GUTACHTEN ZUR SCHATTENBELASTUNG

NE-B-130571

Schattenwurfbericht für den Windpark WP Sundern Hohe Liete mit insgesamt 5 geplanten Windenergieanlagen vom Typ N175/6.X - 6.8MW am Standort Stadt Sundern (Sauerland).

Datum:
20. August 2025

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1 Zusammenfassung

Am Standort Stadt Sundern (Sauerland) plant die Firma NATURWERK Windenergie GmbH die Errichtung von fünf WEA vom Typ N175/6.X - 6.8MW. Insgesamt werden 96 Schattenrezeptoren (SR) berücksichtigt. Diese Schattenwurfprognose analysiert den astronomisch maximal möglichen Schattenwurf der geplanten WEA und den der bereits bestehenden WEA. Die Berechnungen der Schattenwurfzeiten erfolgen nach den Vorgaben der Bund/Länder-Arbeitsgemeinschaft Immissionsschutz (LAI) in der aktualisierten Fassung von 2019 [lai20].

Die Berechnungen haben ergeben, dass es an 80 der 96 SR zu unzulässigen Überschreitungen von einem der beiden Richtwerte durch die Gesamtbelastung kommt.

Bei SR-068 kommt es zu einer maximalen Überschreitung des täglichen Richtwertes von 86 Minuten. Der tägliche Richtwert wird durch die Gesamtbelastung an insgesamt 80 der 96 Schattenrezeptoren überschritten.

Bei SR-094 wird der jährliche Richtwert mit maximal 282 Stunden überschritten. Eine Überschreitung tritt an 80 der 96 untersuchten Rezeptoren auf.

Die ausgewählten Immissionsorte wurde den offiziellen Satellitenbildern entnommen und sind in Abschnitt 8 dargestellt.

Zur Einhaltung der Immissionsrichtwerte durch die Gesamtbelastung ist die Installation einer Abschaltautomatik bei Schattenwurf erforderlich.

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2 Situation und Aufgabenstellung

Am Standort Stadt Sundern (Sauerland) in Nordrhein-Westfalen plant die Firma NATURWERK Windenergie GmbH die Errichtung von fünf WEA vom Typ N175/6.X - 6.8MW. Für die Genehmigung der geplanten WEA ist der Kreis Hochsauerlandkreis zuständig.
Im Rahmen des Genehmigungsverfahrens gemäß dem Bundes-Immissionsschutzgesetz (BImSchG) muss für neu geplante WEA der Nachweis zur Schattenwurfausbreitung geführt werden. Berechnungsdetails werden durch die Bund/Länder-Arbeitsgemeinschaft Immissionsschutz (LAI) in der aktualisierten Fassung von 2019 [lai20] vorgegeben. Die in diesem Gutachten dargestellten Berechnungen erfolgen strikt nach diesen Vorgaben.
In der Umgebung des Standortes sind 96 WEA als Vorbelastung zu berücksichtigen. An den umliegenden Wohngebäuden wurden insgesamt 96 SR angesetzt. Berechnet werden die Vor-, Zusatz- und Gesamtbelastung. Die Gesamtbelastung (kumulativ aufaddierte Schattenwurfzeiten der Vor- und Zusatzbelastung) darf die in den LAI-Hinweisen festgelegten Richtwerte an den Wohngebäuden nicht überschreiten. Tritt jedoch an einem oder mehreren SR eine Überschreitung der Richtwerte auf, muss von Seiten des Anlagenbetreibers eine entsprechende technische Abschalt- oder Schattenautomatik in geplanten WEA installiert werden.

