- Rep 10: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (332)
- Rep 11: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)

## SHADOW - Grafischer Kalender

**Berechnung:** Zusatzbelastung Repowering 5x N175



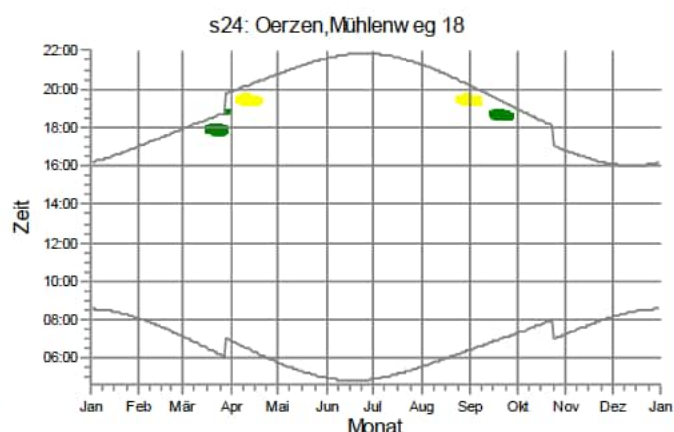
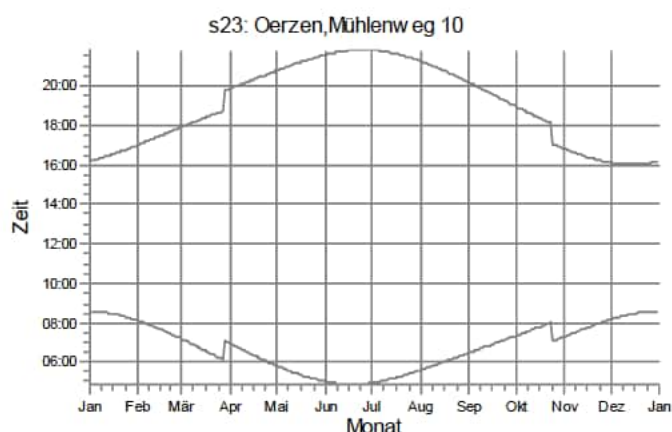
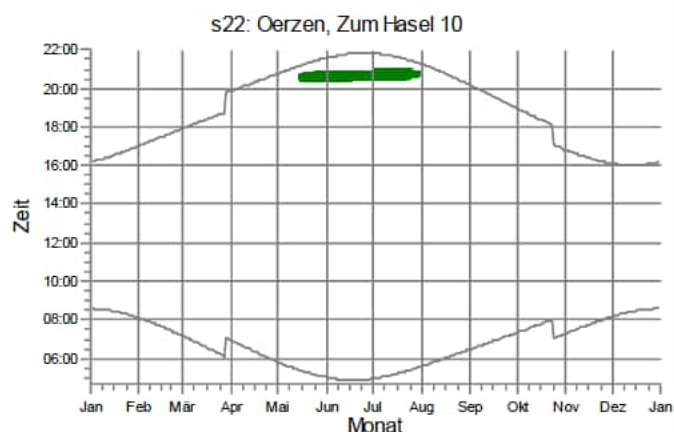
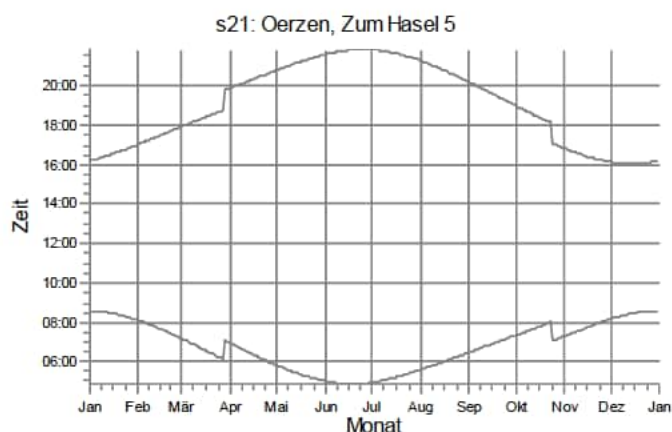
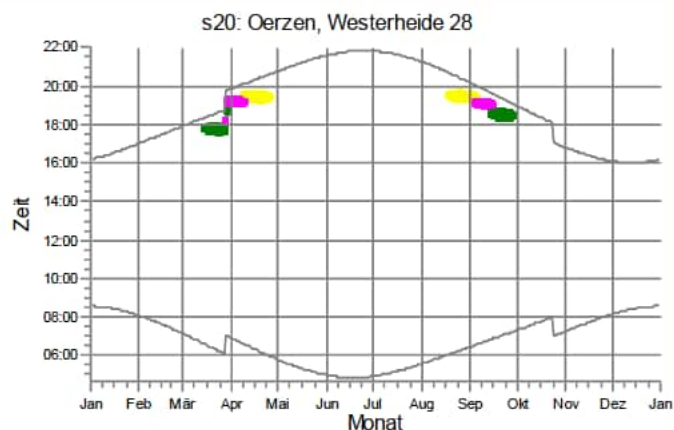
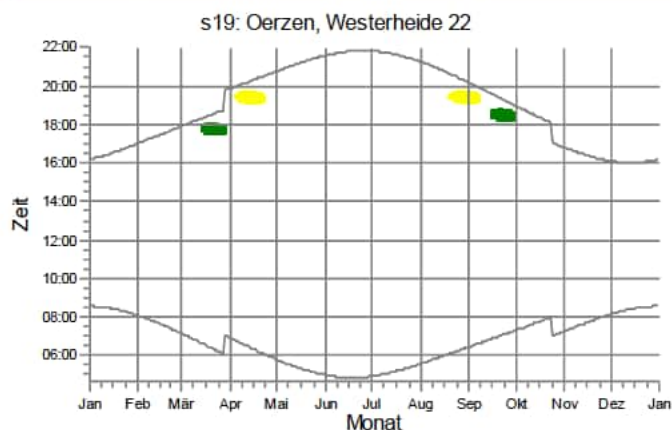
WEA

- Rep 10: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (332)
- Rep 11: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)



## SHADOW - Grafischer Kalender

**Berechnung:** Zusatzbelastung Repowering 5x N175

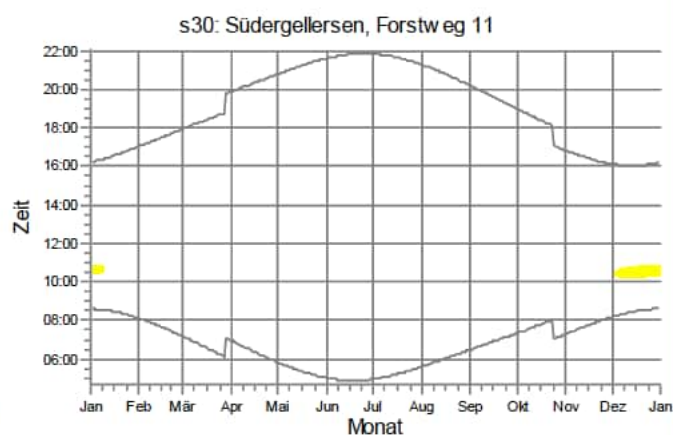
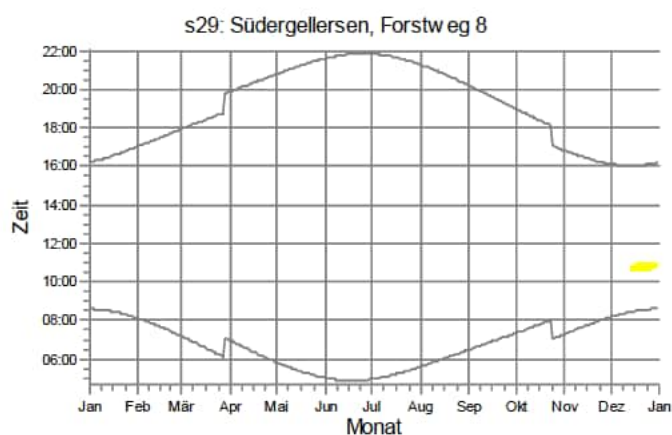
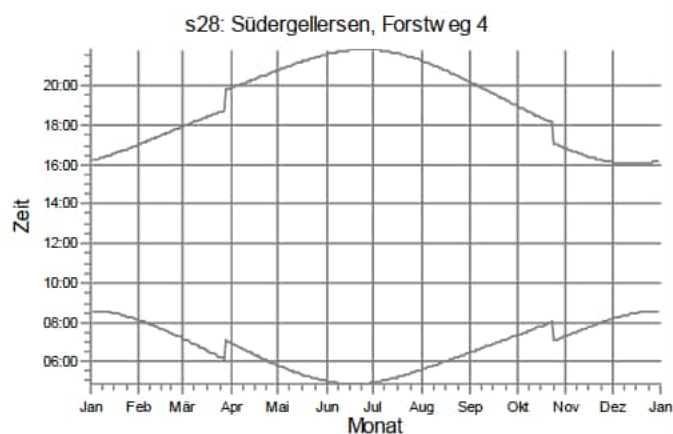
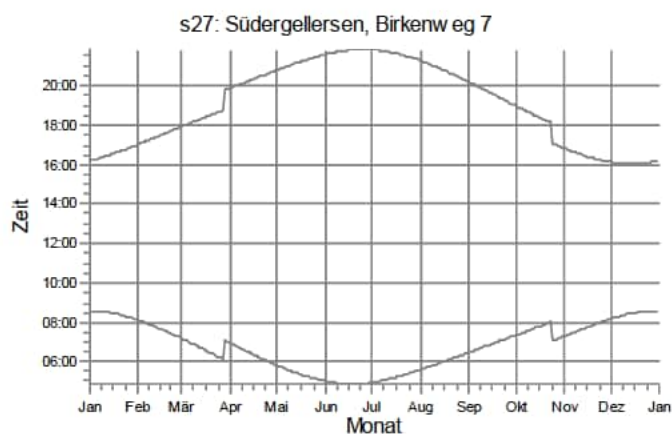
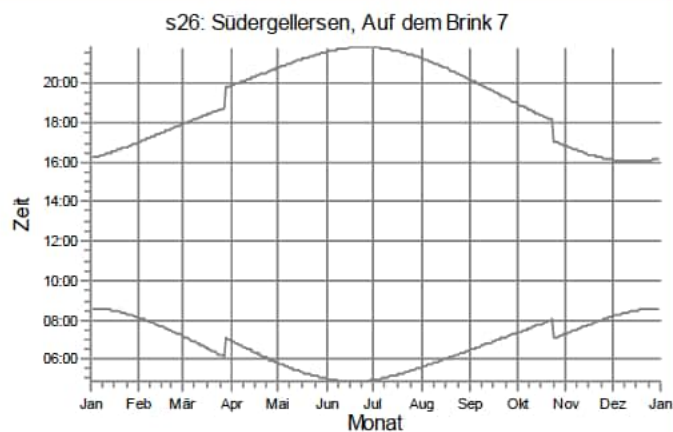
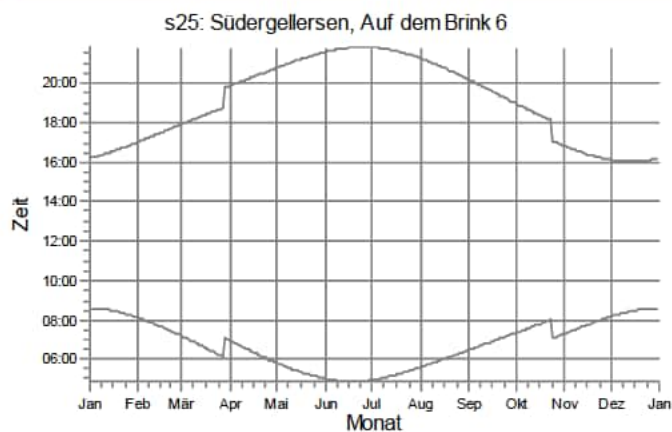


WEA

- Rep 10: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (332)
- Rep 11: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)
- Rep 9: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (331)

## SHADOW - Grafischer Kalender

**Berechnung:** Zusatzbelastung Repowering 5x N175



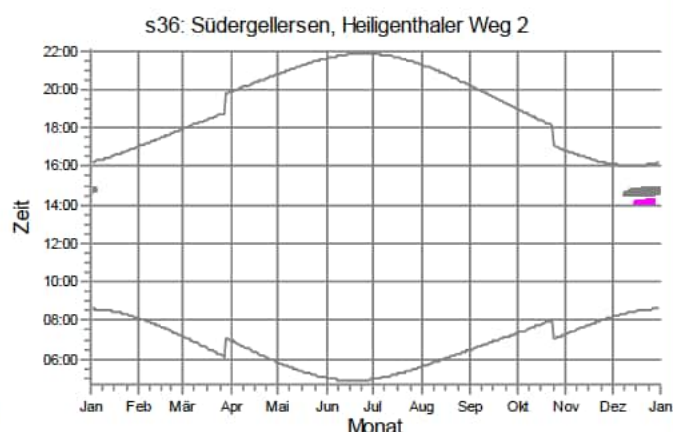
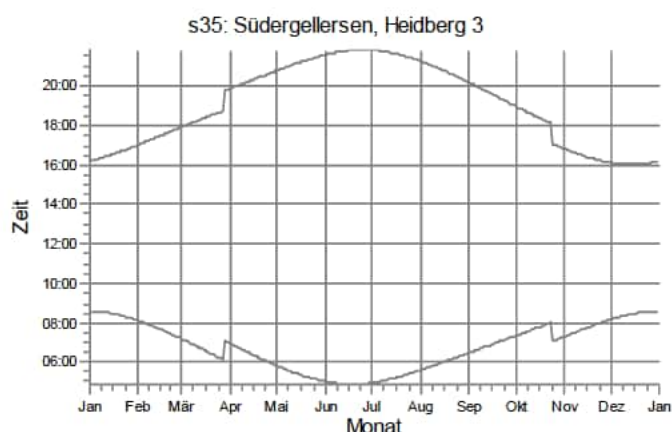
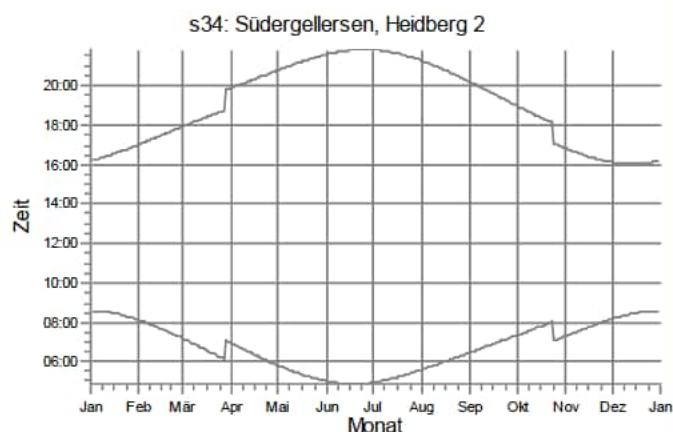
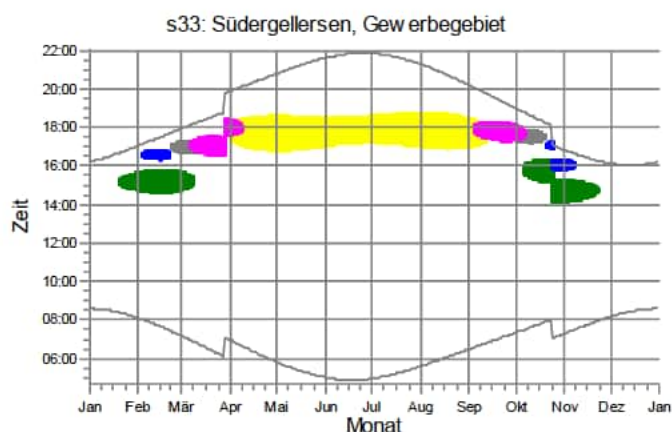
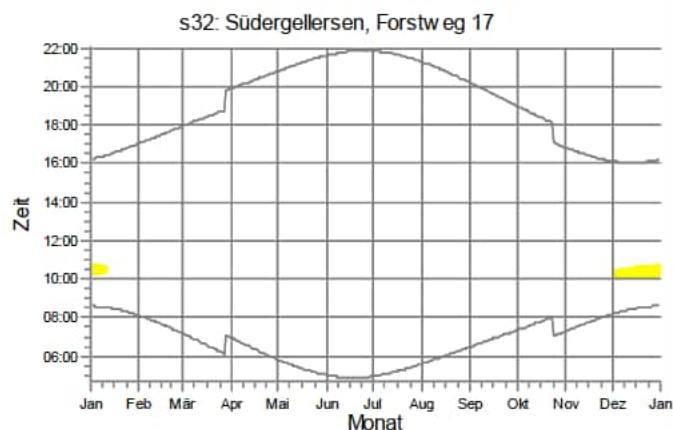
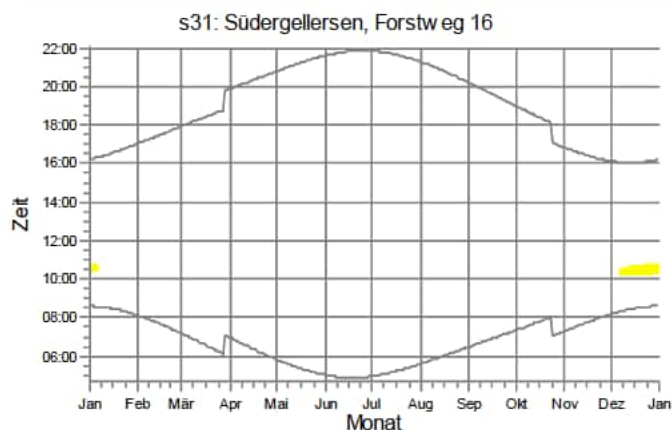
WEA

Rep 11: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)



## SHADOW - Grafischer Kalender

**Berechnung:** Zusatzbelastung Repowering 5x N175

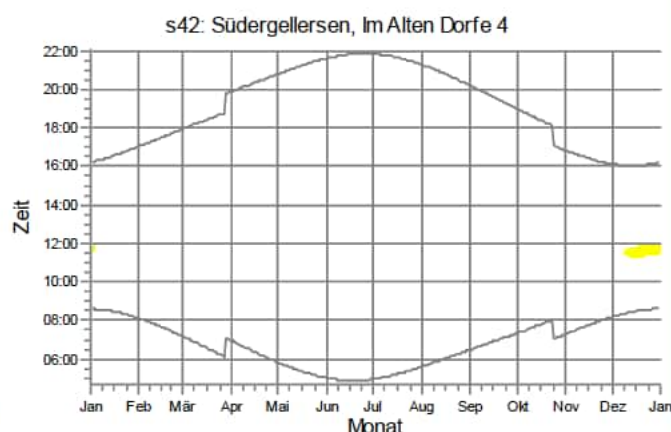
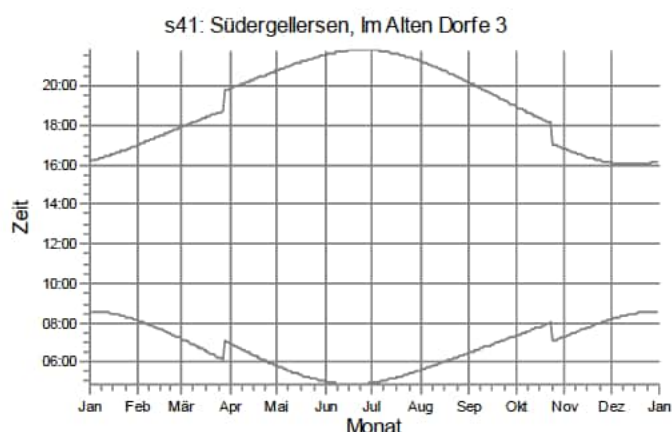
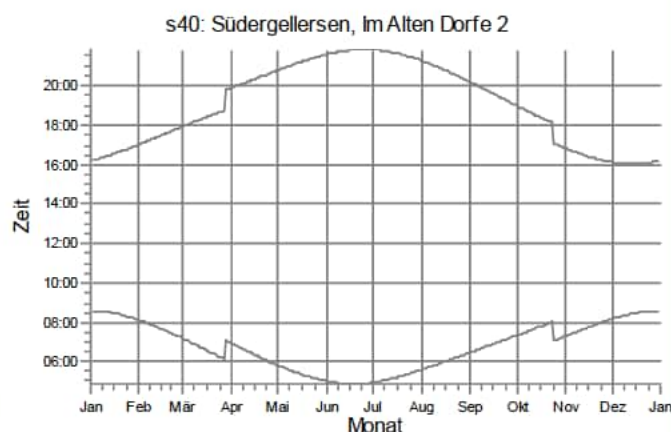
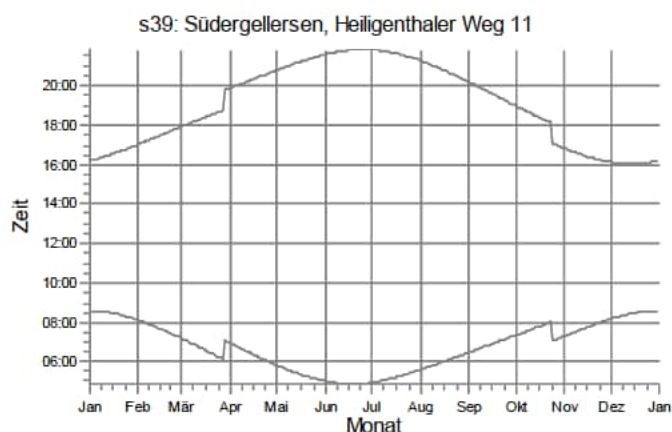
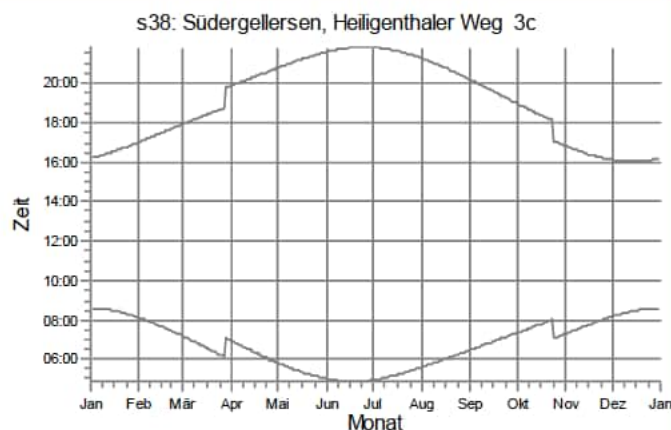
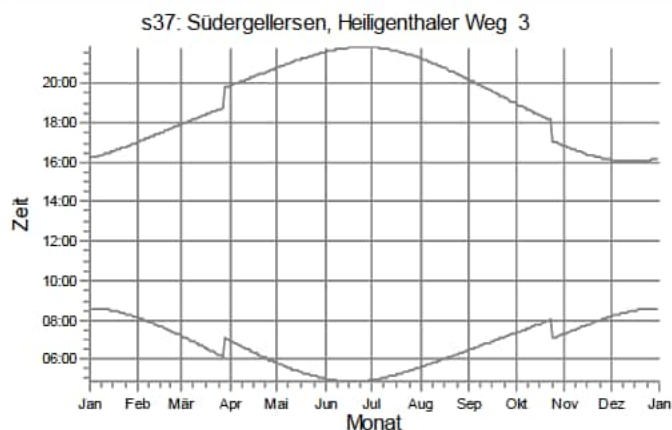


WEA

- Rep 10: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (332)
- Rep 11: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)
- Rep 5: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (329)
- Rep 8: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (330)
- Rep 9: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (331)

## SHADOW - Grafischer Kalender

**Berechnung:** Zusatzbelastung Repowering 5x N175



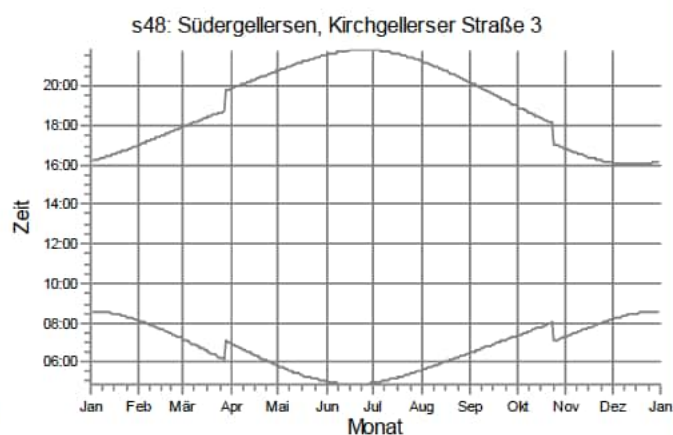
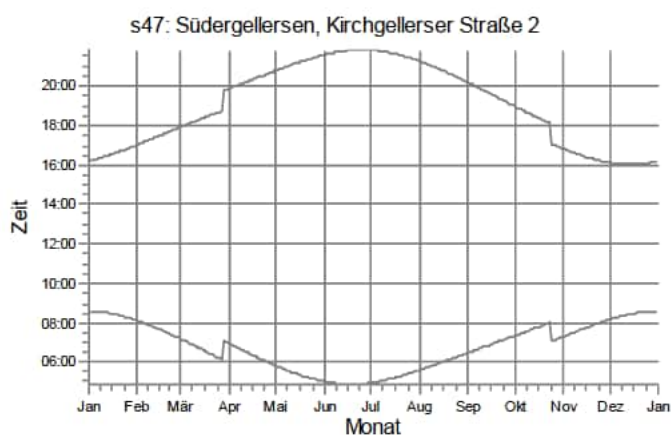
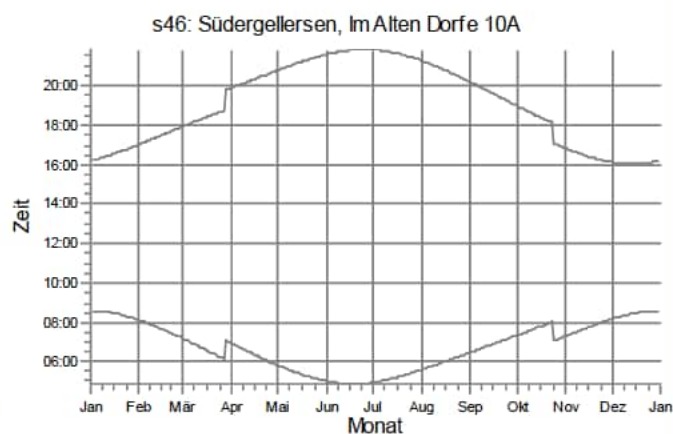
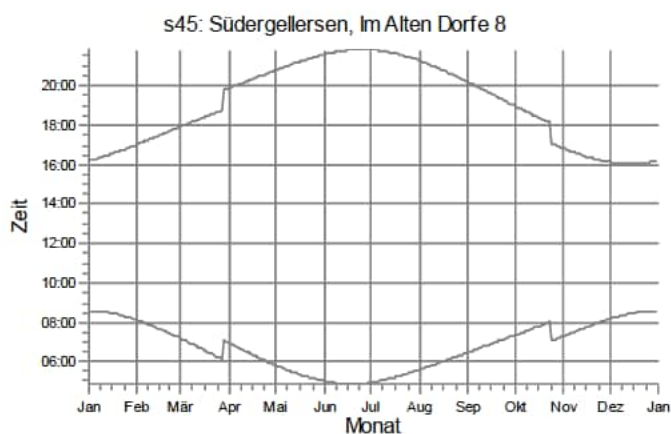
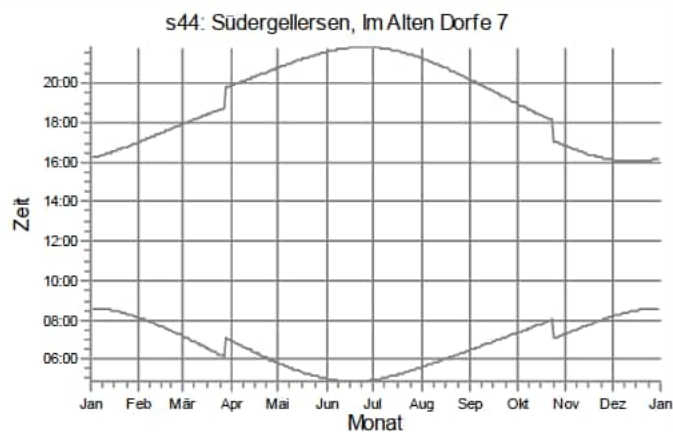
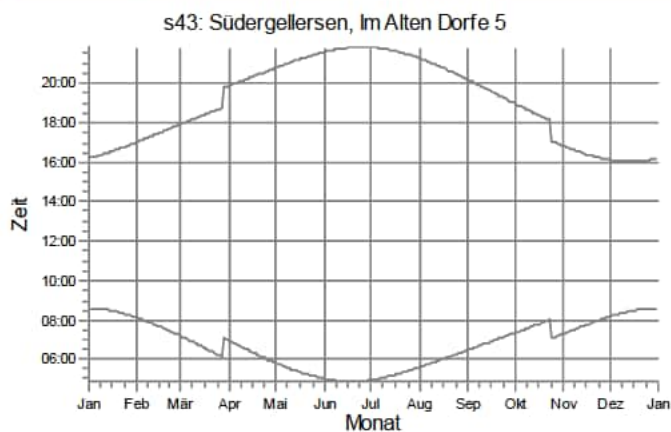
WEA

Rep 11: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)



## SHADOW - Grafischer Kalender

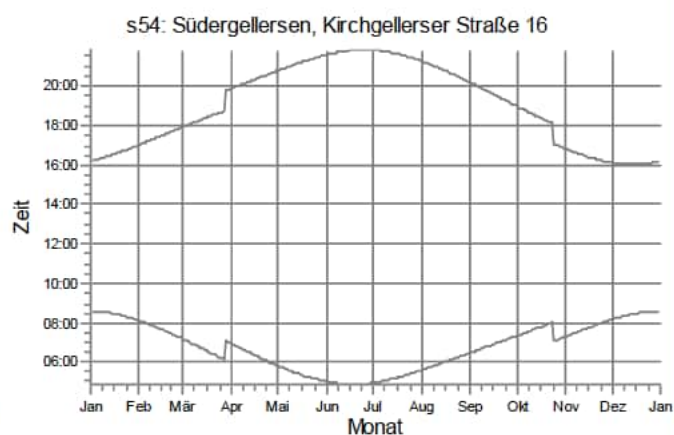
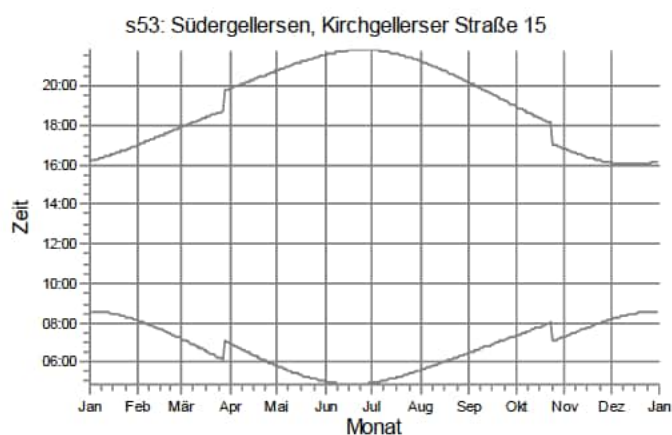
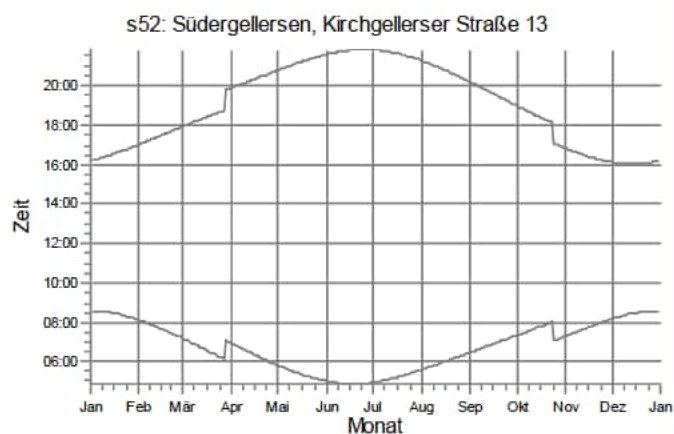
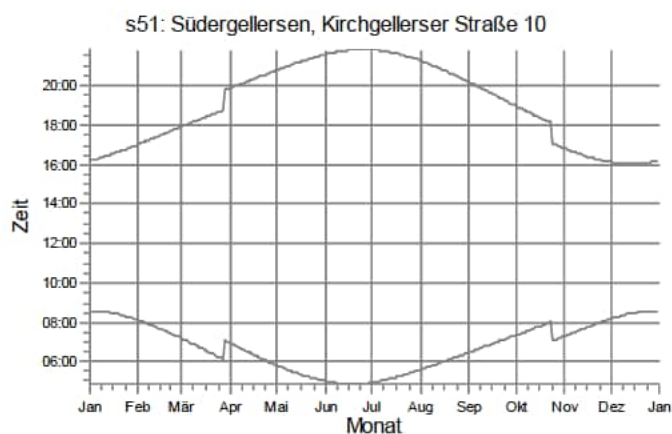
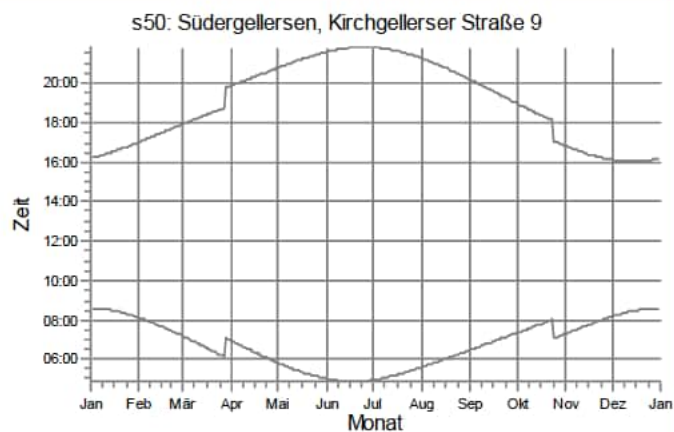
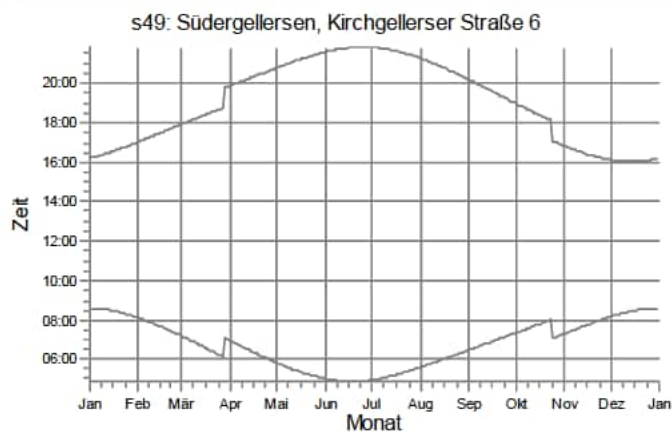
**Berechnung:** Zusatzbelastung Repowering 5x N175