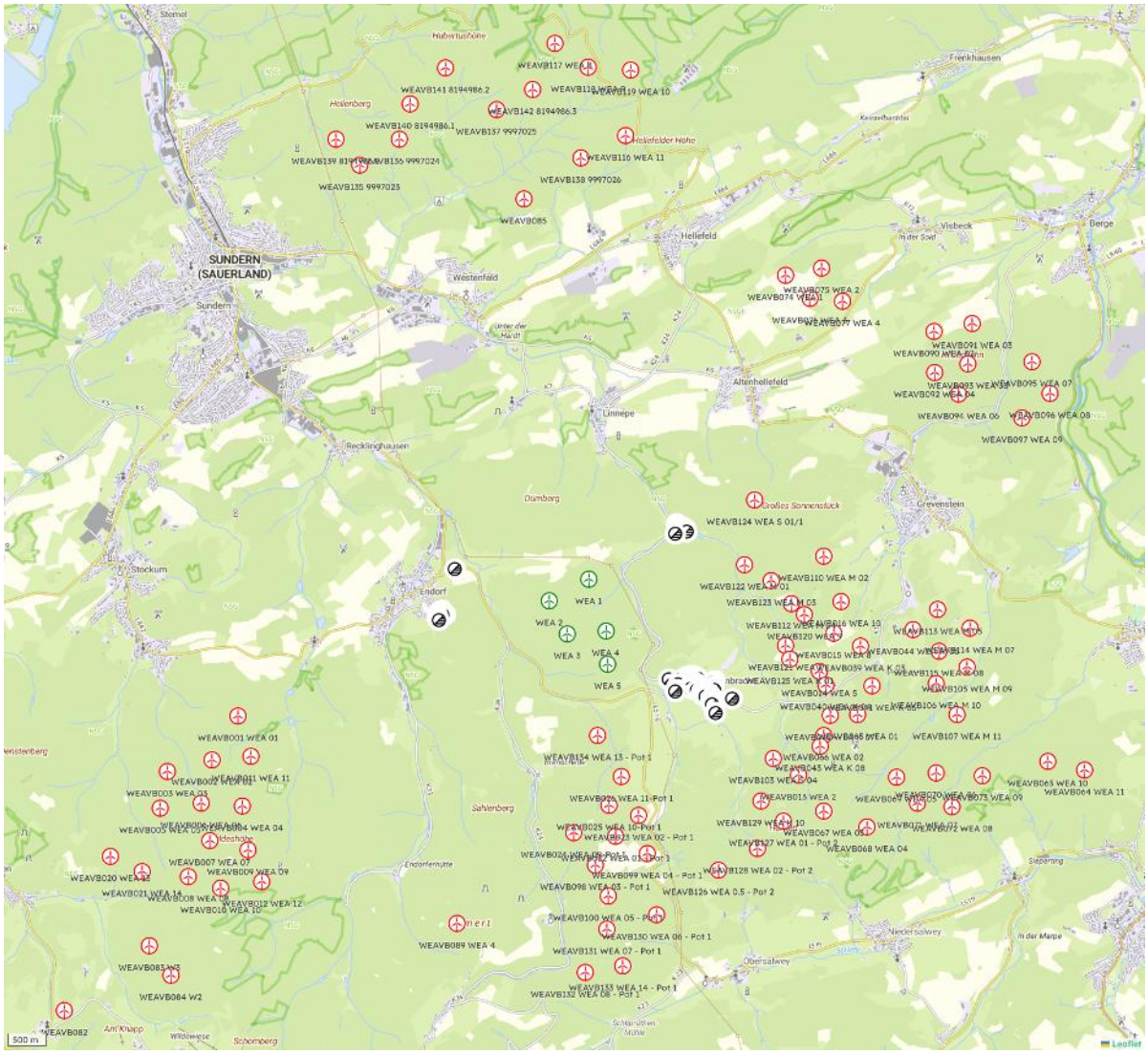


Abbildung 2.1: Lageplan am Standort Stadt Sundern (Sauerland) mit den untersuchten WEA und Schattenrezeptoren. [Bun24]

3 Grundlagen

Gemäß Bundesimmissionsschutzgesetz [BIm21] dürfen durch WEA keine schädliche Umwelteinwirkungen und Gefahren, erhebliche Belästigungen für die Allgemeinheit und die Nachbarschaft hervorgerufen werden. Die Maßnahmen zu deren Vermeidung müssen dem Stand der Technik entsprechen.

Die Empfehlungen zur Ermittlung und Bewertung der optischen Immissionen von Windenergieanlagen (WEA) der Bund/Länder-Arbeitsgemeinschaft für Immissionsschutz (LAI) [lai20] präzisieren die gesetzlichen Vorgaben.

WEA verursachen durch ihre Rotorbewegung einen periodischen Schattenschlag, welcher in der Nachbarschaft zu Belästigungen führen kann (optische Immissionen). Dieser Effekt des frequentierenden Lichtwechsels trifft nicht auf den Turm zu, da dieser lediglich einen statischen Schatten verursacht.

Die Länge des jeweiligen Schattens hängt von dem Sonnenstand über dem Horizont ab. Je niedriger der Sonnenstand, desto länger ist der Schatten. Dieser hängt von der Jahres- und Tageszeit ab. Bei den Berechnungen wird ein Sonnenstand von mindestens 3° berücksichtigt. Unterhalb von diesem kann der Effekt wegen der Bebauung, des Bewuchses und die dann nur noch schwer zu durchdringende Atmosphäre vernachlässigt werden.