WEA

## SHADOW - Grafischer Kalender

**Berechnung:** Zusatzbelastung Repowering 5x N175

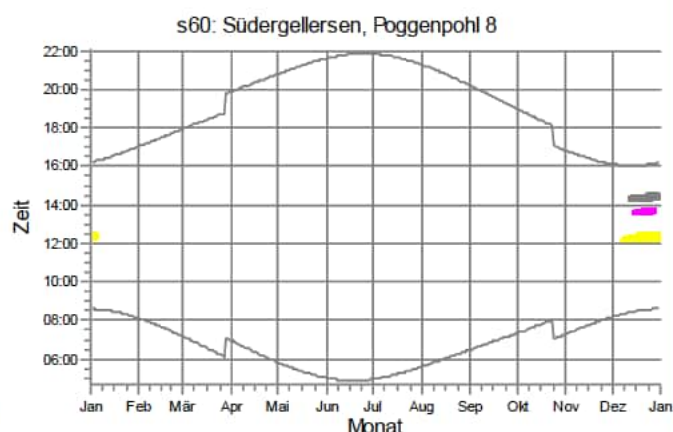
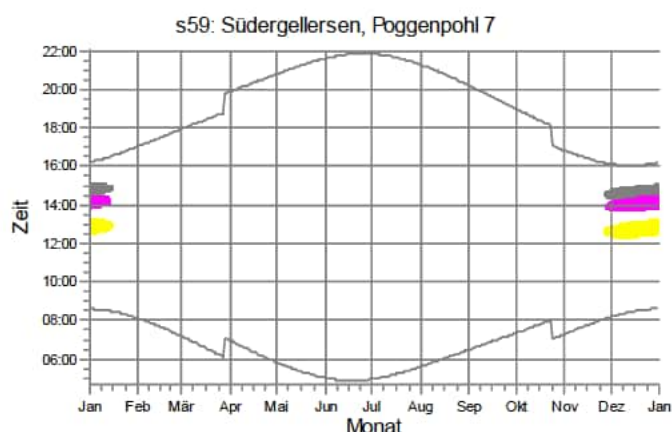
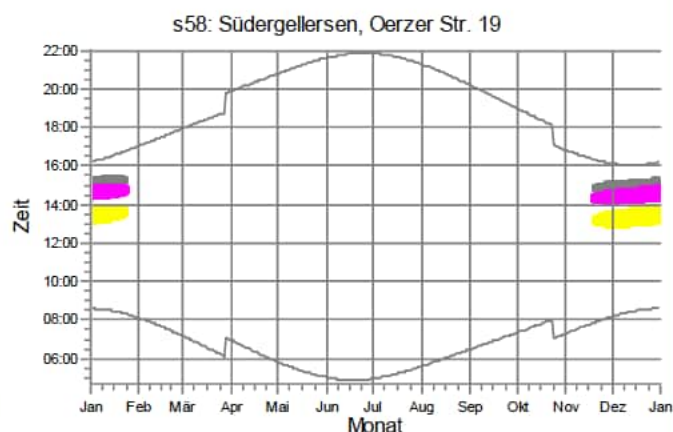
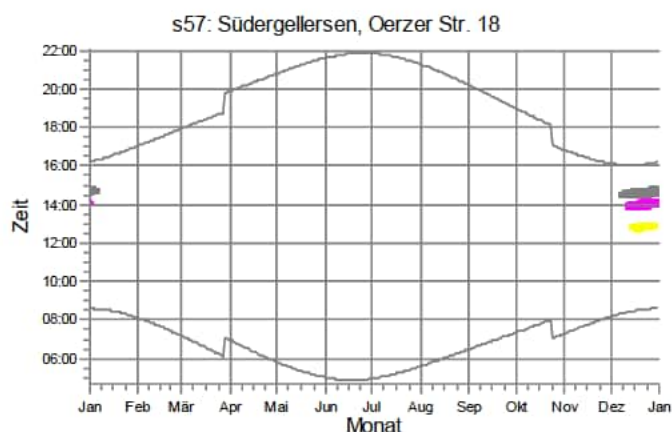
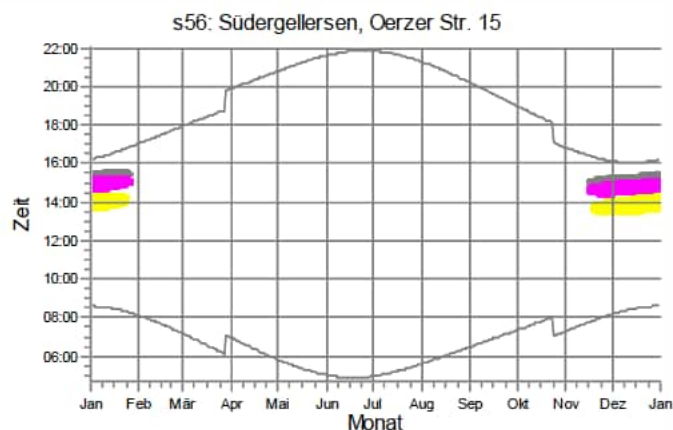
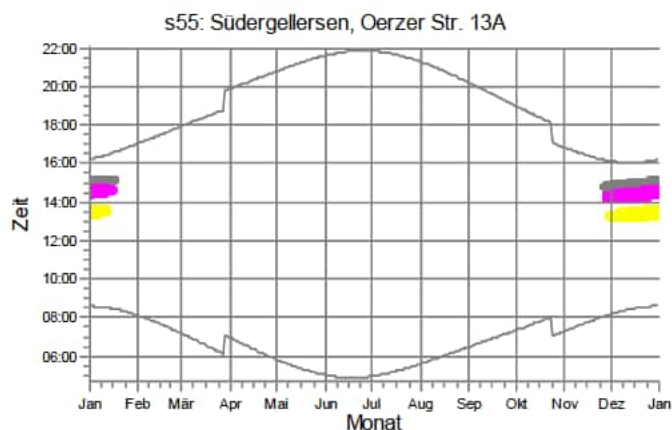


WEA



## SHADOW - Grafischer Kalender

**Berechnung:** Zusatzbelastung Repowering 5x N175

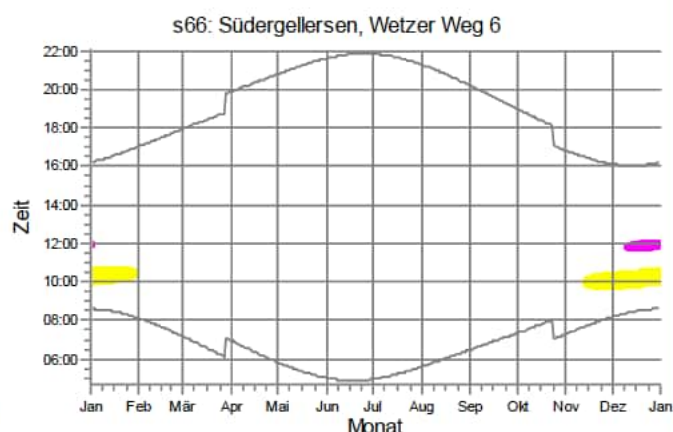
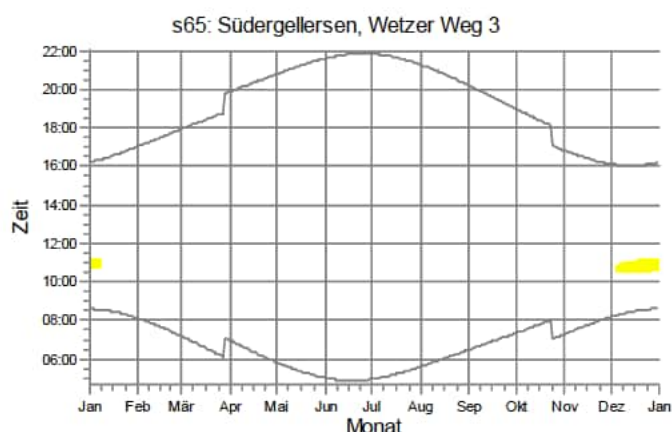
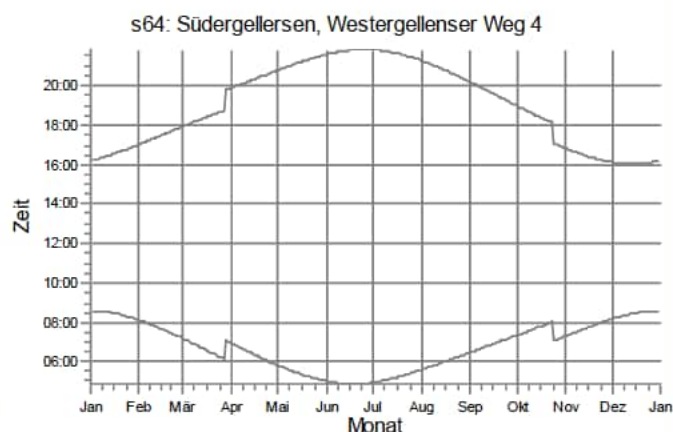
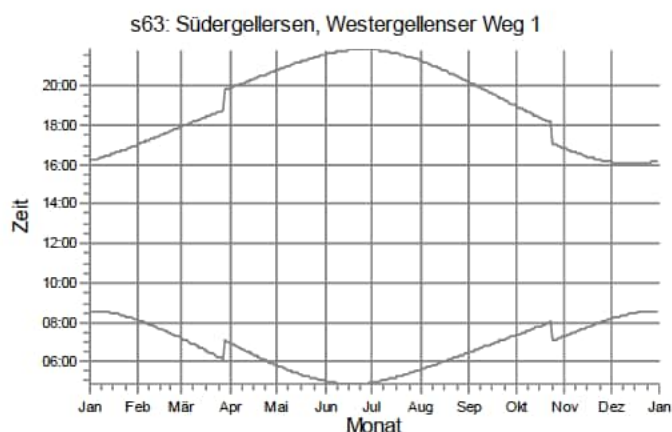
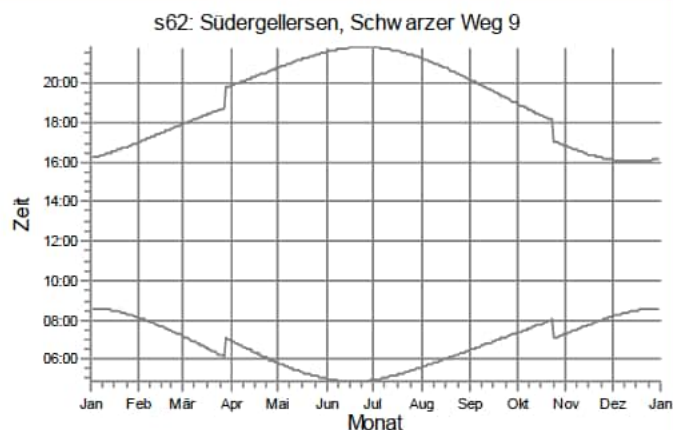
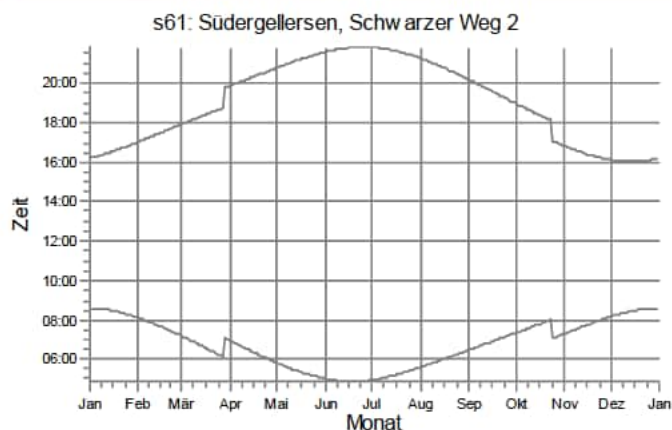


WEA

- Rep 11: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)
- Rep 8: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (330)
- Rep 9: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (331)

## SHADOW - Grafischer Kalender

**Berechnung:** Zusatzbelastung Repowering 5x N175



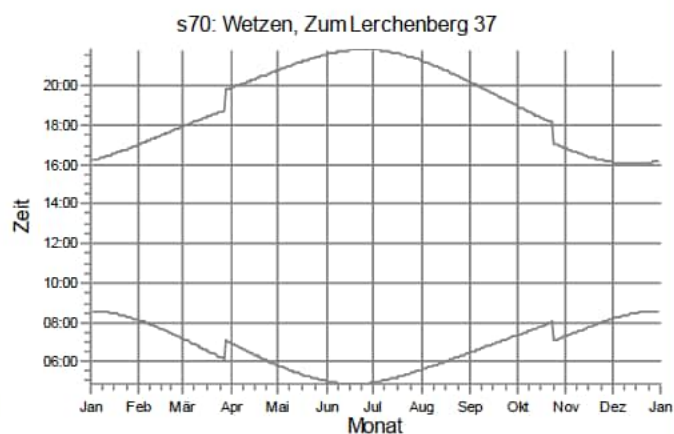
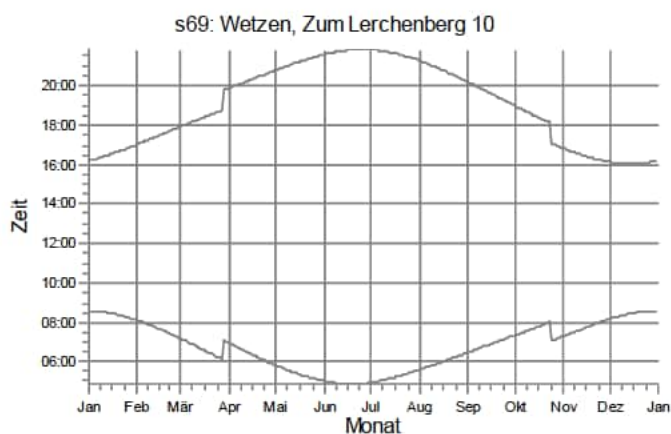
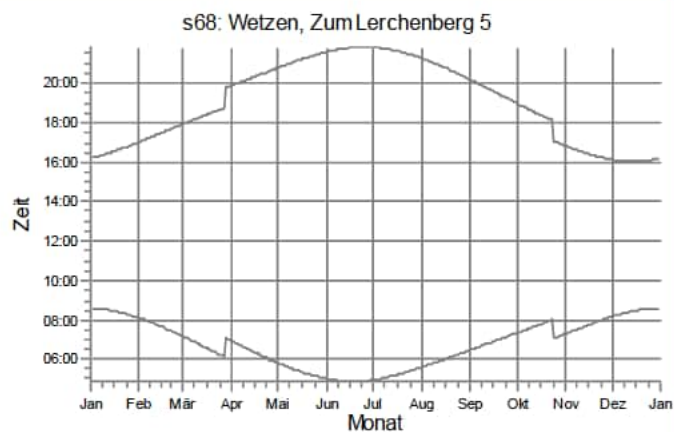
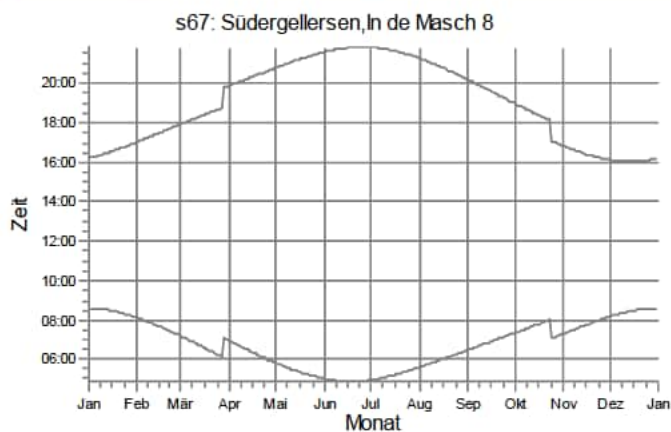
WEA

- Rep 11: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)
- Rep 9: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (331)



## SHADOW - Grafischer Kalender

**Berechnung:** Zusatzbelastung Repowering 5x N175



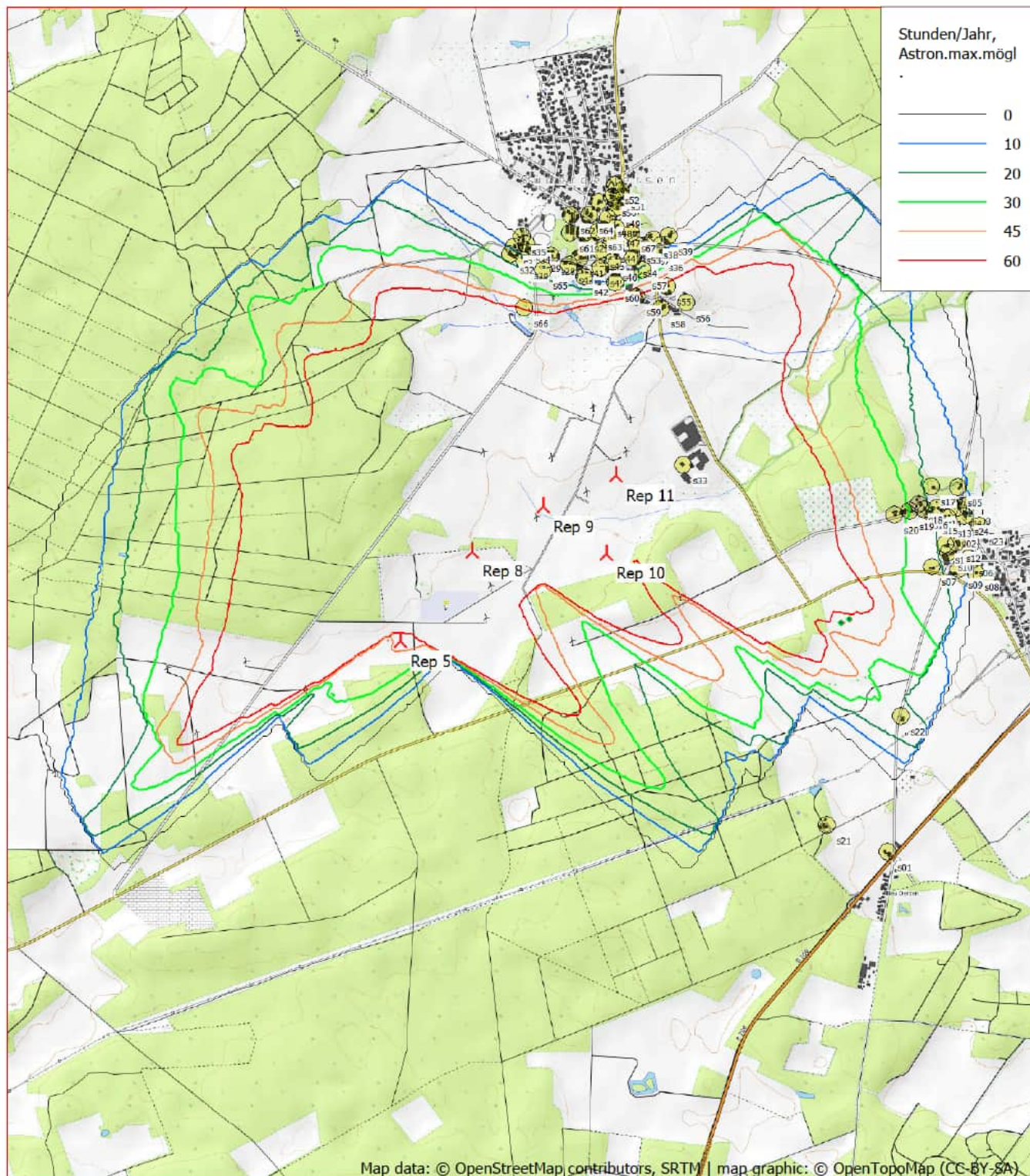
WEA

Projekt:  
**Süderheide**

Lizenzierter Anwender:  
**SOWIWAS - Energie GmbH**  
Watenstedter Straße 11  
DE-38384 Gevensleben  
+49 0 53 54 / 99 06 - 235  
Berechnet: [REDACTED] / gutachten@sowiwas.de  
21.07.2025 16:04/4.1.287

## SHADOW - Karte

**Berechnung:** Zusatzbelastung Repowering 5x N175



Karte: OpenTopoMap.org , Maßstab 1:30.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 586.120,0 Nord: 5.894.340,0  
⚡ Neue WEA      📡 Schattenrezeptor  
Höhe der Schattenkarte: Höhenlinien: CONTOURLINE\_ONLINEDATA\_0.wpo (1)  
Zeitschritt: 2 Minuten, Schrittweite: 2 Tag(e), Kartenaufösung: 20 m, Sichtbarkeit Auflösung: 5 m, Augenhöhe: 1,5 m



## **Berechnung: Vorbelastung Repowering 18 Bestand**

Hauptergebnis	4 Seiten
Grafischer Kalender	12 Seiten
Karte	1 Seite

## SHADOW - Hauptergebnis

**Berechnung:** Vorbelastung Repowering 18 Bestand

### 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 Sonneneinstrahlungsrichtung

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:

DHM: Höhenlinien: CONTOURLINE\_ONLINEDATA\_0.wpo (1)