Eine Betrachtung der optischen Immissionen soll an Immissionsorten mit schutzbedürftigen Räumen stattfinden. Diese sind:

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

Zusätzlich gelten direkt an Gebäude angrenzende Balkone und Terrassen in der Zeit zwischen 6:00 Uhr und 22:00 Uhr als schutzbedürftige Räume.

Bau- und planungsrechtlich genehmigte Flächen müssen ebenfalls betrachtet werden. Der Schattenrezeptor ist an den äußersten, am stärksten belasteten Rand der Fläche in einer Höhe von 2 m anzusetzen.

Die Schutzbedürftigkeit der einzelnen Räume innerhalb von Gebäuden wird in dieser Untersuchung nicht im Detail analysiert. Stattdessen wird die Fassadenseite mit der höchsten Belastung betrachtet.

Bei der Worst-Case-Betrachtung wird an dieser Stelle nicht zwischen Kern- und Halbschatten differenziert.

Die Hinweise der LAI [lai20] geben vor, dass eine erhebliche Belästigung in der Nachbarschaft nicht mehr gegeben ist, sobald der kumulative astronomisch maximal mögliche Schattenwurf aller betrachteten WEA an den jeweiligen Immissionsorten in einer Höhe von 2 m die folgenden Richtwerte nicht überschreitet:

- 30 Stunden pro Kalenderjahr
- 30 Minuten pro Kalendertag

Bei einer Überschreitung der Richtwerte müssen technische Einrichtungen, wie beispielsweise Abschalt- oder Schattenautomatiken, in den WEA installiert werden, damit die Richtwerte eingehalten werden. Hier wird allerdings die reale Schattenwurfdauer von 8 h pro Kalenderjahr angesetzt. Der Richtwert von 30 h pro Kalenderjahr wurde mit meteorologischen Daten aus der realen Schattenwurfdauer (8 h) abgeleitet.

Für den Worst-Case Fall werden gemäß der Hinweise der LAI [lai20] die folgenden Annahmen getroffen:

- Die Sonne ist eine punktförmige Quelle.
- Die Sonne scheint zu 100% von Sonnenauf- bis Sonnenuntergang.
- Die Rotorfläche steht immer senkrecht zur Achse zwischen der Sonne und dem Immissionsort.
- Hindernisse haben keine abschirmende Wirkung.
- Der Schattenrezeptor wird an der am meisten belasteten Fassade im Gewächshausmodus platziert. Das beutet, dass die Sonneneinstrahlung von allen Seiten gleichmäßig und gleichzeitig erfolgt.

Der Einwirkungsbereich, bis zu der die Beschattung um die hier betrachteten WEA relevant ist, wurde auf 2.500 m festgesetzt. Damit ist der Beschattungsbereich der WEA vollständig abgedeckt.

4 Eingangsdaten

4.1 Schattenrezeptoren

Für die Berechnungen und Beurteilungen wurden für den Standort Stadt Sundern (Sauerland) insgesamt 96 Schattenrezeptoren (SR) ausgewählt. Die Realisierung der geographischen Darstellung sowie die Ableitung der Geländemodelle basiert auf den amtlichen Karten, die öffentlich zugänglich sind [Bun24]. Die vollständige Adresse sowie die Koordinaten im Koordinatensystem ETRS89 / UTM Zone 32N sind in der nachfolgenden Tabelle 4.1 aufgelistet.