Rasterauflösung: 1,0 m

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

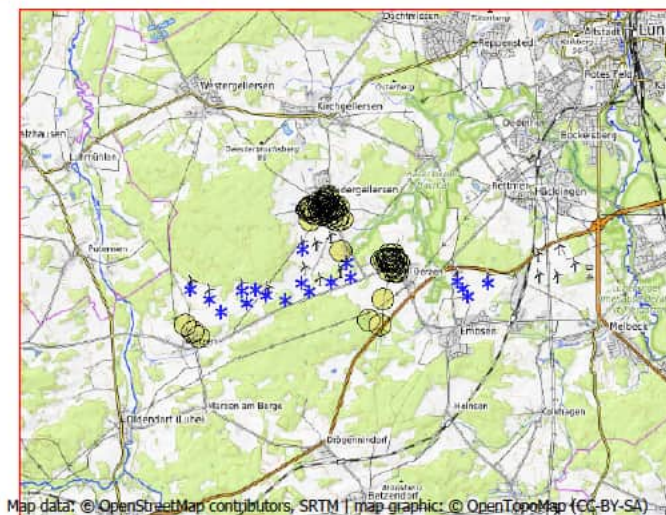
### WEA

	Ost	Nord	Z	Beschreibung	Aktuell	Hersteller	Typ	Nennleistung	Rotor-durchmesser	NH	Schattendaten	
											Beschatt.-Bereich	U/min
			[m]					[kW]	[m]	[m]	[m]	[U/min]
B 01	585.971,6	5.895.090,6	50,0	NORDEX N1...	Ja	NORDEX	N149/4.0-4.5-4.500	4.500	149,0	125,0	1.822	10,7
B 02	585.959,5	5.894.188,5	45,0	NORDEX N1...	Ja	NORDEX	N131/3300 DE-3.300	3.300	131,0	134,0	1.722	10,9
B 03	585.020,8	5.893.835,6	50,0	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 04	584.733,6	5.893.984,8	50,0	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 05	584.375,7	5.893.950,2	55,0	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 06	584.497,2	5.893.629,8	56,7	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 07	583.821,9	5.893.385,7	64,4	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 08	583.491,9	5.893.713,6	60,0	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 09	582.991,2	5.893.966,5	55,0	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 10	590.139,5	5.894.321,8	37,1	ENERCON E...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
B 11	590.290,9	5.894.120,4	40,0	ENERCON E...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
B 12	590.431,2	5.893.915,7	42,1	ENERCON E...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
B 13	590.960,7	5.894.291,0	45,6	ENERCON E...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
Oerzen 1	587.151,9	5.894.746,2	45,6	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Oerzen 2	587.284,9	5.894.361,9	40,0	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Oerzen 3	586.751,2	5.894.214,7	49,2	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Oerzen 4	586.171,4	5.893.951,1	50,0	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Oerzen 5	585.523,5	5.893.709,1	56,0	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8

### 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]
s01	Neu Oerzen, Soltauer Straße 1	588.101,7	5.893.084,2	46,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s02	Oerzen, Am Ohfeld 1	588.404,8	5.894.762,2	45,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s03	Oerzen, Am Ohfeld 4	588.478,4	5.894.877,5	40,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s04	Oerzen, Am Ohfeld 9	588.431,5	5.894.865,5	40,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s05	Oerzen, Am Ohfeld 15	588.429,4	5.894.972,8	43,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s06	Oerzen, Im Dorfe 14	588.496,1	5.894.607,3	48,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s07	Oerzen, Im Dorfe 16	588.303,1	5.894.557,6	47,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s08	Oerzen, Im Dorfe 19	588.526,8	5.894.534,4	50,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s09	Oerzen, Im Dorfe 25	588.443,9	5.894.543,8	50,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s10	Oerzen, Westerheide 1	588.389,1	5.894.636,1	49,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s11	Oerzen, Westerheide 3	588.370,1	5.894.675,9	47,7	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s12	Oerzen, Westerheide 4	588.427,4	5.894.685,8	48,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s13	Oerzen, Westerheide 5	588.381,0	5.894.813,7	42,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0

(Fortsetzung nächste Seite)...



Maßstab 1:200.000  
\* Existierende WEA  
\* Schattenrezeptor



**SHADOW - Hauptergebnis****Berechnung: Vorbelastung Repowering 18 Bestand**

... (Fortsetzung von vorheriger Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
				[m]	[m]	[m]	[m]	[°]		[m]
s14	Oerzen, Westerheide 12A	588.325,0	5.894.865,9	42,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s15	Oerzen, Westerheide 12C	588.306,5	5.894.823,7	44,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s16	Oerzen, Westerheide 18	588.256,0	5.894.856,0	45,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s17	Oerzen, Westerheide 19	588.291,4	5.894.974,5	48,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s18	Oerzen, Westerheide 20	588.229,9	5.894.881,8	47,7	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s19	Oerzen, Westerheide 22	588.185,2	5.894.847,2	46,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s20	Oerzen, Westerheide 28	588.102,7	5.894.825,3	47,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s21	Oerzen, Zum Hasel 5	587.786,3	5.893.215,0	57,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s22	Oerzen, Zum Hasel 10	588.158,0	5.893.781,7	45,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s23	Oerzen, Mühlenweg 10	588.545,4	5.894.776,2	44,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s24	Oerzen, Mühlenweg 18	588.468,7	5.894.823,3	42,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s25	Südergellersen, Auf dem Brink 6	586.477,5	5.896.246,7	67,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s26	Südergellersen, Auf dem Brink 7	586.498,2	5.896.189,4	65,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s27	Südergellersen, Birkenweg 7	586.547,8	5.896.410,5	65,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s28	Südergellersen, Forstweg 4	586.302,3	5.896.127,2	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s29	Südergellersen, Forstweg 8	586.230,1	5.896.140,7	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s30	Südergellersen, Forstweg 11	586.166,4	5.896.101,6	63,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s31	Südergellersen, Forstweg 16	586.112,1	5.896.167,0	64,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s32	Südergellersen, Forstweg 17	586.094,1	5.896.128,7	62,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s33	Südergellersen, Gewerbegebiet	587.007,3	5.895.062,8	43,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s34	Südergellersen, Heidberg 2	586.177,4	5.896.183,9	66,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s35	Südergellersen, Heidberg 3	586.154,2	5.896.223,0	66,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s36	Südergellersen, Heilighenthaler Weg 2	586.863,9	5.896.155,5	55,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s37	Südergellersen, Heilighenthaler Weg 3	586.792,8	5.896.190,0	58,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s38	Südergellersen, Heilighenthaler Weg 3c	586.833,1	5.896.217,7	58,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s39	Südergellersen, Heilighenthaler Weg 11	586.911,1	5.896.239,1	52,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s40	Südergellersen, Im Alten Dorfe 2	586.402,6	5.896.082,0	64,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s41	Südergellersen, Im Alten Dorfe 3	586.453,7	5.896.115,5	65,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s42	Südergellersen, Im Alten Dorfe 4	586.480,0	5.896.021,4	61,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s43	Südergellersen, Im Alten Dorfe 5	586.561,2	5.896.156,3	63,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s44	Südergellersen, Im Alten Dorfe 7	586.616,6	5.896.197,1	62,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s45	Südergellersen, Im Alten Dorfe 8	586.561,9	5.896.067,6	60,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s46	Südergellersen, Im Alten Dorfe 10A	586.625,5	5.896.101,5	60,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s47	Südergellersen, Kirchgellerser Straße 2	586.638,0	5.896.277,9	62,7	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s48	Südergellersen, Kirchgellerser Straße 3	586.594,8	5.896.327,3	63,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s49	Südergellersen, Kirchgellerser Straße 6	586.637,2	5.896.375,2	63,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s50	Südergellersen, Kirchgellerser Straße 9	586.617,5	5.896.432,1	64,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s51	Südergellersen, Kirchgellerser Straße 10	586.660,0	5.896.465,5	63,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s52	Südergellersen, Kirchgellerser Straße 13	586.632,2	5.896.499,1	64,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s53	Südergellersen, Kirchgellerser Straße 15	586.747,3	5.896.191,6	60,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s54	Südergellersen, Kirchgellerser Straße 16	586.731,0	5.896.121,0	59,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s55	Südergellersen, Oerzer Str. 13A	586.909,5	5.895.981,7	53,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s56	Südergellersen, Oerzer Str. 15	587.010,6	5.895.899,8	50,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s57	Südergellersen, Oerzer Str. 18	586.781,3	5.896.062,2	56,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s58	Südergellersen, Oerzer Str. 19	586.879,7	5.895.864,2	49,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s59	Südergellersen, Poggenpohl 7	586.751,1	5.895.922,0	55,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s60	Südergellersen, Poggenpohl 8	586.640,6	5.895.995,8	58,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s61	Südergellersen, Schwarzer Weg 2	586.403,0	5.896.246,5	71,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s62	Südergellersen, Schwarzer Weg 9	586.404,8	5.896.338,8	69,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s63	Südergellersen, Westergellerser Weg 1	586.545,3	5.896.256,4	63,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s64	Südergellersen, Westergellerser Weg 4	586.498,9	5.896.338,8	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s65	Südergellersen, Wetzzer Weg 3	586.268,4	5.896.052,0	63,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s66	Südergellersen, Wetzzer Weg 6	586.172,4	5.895.854,5	57,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s67	Südergellersen, In de Masch 8	586.717,4	5.896.250,8	61,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s68	Wetzen, Zum Lerchenberg 5	583.085,3	5.892.839,1	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s69	Wetzen, Zum Lerchenberg 10	583.242,4	5.892.711,0	60,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s70	Wetzen, Zum Lerchenberg 37	582.866,7	5.892.994,9	69,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0



## SHADOW - Hauptergebnis

**Berechnung:** Vorbelastung Repowering 18 Bestand

### Berechnungsergebnisse

Schattenrezeptor

Nr.	Name	astron. max. mögl. Beschattungsdauer		
		Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag
		[h/a]	[d/a]	[h/d]
s01	Neu Oerzen, Soltau Straße 1	0:00	0	0:00
s02	Oerzen, Am Ohfeld 1	38:32	85	0:38
s03	Oerzen, Am Ohfeld 4	34:15	78	0:38
s04	Oerzen, Am Ohfeld 9	37:04	82	0:41
s05	Oerzen, Am Ohfeld 15	38:01	81	0:44
s06	Oerzen, Im Dorfe 14	35:16	89	0:32
s07	Oerzen, Im Dorfe 16	51:06	109	0:39
s08	Oerzen, Im Dorfe 19	35:44	92	0:32
s09	Oerzen, Im Dorfe 25	40:22	98	0:34
s10	Oerzen, Westerheide 1	40:59	95	0:35
s11	Oerzen, Westerheide 3	41:31	93	0:35
s12	Oerzen, Westerheide 4	37:23	87	0:33
s13	Oerzen, Westerheide 5	40:17	87	0:41
s14	Oerzen, Westerheide 12A	44:42	88	0:46
s15	Oerzen, Westerheide 12C	46:09	91	0:45
s16	Oerzen, Westerheide 18	50:58	94	0:49
s17	Oerzen, Westerheide 19	48:29	91	0:51
s18	Oerzen, Westerheide 20	53:49	96	0:52
s19	Oerzen, Westerheide 22	58:29	101	0:54
s20	Oerzen, Westerheide 28	69:53	112	1:00
s21	Oerzen, Zum Hasel 5	16:16	55	0:24
s22	Oerzen, Zum Hasel 10	23:07	72	0:28
s23	Oerzen, Mühlenweg 10	30:40	77	0:32
s24	Oerzen, Mühlenweg 18	34:27	79	0:38
s25	Südergellersen, Auf dem Brink 6	0:00	0	0:00
s26	Südergellersen, Auf dem Brink 7	0:00	0	0:00
s27	Südergellersen, Birkenweg 7	0:00	0	0:00
s28	Südergellersen, Forstweg 4	5:50	26	0:17
s29	Südergellersen, Forstweg 8	8:47	32	0:20
s30	Südergellersen, Forstweg 11	15:37	46	0:25
s31	Südergellersen, Forstweg 16	13:01	42	0:23
s32	Südergellersen, Forstweg 17	16:45	48	0:25
s33	Südergellersen, Gewerbegebiet	359:00	239	2:14
s34	Südergellersen, Heidberg 2	7:45	31	0:19
s35	Südergellersen, Heidberg 3	5:56	27	0:17
s36	Südergellersen, Heiligenthaler Weg 2	24:45	64	0:27
s37	Südergellersen, Heiligenthaler Weg 3	19:41	52	0:27
s38	Südergellersen, Heiligenthaler Weg 3c	19:25	52	0:26
s39	Südergellersen, Heiligenthaler Weg 11	21:43	60	0:25
s40	Südergellersen, Im Alten Dorfe 2	3:43	20	0:14
s41	Südergellersen, Im Alten Dorfe 3	0:00	0	0:00
s42	Südergellersen, Im Alten Dorfe 4	21:56	42	0:46
s43	Südergellersen, Im Alten Dorfe 5	4:40	22	0:16
s44	Südergellersen, Im Alten Dorfe 7	5:15	24	0:16
s45	Südergellersen, Im Alten Dorfe 8	17:07	44	0:29
s46	Südergellersen, Im Alten Dorfe 10A	18:07	46	0:29
s47	Südergellersen, Kirchgellerser Straße 2	0:00	0	0:00
s48	Südergellersen, Kirchgellerser Straße 3	0:00	0	0:00
s49	Südergellersen, Kirchgellerser Straße 6	0:00	0	0:00
s50	Südergellersen, Kirchgellerser Straße 9	0:00	0	0:00
s51	Südergellersen, Kirchgellerser Straße 10	0:00	0	0:00
s52	Südergellersen, Kirchgellerser Straße 13	0:00	0	0:00
s53	Südergellersen, Kirchgellerser Straße 15	16:39	46	0:26
s54	Südergellersen, Kirchgellerser Straße 16	22:55	56	0:29
s55	Südergellersen, Oerzer Str. 13A	18:12	56	0:28
s56	Südergellersen, Oerzer Str. 15	14:00	44	0:27
s57	Südergellersen, Oerzer Str. 18	29:43	70	0:29
s58	Südergellersen, Oerzer Str. 19	22:46	71	0:30
s59	Südergellersen, Poggenpohl 7	31:40	88	0:32
s60	Südergellersen, Poggenpohl 8	31:47	66	0:33
s61	Südergellersen, Schwarzer Weg 2	0:00	0	0:00
s62	Südergellersen, Schwarzer Weg 9	0:00	0	0:00

(Fortsetzung nächste Seite)...



**SHADOW - Hauptergebnis****Berechnung: Vorbelastung Repowering 18 Bestand**

...(Fortsetzung von vorheriger Seite)

Nr.	Name	astron. max. mögl. Beschattungsdauer		
		Stunden/Jahr [h/a]	Schattentage/Jahr [d/a]	Max.Schattendauer/Tag [h/d]
s63	Südergellersen, Westergellenser Weg 1	0:00	0	0:00
s64	Südergellersen, Westergellenser Weg 4	0:00	0	0:00
s65	Südergellersen, Wetzer Weg 3	14:45	44	0:25
s66	Südergellersen, Wetzer Weg 6	58:08	76	1:14
s67	Südergellersen, In de Masch 8	8:07	31	0:20
s68	Wetzen, Zum Lerchenberg 5	20:25	89	0:19
s69	Wetzen, Zum Lerchenberg 10	13:47	66	0:18
s70	Wetzen, Zum Lerchenberg 37	35:54	103	0:40

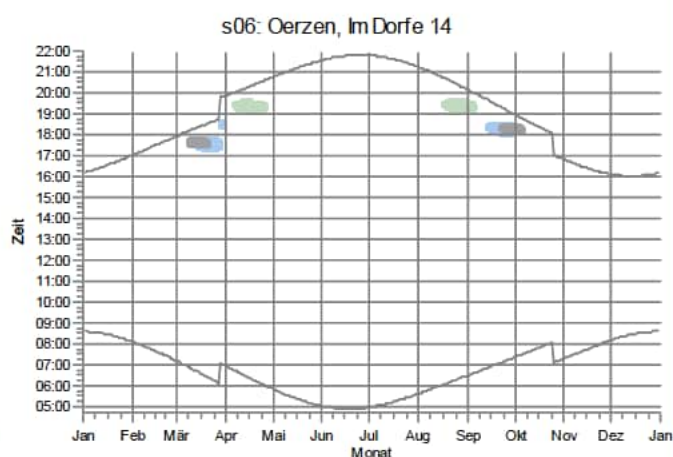
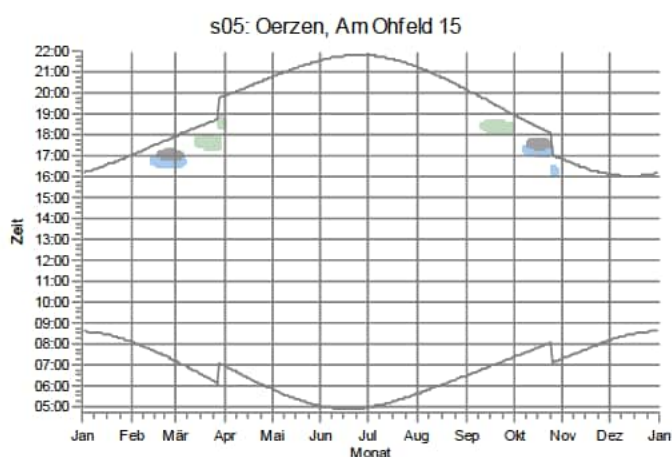
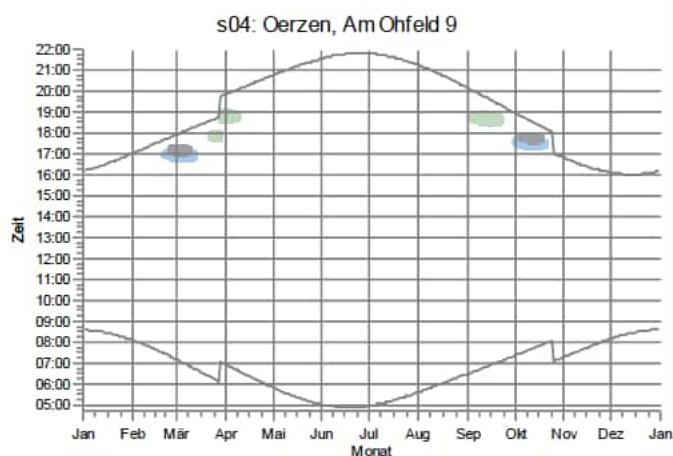
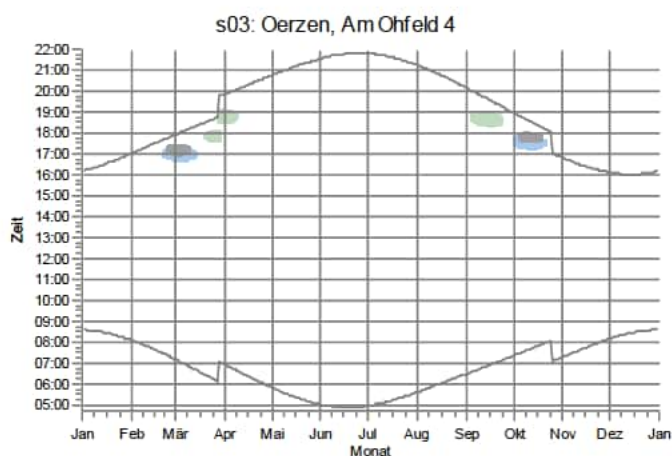
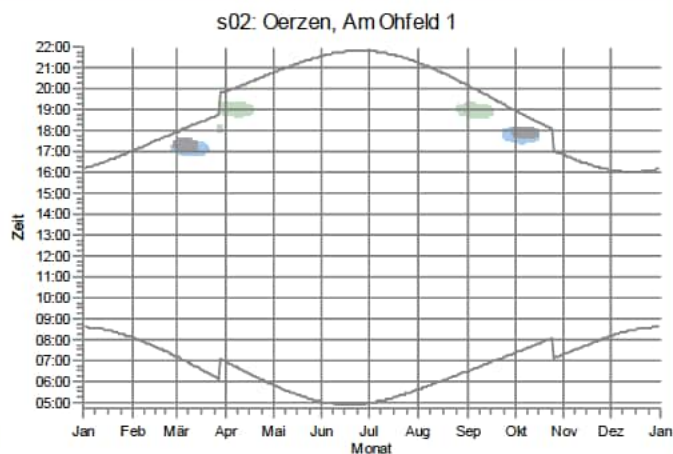
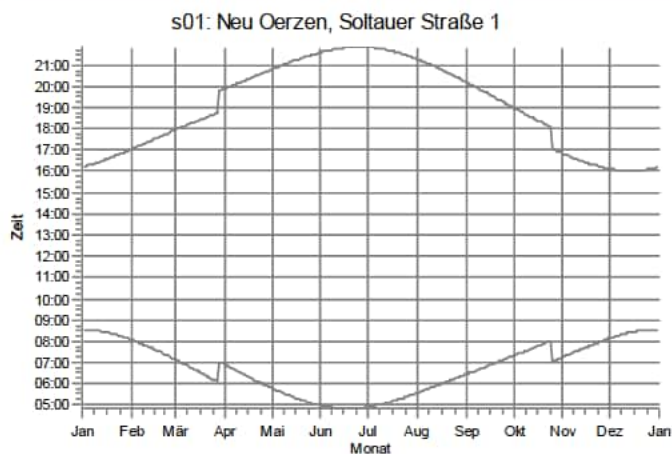
## Gesamtdauer Beschattung an Rezeptoren pro WEA

Nr.	Name	Maximal [h/a]
B 01	NORDEX N149/4.0-4.5 4500 149.0 !O! NH: 125,0 m (Ges:199,5 m) (101)	142:41
B 02	NORDEX N131/3300 DE 3300 131.0 !-! NH: 134,0 m (Ges:199,5 m) (120)	11:43
B 03	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (94)	11:18
B 04	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (95)	12:12
B 05	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (96)	10:15
B 06	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (97)	23:02
B 07	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (98)	20:35
B 08	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (99)	0:00
B 09	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (100)	0:00
B 10	ENERCON E-66/18.70 1800 70.0 !O! NH: 65,0 m (Ges:100,0 m) (103)	0:00
B 11	ENERCON E-66/18.70 1800 70.0 !O! NH: 65,0 m (Ges:100,0 m) (104)	0:00
B 12	ENERCON E-66/18.70 1800 70.0 !O! NH: 65,0 m (Ges:100,0 m) (105)	0:00
B 13	ENERCON E-66/18.70 1800 70.0 !O! NH: 65,0 m (Ges:100,0 m) (106)	0:00
Oerzen 1	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (79)	331:00
Oerzen 2	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (80)	194:07
Oerzen 3	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (81)	115:16
Oerzen 4	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (82)	50:45
Oerzen 5	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (83)	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.

## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



WEA

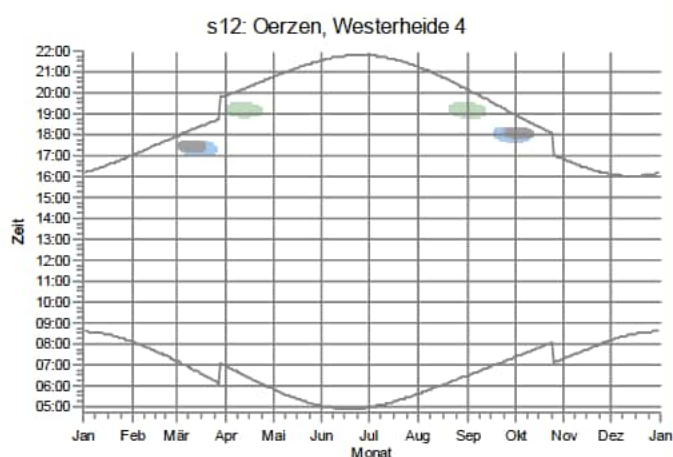
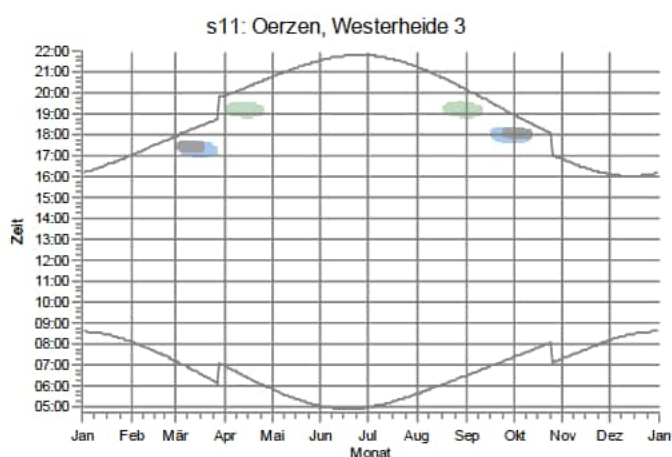
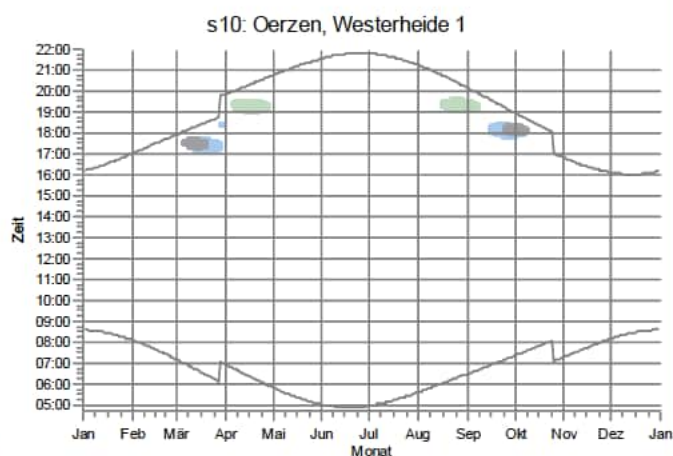
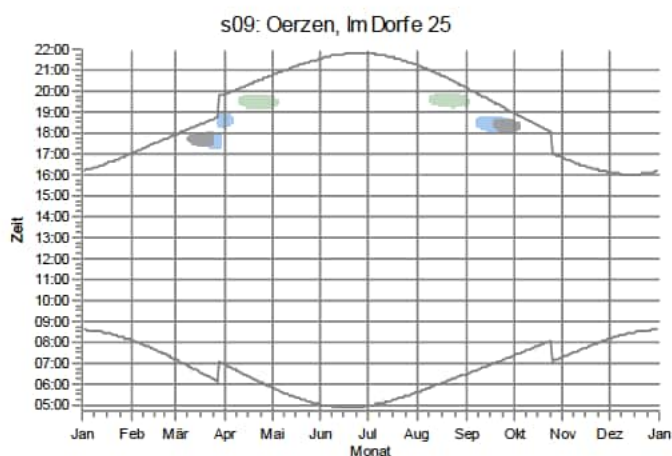
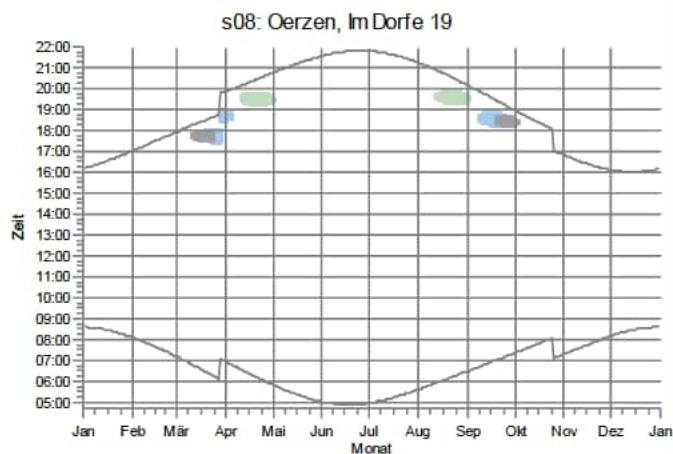
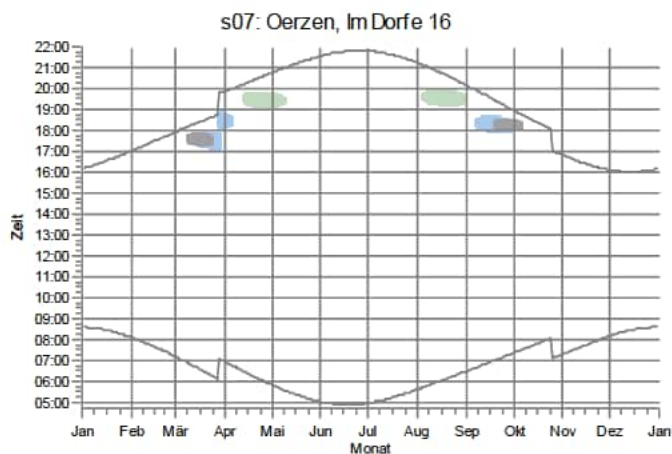
Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)  
Oerzen 2: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (80)

Oerzen 3: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (81)



## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



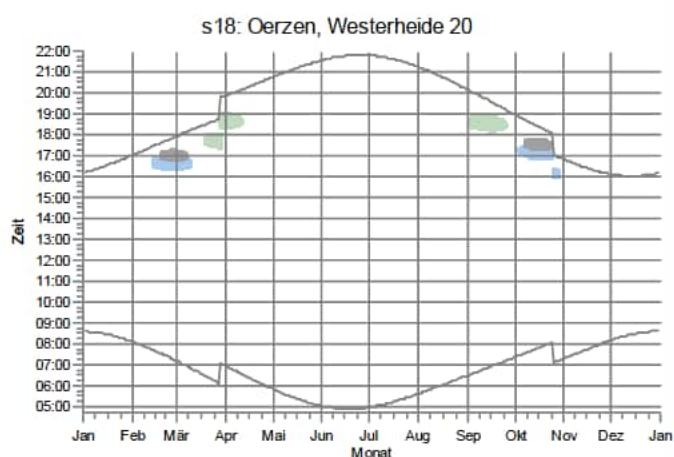
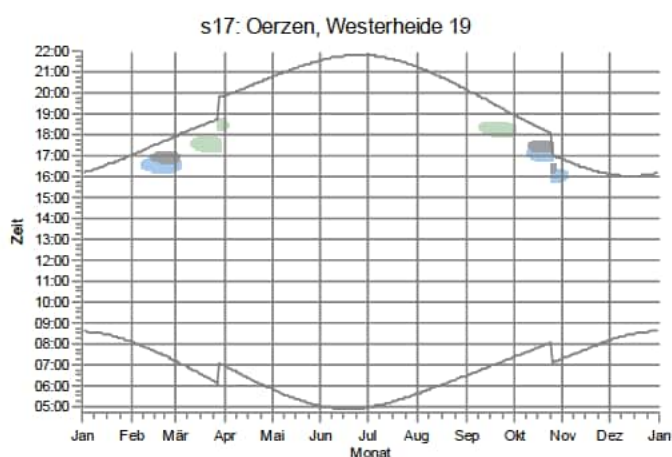
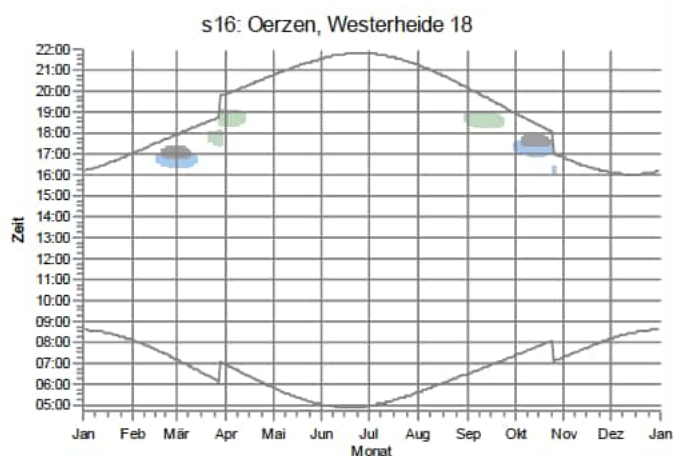
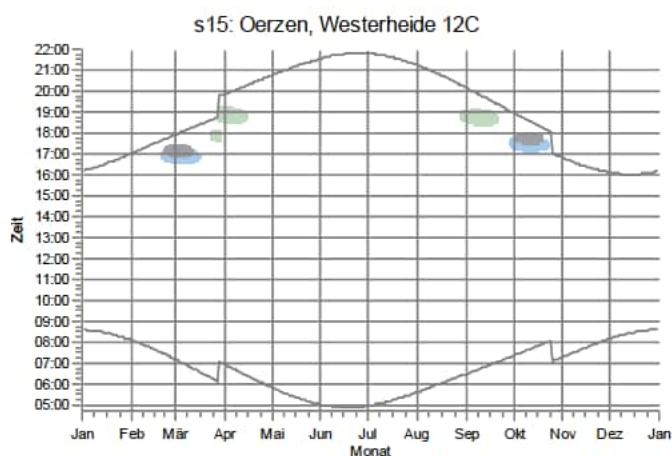
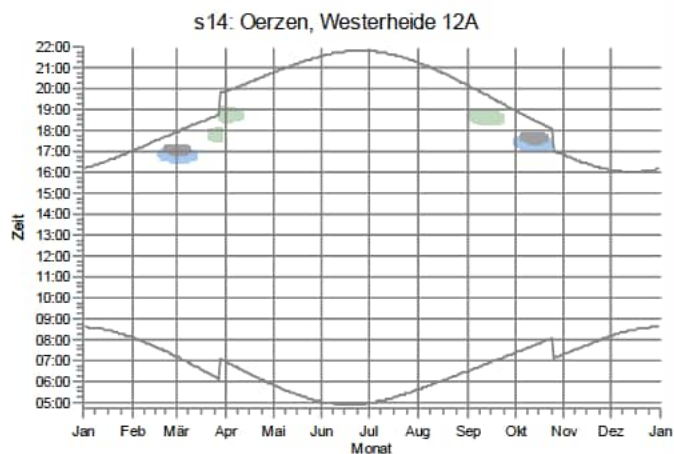
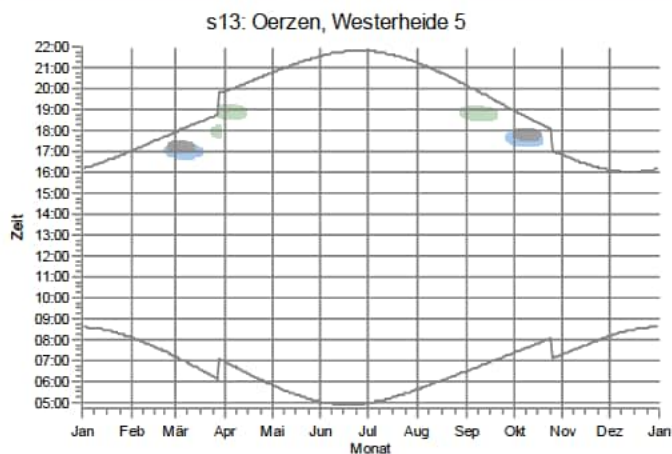
WEA

Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)  
Oerzen 2: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (80)

Oerzen 3: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (81)

## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



WEA

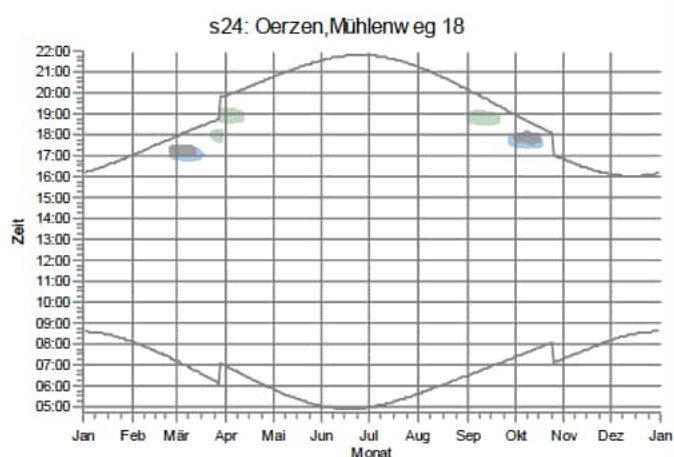
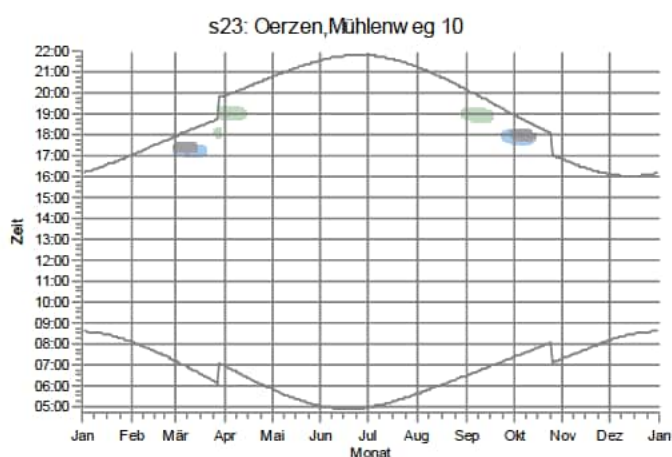
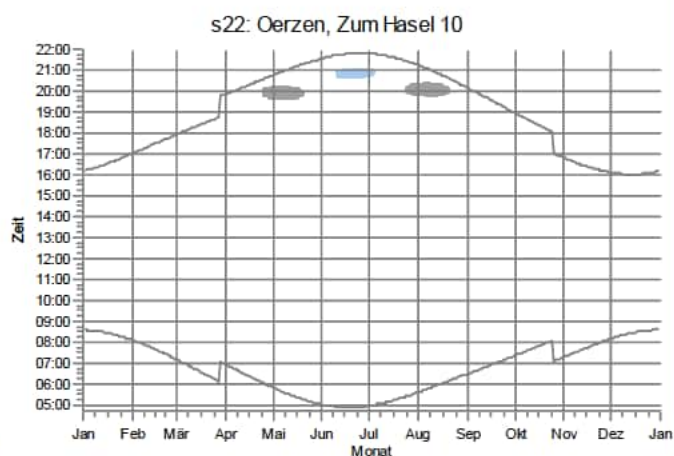
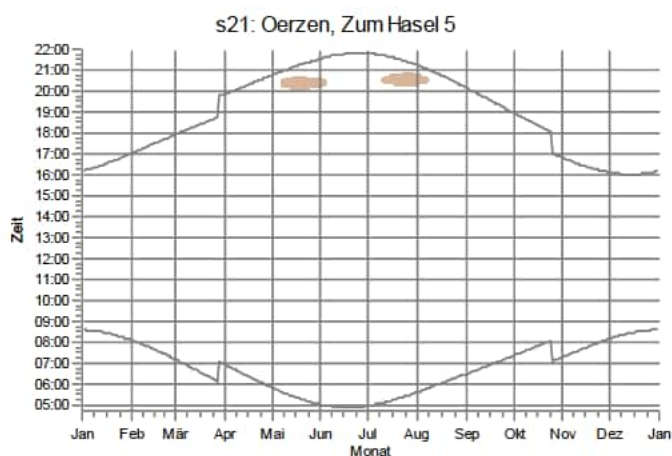
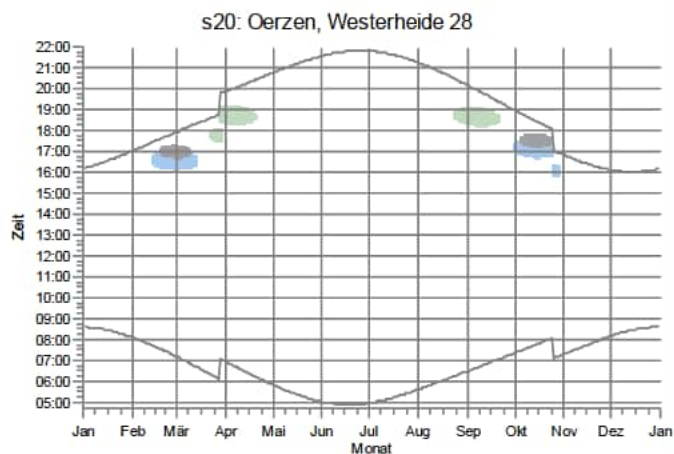
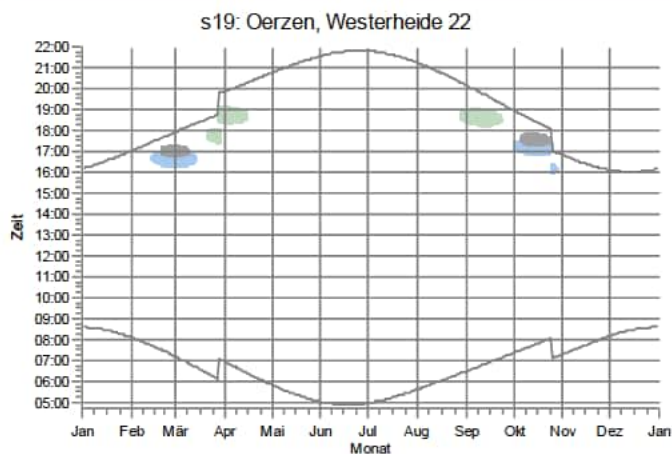
Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)  
Oerzen 2: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (80)