Tabelle 4.1: Auflistung der untersuchten Immissionsorte

SR-ID	Straße	Ort	PLZ	Ostwert [m]	Nordwert [m]	Höhe ü.G. [m]
SR-001	In der Sierpke 17	Sundern (Sauerland)	59846	433.261,9	5.682.377,9	2,00
SR-002	In der Sierpke 15	Sundern (Sauerland)	59846	433.264,7	5.682.394,3	2,00
SR-003	In der Sierpke 19	Sundern	59846	433.264,7	5.682.352,2	2,00
SR-004	In der Sierpke 13	Sundern (Sauerland)	59846	433.275,6	5.682.409,7	2,00
SR-005	Am Hüttenberg 2	Sundern (Sauerland)	59846	433.277,2	5.682.437,5	2,00
SR-006	In der Sierpke 21	Sundern (Sauerland)	59846	433.275,9	5.682.334,1	2,00
SR-007	Am Hüttenberg 2a	Sundern	59846	433.288,5	5.682.427,0	2,00
SR-008	Am Hüttenberg 1	Sundern (Sauerland)	59846	433.295,9	5.682.458,6	2,00
SR-009	Am Hüttenberg 4	Sundern (Sauerland)	59846	433.304,0	5.682.409,1	2,00
SR-010	Am Hüttenberg 5	Sundern	59846	433.310,0	5.682.435,4	2,00
SR-011	Am Hüttenberg 3	Sundern (Sauerland)	59846	433.315,3	5.682.461,0	2,00
SR-012	Am Hüttenberg 6	Sundern (Sauerland)	59846	433.317,0	5.682.403,7	2,00
SR-013	Am Hüttenberg 7	Sundern (Sauerland)	59846	433.329,0	5.682.427,7	2,00

Tabelle 4.1: Fortsetzung: Auflistung der untersuchten Immissionsorte

SR-ID	Straße	Ort	PLZ	Ostwert [m]	Nordwert [m]	Höhe ü.G. [m]
SR-014	Am Hüttenberg 8	Sundern (Sauerland)	59846	433.329,0	5.682.397,9	2,00
SR-015	Am Hüttenberg 9	Sundern (Sauerland)	59846	433.358,2	5.682.420,4	2,00
SR-016	Am Hüttenberg 11	Sundern	59846	433.364,6	5.682.411,6	2,00
SR-017	Auf dem Schoten 1	Sundern	59846	433.487,6	5.682.974,3	2,00
SR-018	Im Senkel 10	Sundern	59846	436.167,2	5.681.555,4	2,00
SR-019	Meinkenbrachter Straße 1	Sundern	59846	436.243,8	5.681.400,7	2,00
SR-020	Linneperhütte 7	Sundern	59846	436.271,3	5.683.384,4	2,00
SR-021	Meinkenbrachter Straße 1	Sundern (Sauerland)	59846	436.255,0	5.681.430,0	2,00
SR-022	Zum Backofen 1	Sundern	59846	436.291,4	5.683.511,0	2,00
SR-023	Linneperhütte 5a	Sundern	59846	436.294,1	5.683.408,3	2,00
SR-024	Linneperhütte 5	Sundern	59846	436.297,0	5.683.413,9	2,00
SR-025	Zum Backofen 3	Sundern	59846	436.299,4	5.683.501,9	2,00
SR-026	Linneperhütte 1	Sundern	59846	436.300,2	5.683.467,0	2,00
SR-027	Im Senkel 1	Sundern	59846	436.281,3	5.681.492,4	2,00
SR-028	An der Eiche 1	Sundern	59846	436.308,4	5.683.444,3	2,00
SR-029	Linneperhütte 3	Sundern	59846	436.310,8	5.683.417,4	2,00
SR-030	An der Eiche 3	Sundern	59846	436.316,0	5.683.467,2	2,00
SR-031	An der Eiche 5	Sundern	59846	436.319,0	5.683.470,5	2,00
SR-032	Im Senkel 2	Sundern	59846	436.299,7	5.681.547,5	2,00
SR-033	An der Eiche 7	Sundern	59846	436.326,8	5.683.441,1	2,00
SR-034	An der Eiche 11	Sundern	59846	436.344,7	5.683.432,7	2,00
SR-035	An der Eiche 13	Sundern	59846	436.356,9	5.683.432,9	2,00
SR-036	An der Eiche 2	Sundern	59846	436.357,3	5.683.419,9	2,00
SR-037	Zum Backofen 2	Sundern	59846	436.358,6	5.683.454,5	2,00
SR-038	Zum Backofen 9	Sundern	59846	436.366,0	5.683.461,2	2,00
SR-039	Zum Backofen 11	Sundern	59846	436.375,3	5.683.456,2	2,00
SR-040	Meinkenbrachter Straße 3	Sundern	59846	436.359,6	5.681.519,5	2,00
SR-041	Am Alten Brunnen 16	Sundern	59846	436.373,7	5.681.582,7	2,00
SR-042	Am Alten Brunnen 18	Sundern	59846	436.379,4	5.681.559,5	2,00
SR-043	Zum Backofen 15	Sundern	59846	436.408,7	5.683.438,1	2,00