Oerzen 3: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (81)



## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



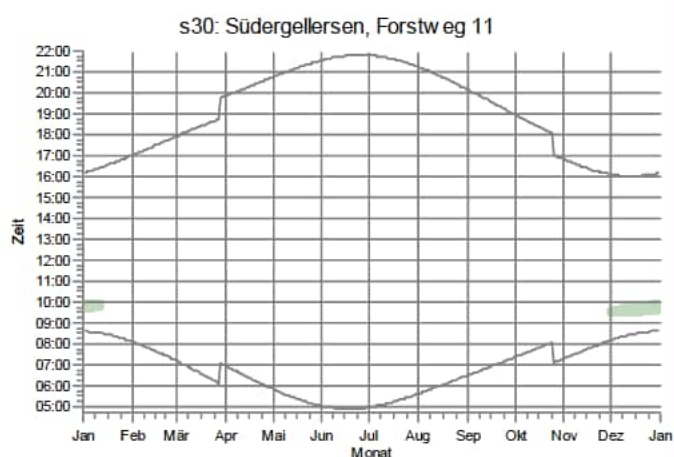
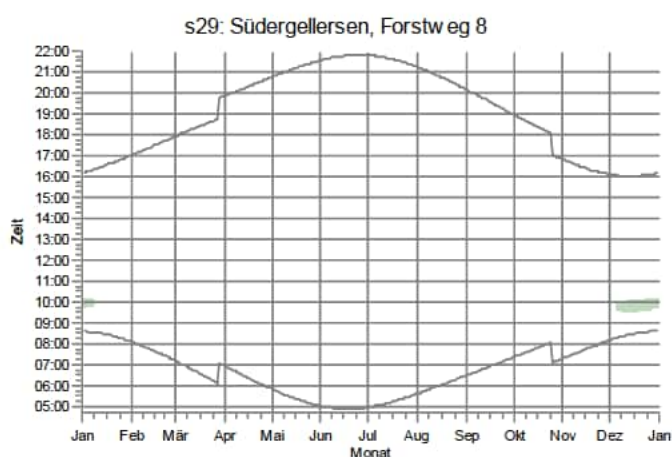
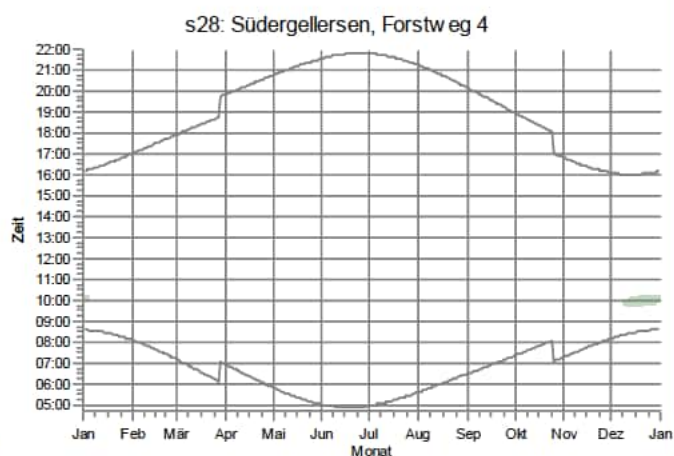
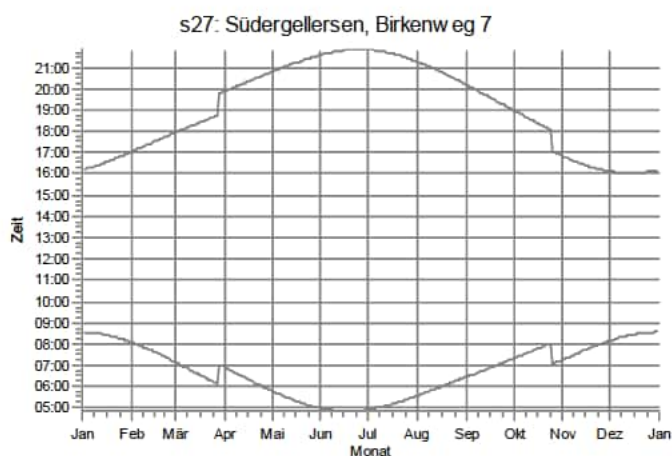
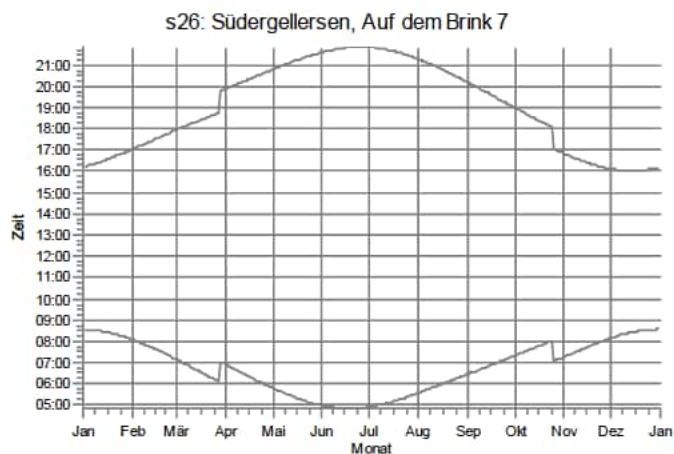
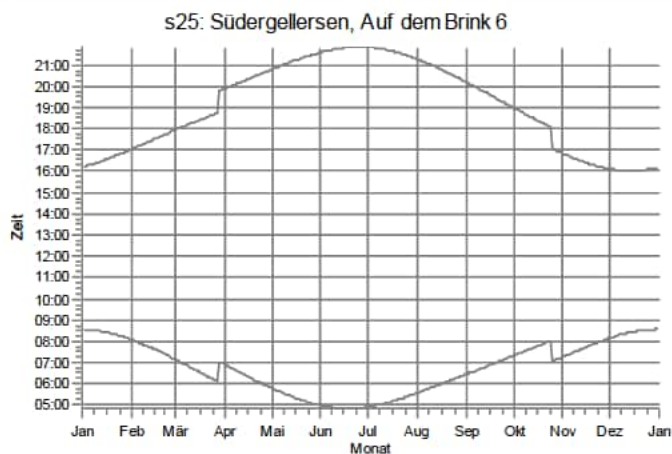
WEA

Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)  
Oerzen 2: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (80)

Oerzen 3: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (81)  
Oerzen 4: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (82)

## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



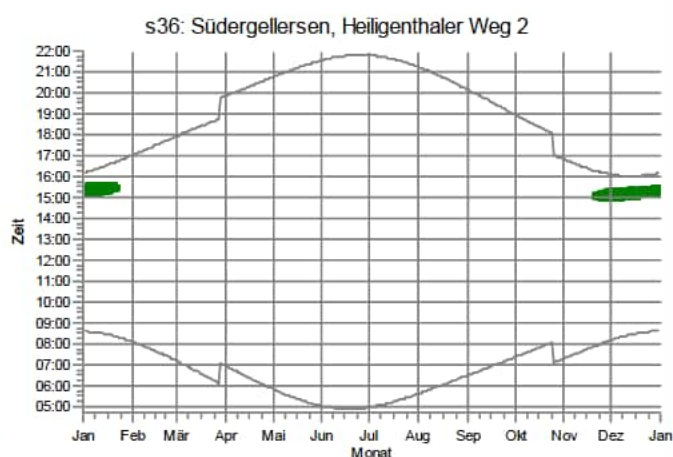
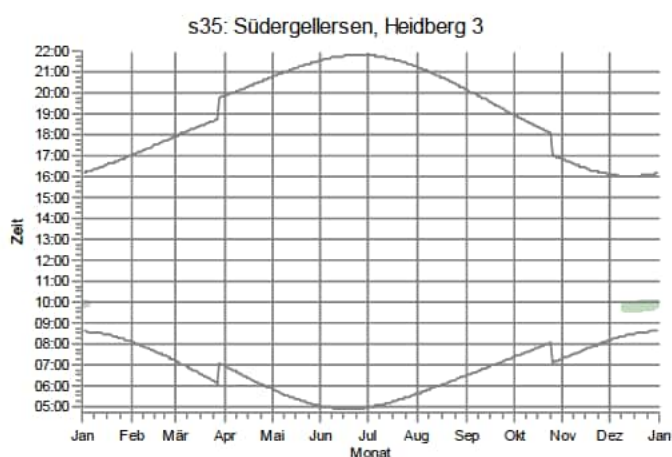
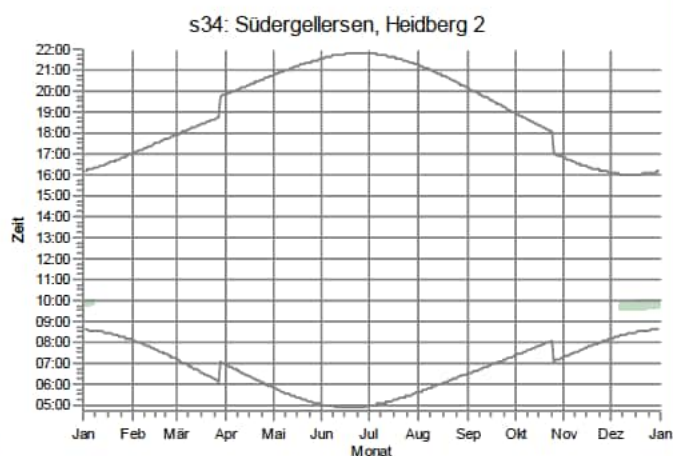
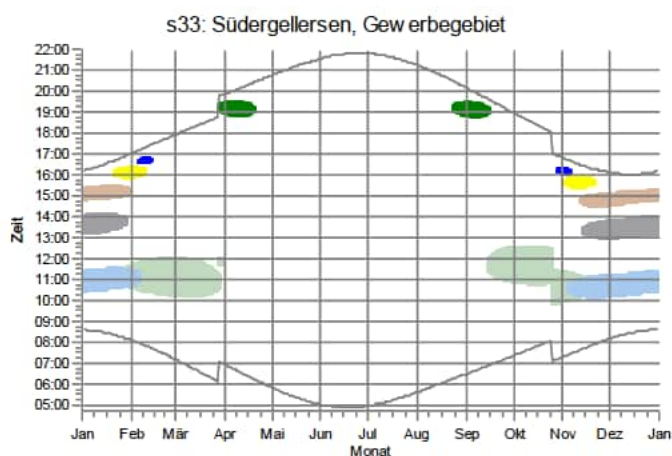
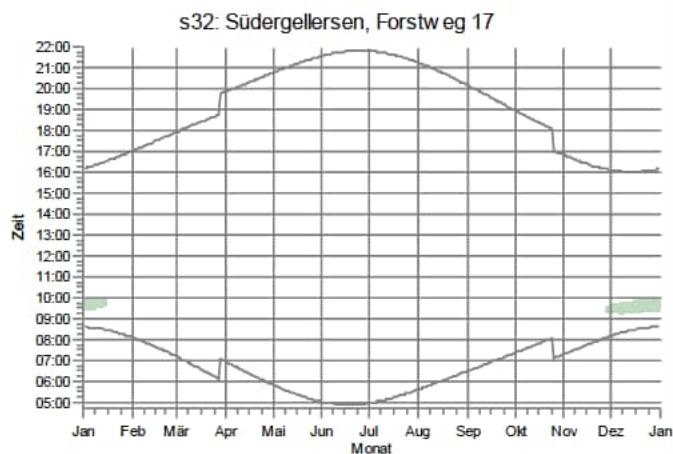
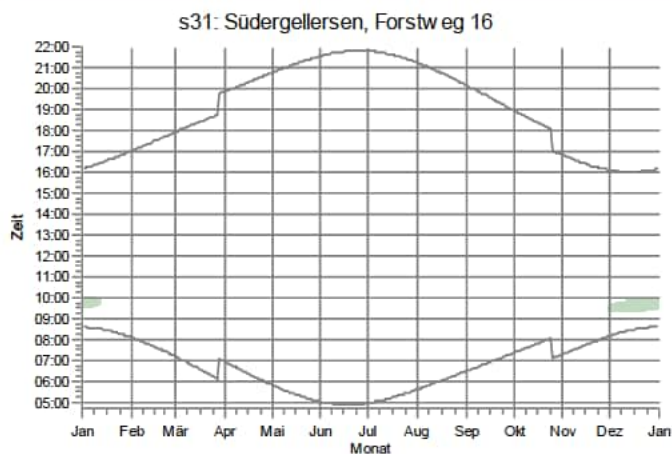
WEA

Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)



## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



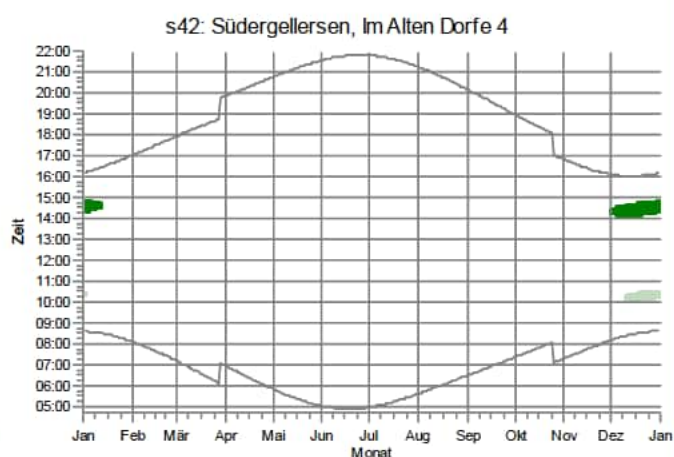
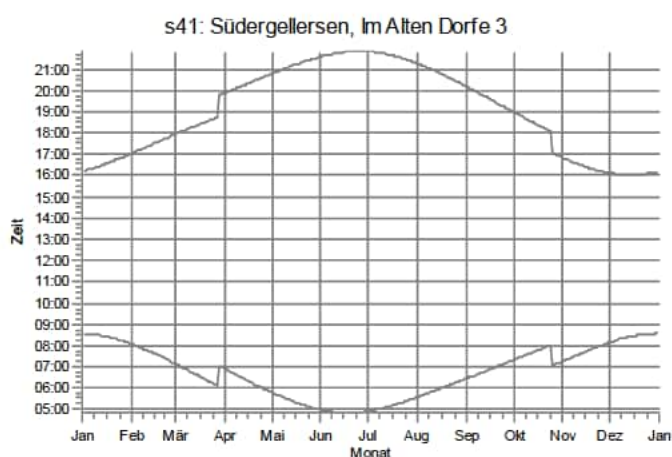
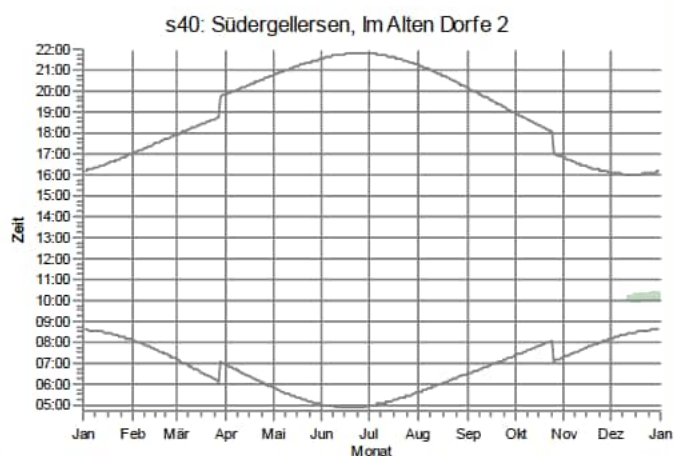
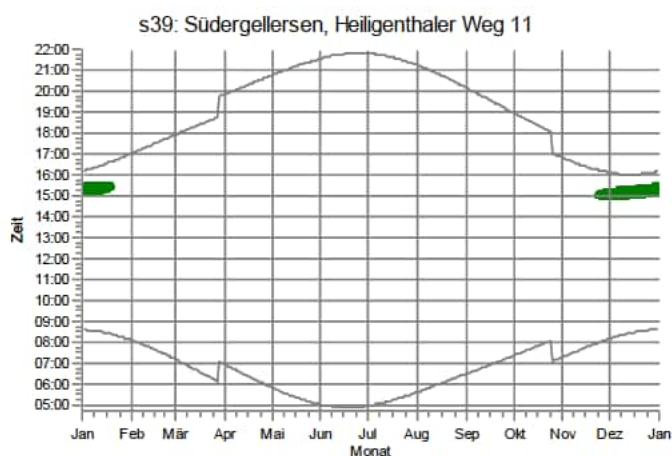
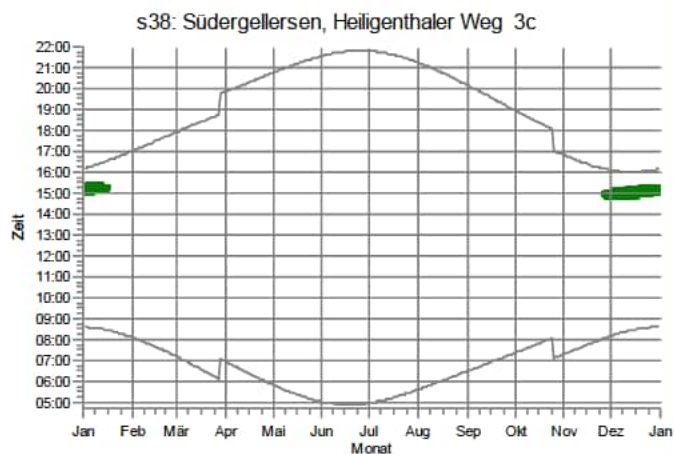
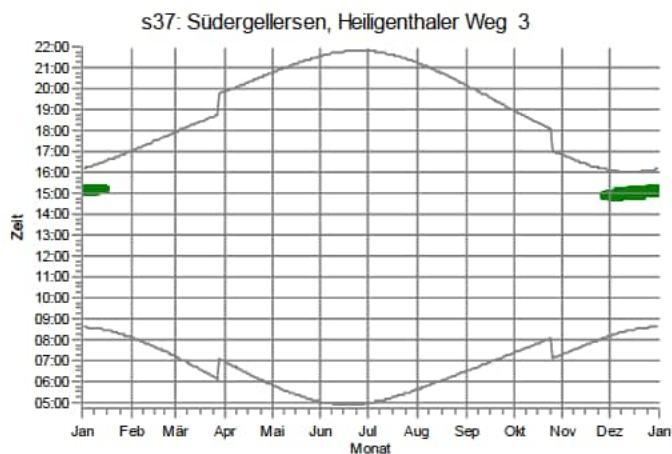
WEA