Tabelle 4.1: Fortsetzung: Auflistung der untersuchten Immissionsorte

SR-ID	Straße	Ort	PLZ	Ostwert [m]	Nordwert [m]	Höhe ü.G. [m]
SR-044	Zum Backofen 4	Sundern	59846	436.412,5	5.683.411,5	2,00
SR-045	Am Alten Brunnen 14	Sundern	59846	436.389,8	5.681.585,7	2,00
SR-046	Meinkenbrachter Straße 3a	Sundern	59846	436.393,2	5.681.525,2	2,00
SR-047	Am Alten Brunnen 20	Sundern	59846	436.411,4	5.681.562,3	2,00
SR-048	Am Alten Brunnen 12	Sundern	59846	436.411,7	5.681.586,7	2,00
SR-049	Meinkenbrachter Straße 5	Sundern	59846	436.419,6	5.681.523,4	2,00
SR-050	Meinkenbrachter Straße 5a	Sundern	59846	436.425,6	5.681.542,0	2,00
SR-051	Am Alten Brunnen 10	Sundern	59846	436.430,9	5.681.591,7	2,00
SR-052	Meinkenbrachter Straße 7	Sundern	59846	436.443,1	5.681.549,2	2,00
SR-053	Brinkweg 2	Sundern	59846	436.446,2	5.681.487,6	2,00
SR-054	Am Alten Brunnen 8	Sundern	59846	436.448,9	5.681.596,5	2,00
SR-055	Meinkenbrachter Straße 10	Sundern	59846	436.448,0	5.681.434,0	2,00
SR-056	Meinkenbrachter Straße 7a	Sundern	59846	436.454,5	5.681.549,4	2,00
SR-057	Am Alten Brunnen 6	Sundern	59846	436.464,5	5.681.601,9	2,00
SR-058	Meinkenbrachter Straße 9	Sundern	59846	436.473,2	5.681.519,0	2,00
SR-059	Meinkenbrachter Straße 12	Sundern	59846	436.475,6	5.681.501,8	2,00
SR-060	Am Alten Brunnen 2	Sundern	59846	436.495,2	5.681.589,2	2,00
SR-061	Am Alten Brunnen 2a	Sundern	59846	436.497,2	5.681.583,3	2,00
SR-062	Brinkweg 4	Sundern	59846	436.495,7	5.681.447,8	2,00
SR-063	Am Alten Brunnen 2b	Sundern	59846	436.498,8	5.681.576,7	2,00

Tabelle 4.1: Fortsetzung: Auflistung der untersuchten Immissionsorte

SR-ID	Straße	Ort	PLZ	Ostwert [m]	Nordwert [m]	Höhe ü.G. [m]
SR-064	Meinkenbrachter Straße 14	Sundern	59846	436.502,1	5.681.481,5	2,00
SR-065	Brinkweg 6	Sundern	59846	436.507,9	5.681.449,3	2,00
SR-066	Brinkweg 6a	Sundern	59846	436.518,4	5.681.453,5	2,00
SR-067	Meinkenbrachter Straße 11	Sundern	59846	436.521,0	5.681.500,1	2,00
SR-068	Brinkweg 8	Sundern	59846	436.520,8	5.681.420,8	2,00
SR-069	Am Alten Brunnen 5	Sundern	59846	436.526,1	5.681.562,9	2,00
SR-070	Meinkenbrachter Straße 13	Sundern	59846	436.557,5	5.681.467,6	2,00
SR-071	August-Essleben-Straße 2	Sundern	59846	436.575,5	5.681.383,0	2,00
SR-072	Meinkenbrachter Straße 18	Sundern	59846	436.579,9	5.681.411,9	2,00
SR-073	August-Essleben-Straße 4a	Sundern	59846	436.593,2	5.681.360,0	2,00
SR-074	August-Essleben-Straße 4b	Sundern	59846	436.593,6	5.681.346,4	2,00
SR-075	Meinkenbrachter Straße 15	Sundern	59846	436.601,2	5.681.421,9	2,00
SR-076	August-Essleben-Straße 6	Sundern	59846	436.608,7	5.681.344,1	2,00
SR-077	August-Essleben-Straße 8	Sundern	59846	436.621,2	5.681.334,1	2,00
SR-078	Meinkenbrachter Straße 22	Sundern	59846	436.625,0	5.681.368,4	2,00
SR-079	Meinkenbrachter Straße 17	Sundern	59846	436.626,0	5.681.404,0	2,00
SR-080	Meinkenbrachter Straße 19	Sundern	59846	436.649,6	5.681.384,9	2,00
SR-081	Meinkenbrachter