- B 01: NORDEX N149/4,0-4,5 4500 149,0 l-o! NH: 125,0 m (Ges:199,5 m) (101)
- B 02: NORDEX N131/3300 DE 3300 131,0 l-i NH: 134,0 m (Ges:199,5 m) (120)
- B 03: GE WIND ENERGY GE 2.75-120 2750 120,0 l-o! NH: 139,0 m (Ges:199,0 m) (94)
- Oerzen 1: NORDEX N175/6,X 6800 175,0 l-i NH: 179,0 m (Ges:266,5 m) (79)

- Oerzen 2: NORDEX N175/6,X 6800 175,0 l-i NH: 179,0 m (Ges:266,5 m) (80)
- Oerzen 3: NORDEX N175/6,X 6800 175,0 l-i NH: 179,0 m (Ges:266,5 m) (81)
- Oerzen 4: NORDEX N175/6,X 6800 175,0 l-i NH: 179,0 m (Ges:266,5 m) (82)

## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



WEA

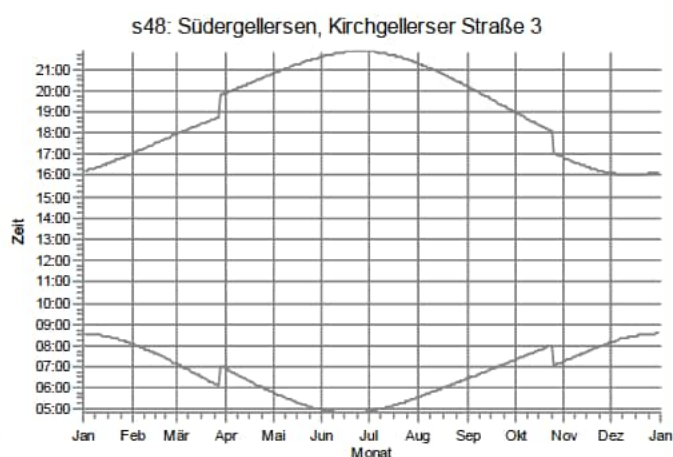
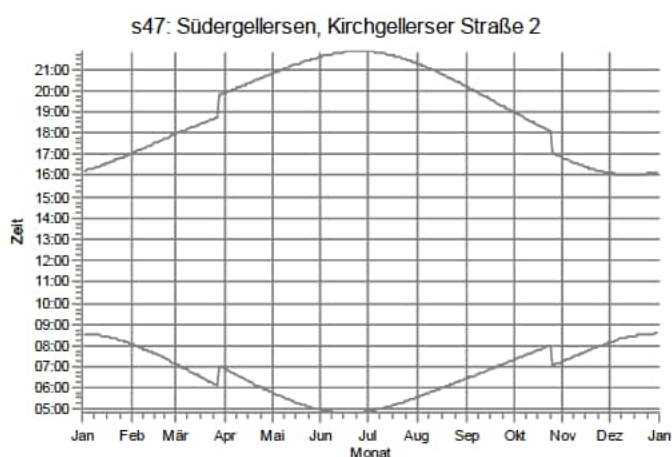
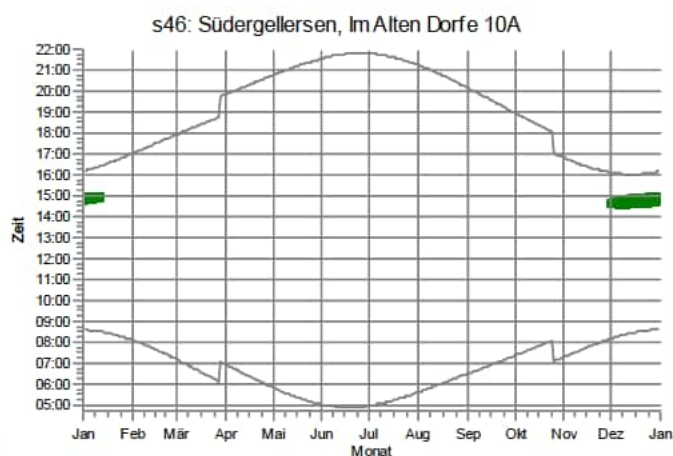
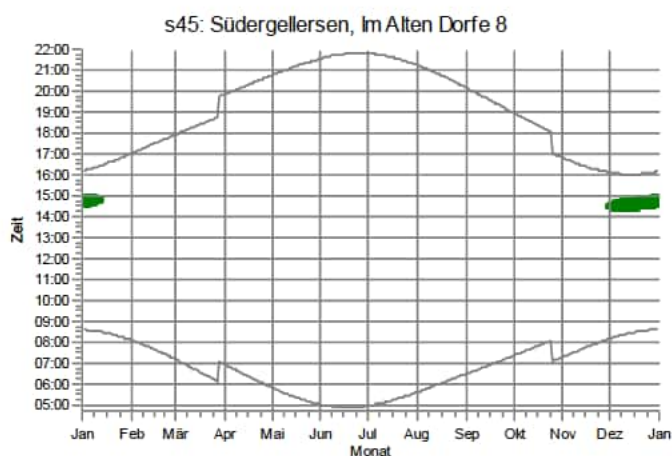
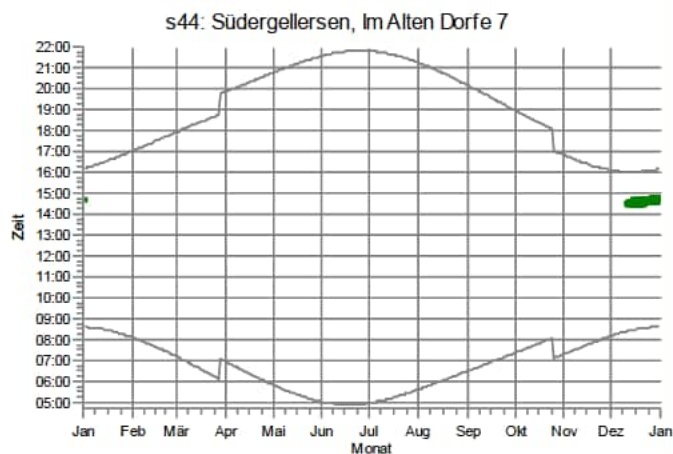
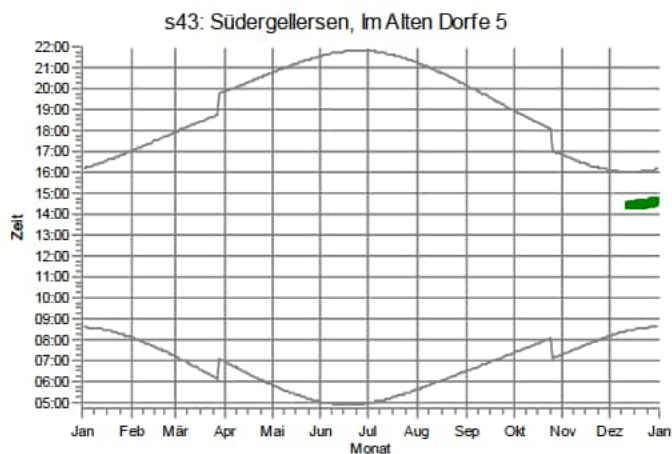
B 01: NORDEX N149/4,0-4,5 4500 149,0 IO! NH: 125,0 m (Ges:199,5 m) (101)

Oerzen 1: NORDEX N175/6,X 6800 175,0 I-I NH: 179,0 m (Ges:266,5 m) (79)



## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand

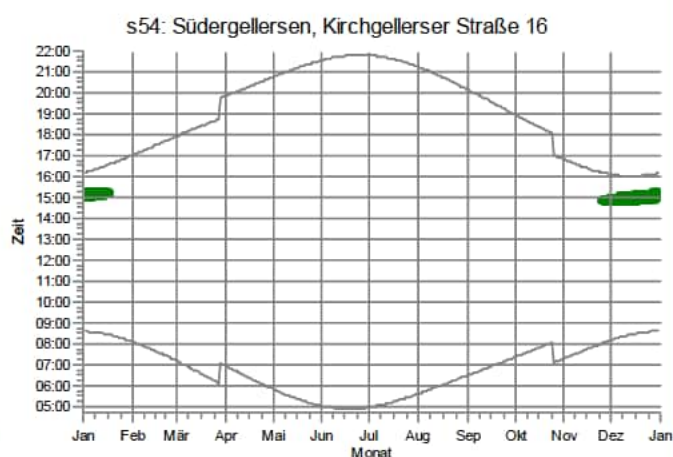
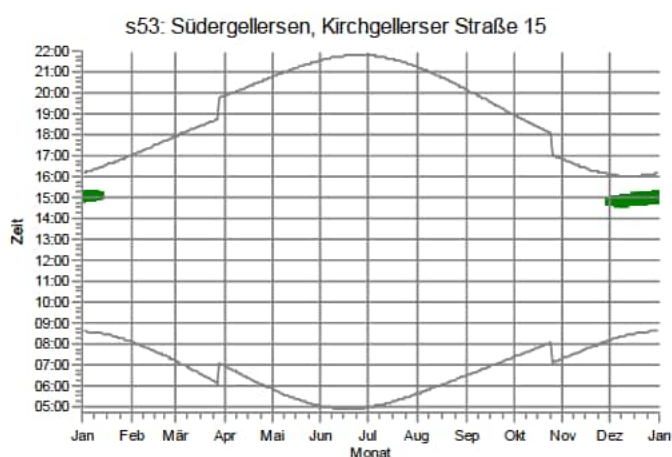
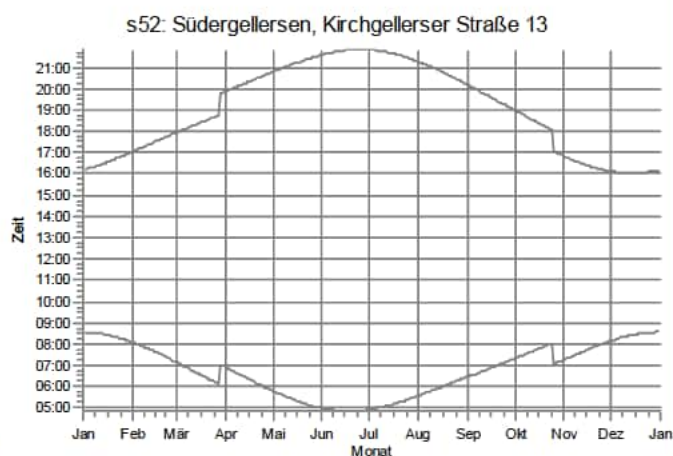
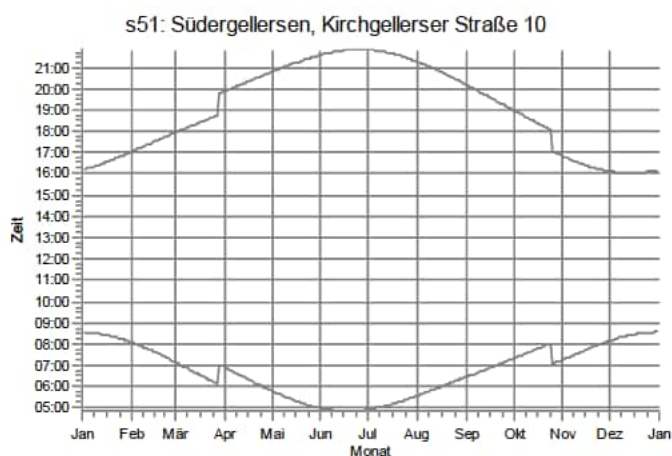
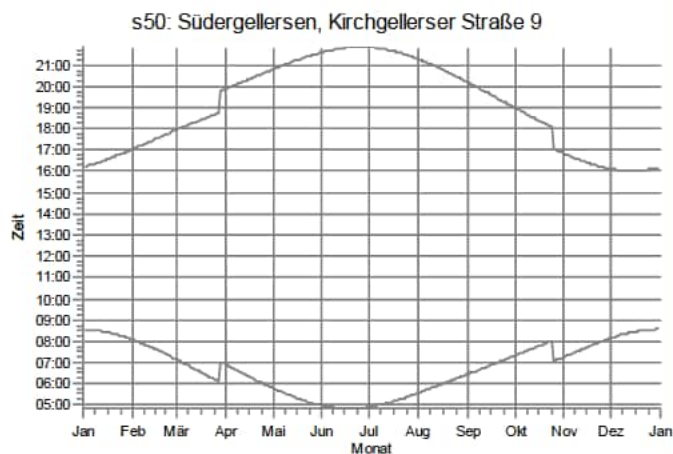
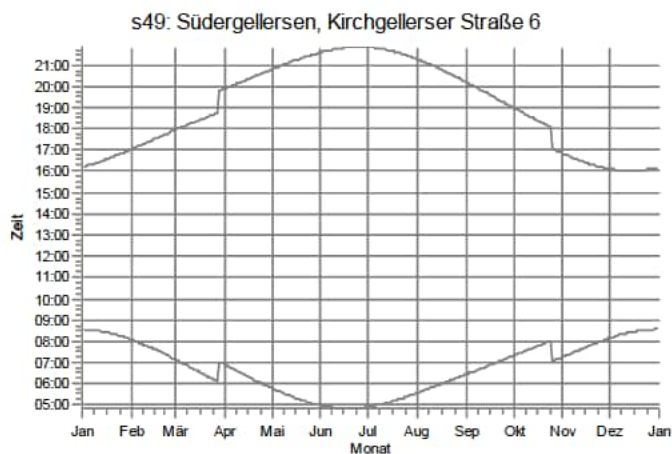


WEA

B 01: NORDEX N149/4.0-4.5 4500 149.0 10! NH: 125,0 m (Ges:199,5 m) (101)

## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



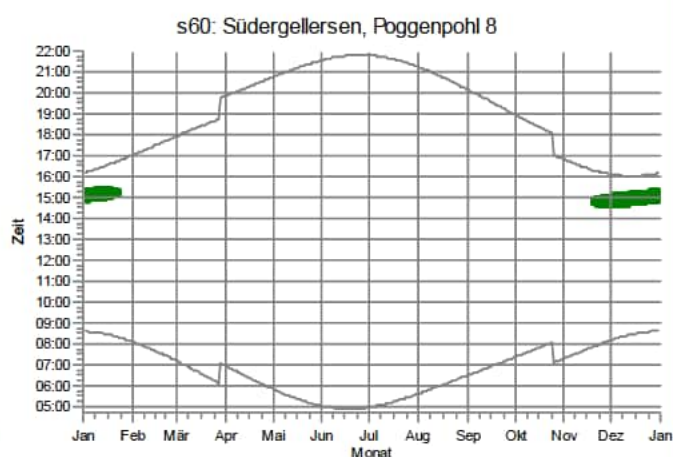
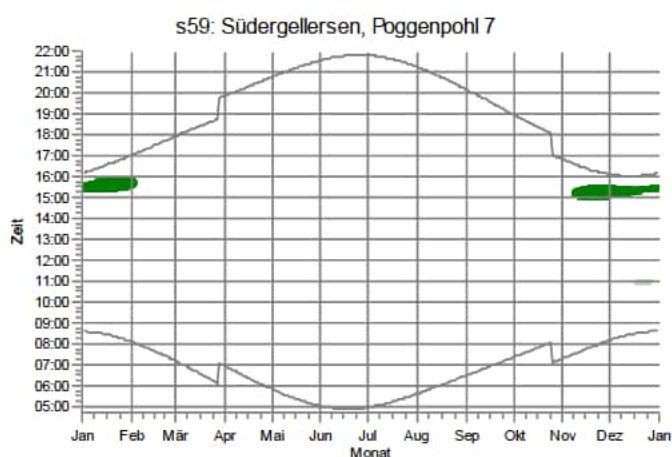
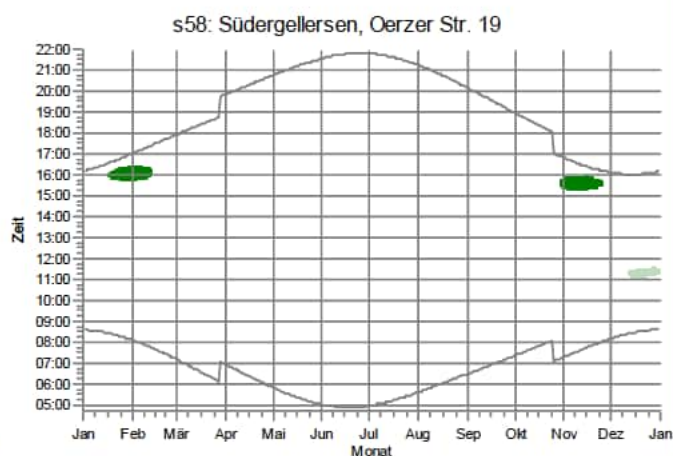
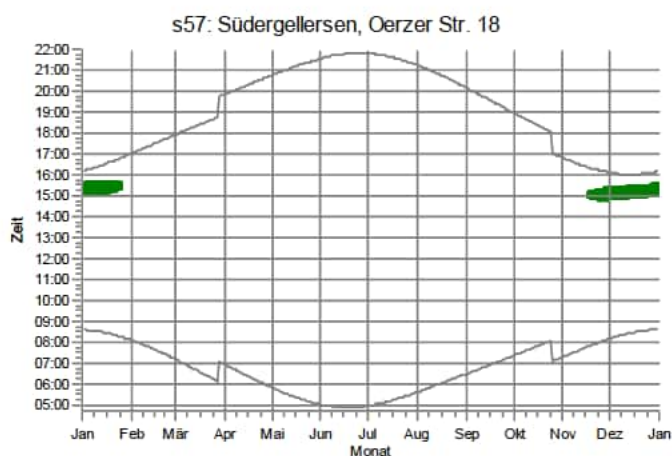
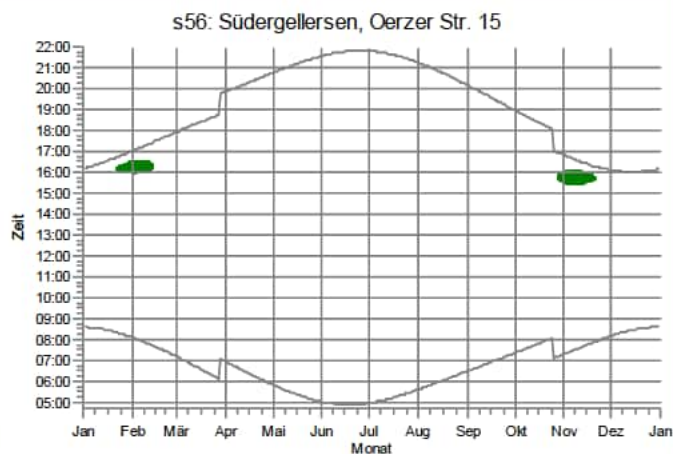
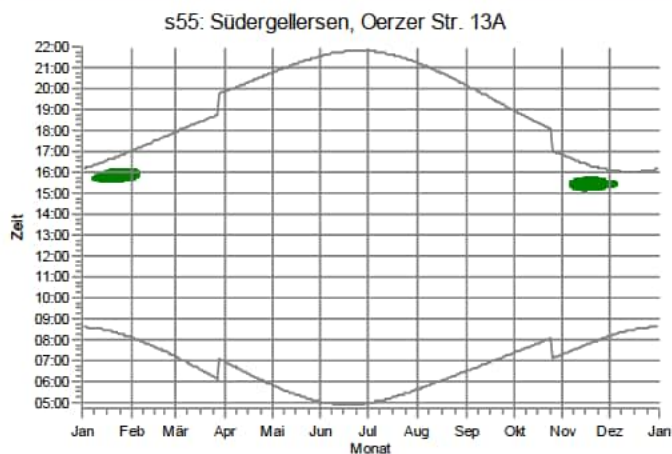
WEA

B 01: NORDEX N149/4.0-4.5 4500 149.0 10! NH: 125,0 m (Ges:199,5 m) (101)



## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



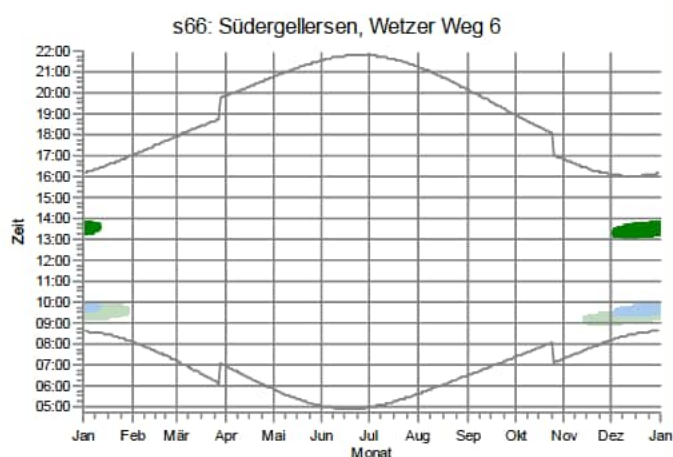
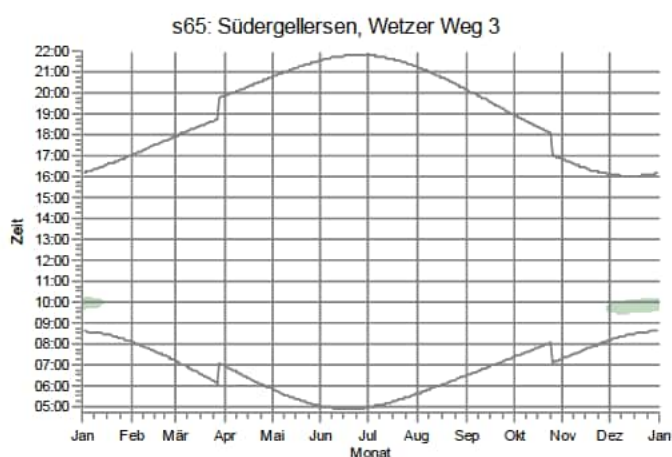
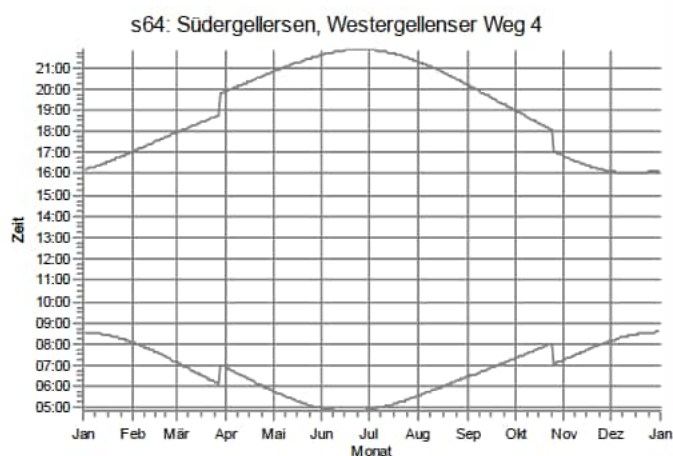
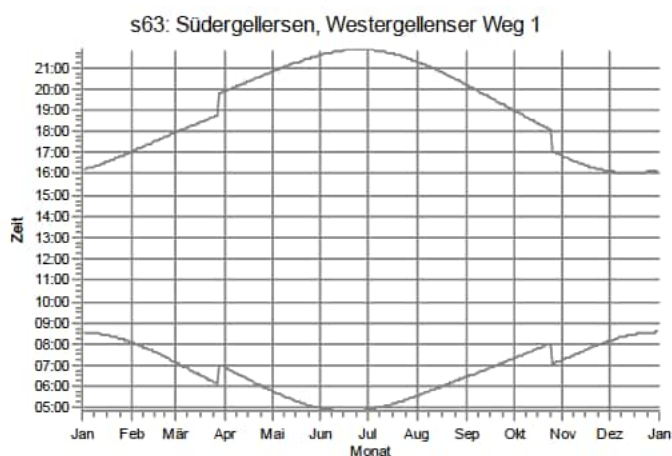
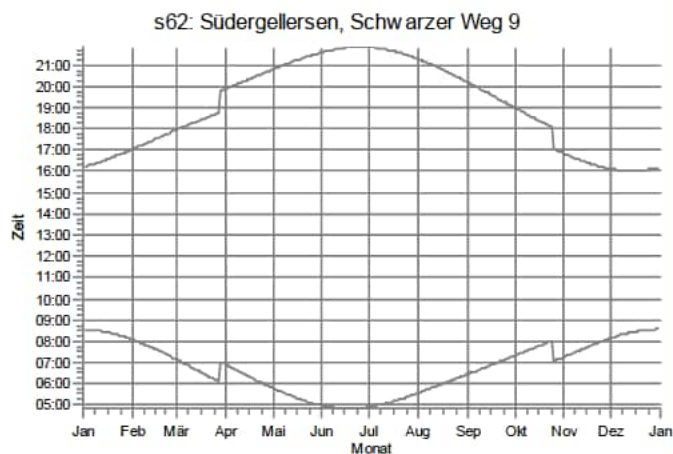
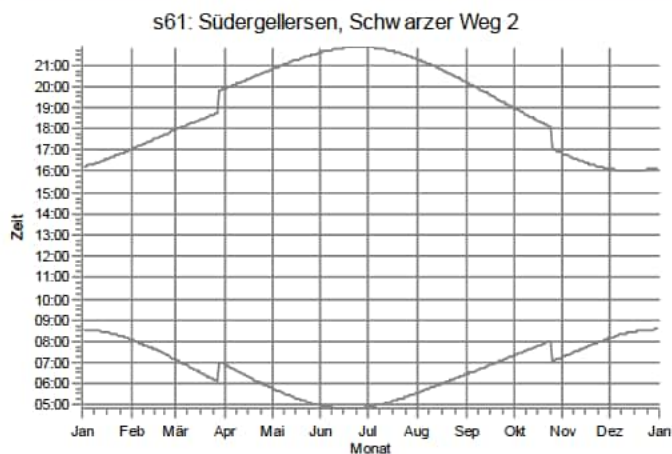
WEA

B 01: NORDEX N149/4,0-4,5 4500 149,0 IO! NH: 125,0 m (Ges:199,5 m) (101)

Oerzen 1: NORDEX N175/6,X 6800 175,0 I-I NH: 179,0 m (Ges:266,5 m) (79)

## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



WEA

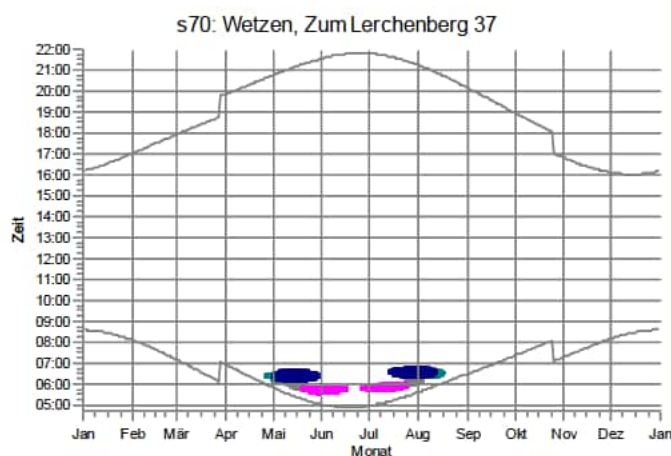
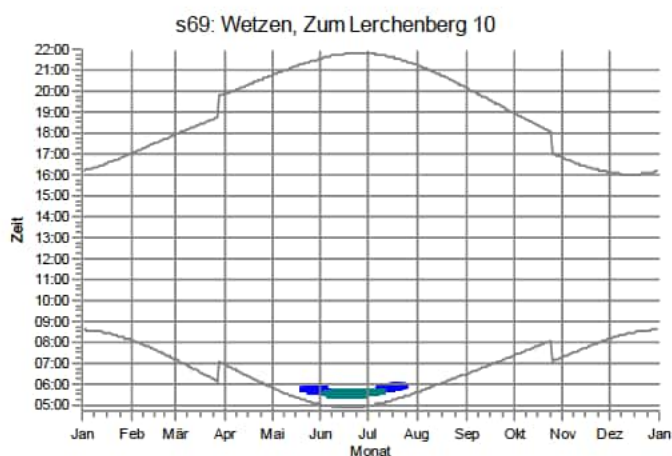
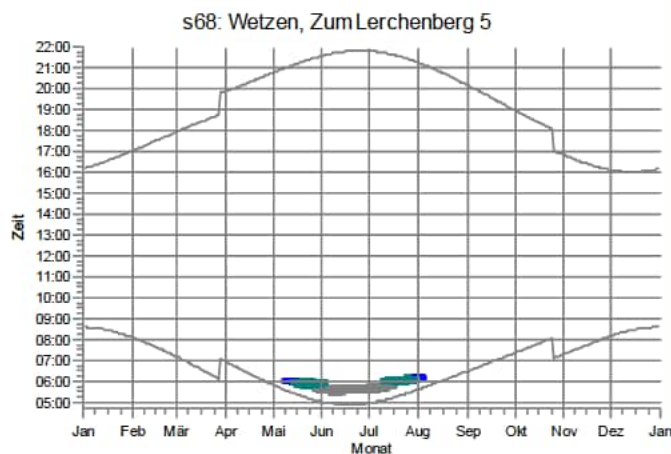
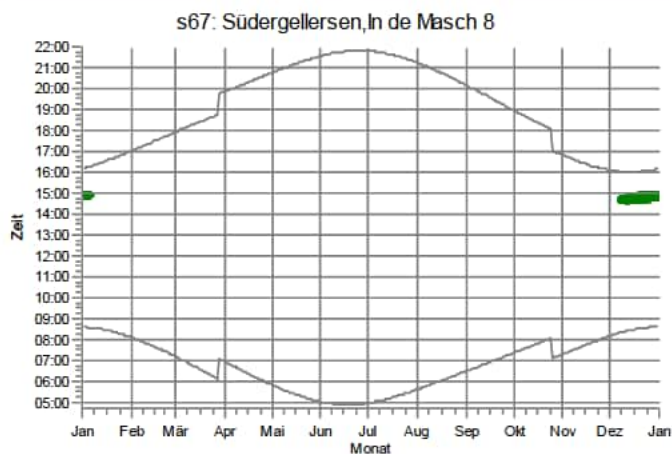
 B 01: NORDEX N149/4,0-4,5 4500 149,0 IO! NH: 125,0 m (Ges:199,5 m) (101)  
 Oerzen 1: NORDEX N175/6,X 6800 175,0 I-I NH: 179,0 m (Ges:266,5 m) (79)

 Oerzen 2: NORDEX N175/6,X 6800 175,0 I-I NH: 179,0 m (Ges:266,5 m) (80)



## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



WEA

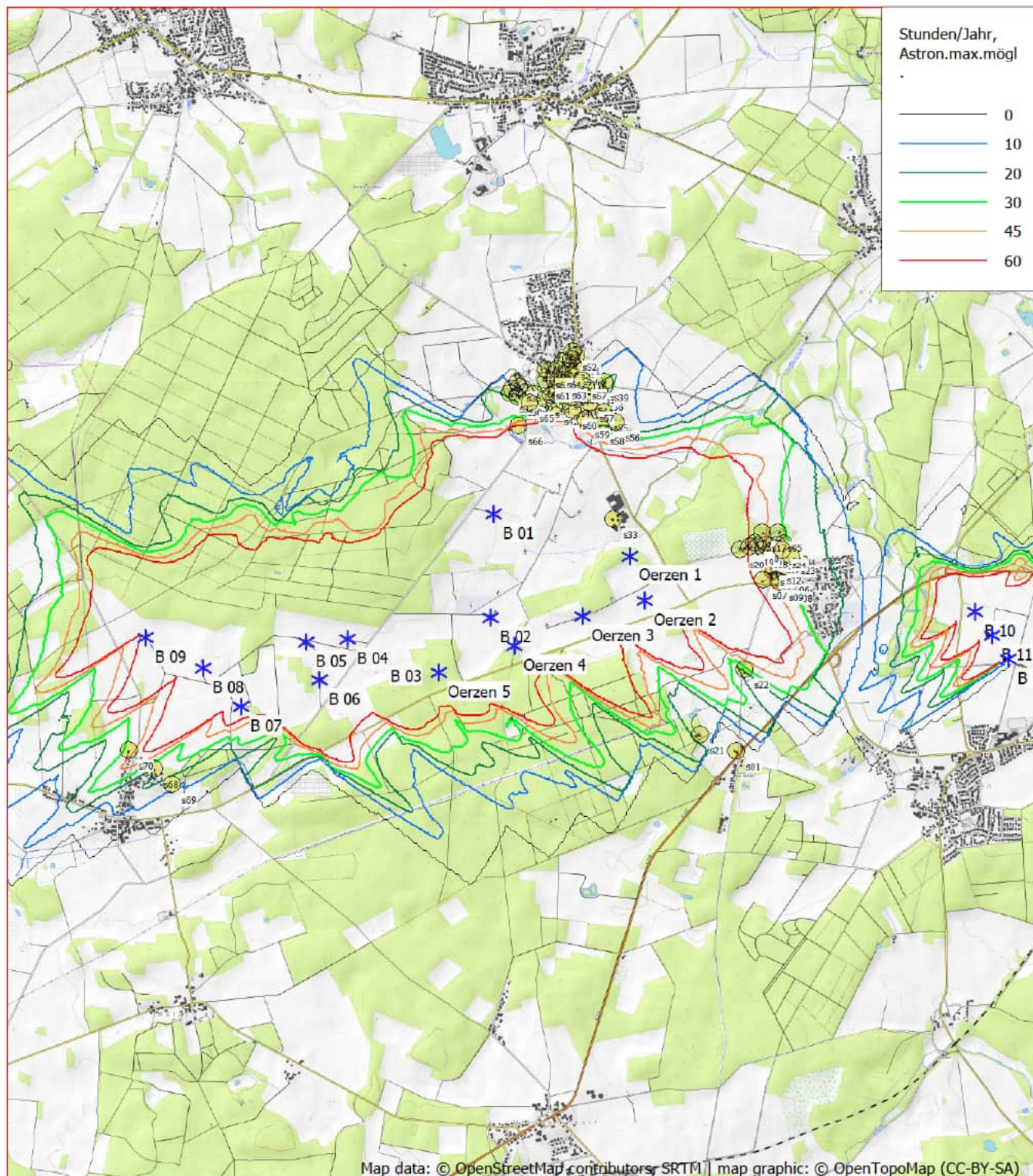
B 01: NORDEX N149/4.0-4.5 4500 149.0 IO! NH: 125,0 m (Ges:199,5 m) (101)  
B 03: GE WIND ENERGY GE 2.75-120 2750 120.0 IO! NH: 139,0 m (Ges:199,0 m) (94)  
B 04: GE WIND ENERGY GE 2.75-120 2750 120.0 IO! NH: 139,0 m (Ges:199,0 m) (95)

B 05: GE WIND ENERGY GE 2.75-120 2750 120.0 IO! NH: 139,0 m (Ges:199,0 m) (96)  
B 06: GE WIND ENERGY GE 2.75-120 2750 120.0 IO! NH: 139,0 m (Ges:199,0 m) (97)  
B 07: GE WIND ENERGY GE 2.75-120 2750 120.0 IO! NH: 139,0 m (Ges:199,0 m) (98)



## SHADOW - Karte

**Berechnung:** Vorbelastung Repowering 18 Bestand



0 500 1000 1500 2000 m

Karte: OpenTopoMap.org, Maßstab 1:50.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 586.120,0 Nord: 5.894.340,0

\* Existierende WEA ☼ Schattenrezeptor

Höhe der Schattenkarte: Höhenlinien: CONTOURLINE\_ONLINEDATA\_0.wpo (1)

Zeitschritt: 2 Minuten, Schrittweite: 2 Tag(e), Kartenaufösung: 20 m, Sichtbarkeit Auflösung: 5 m, Augenhöhe: 1,5 m



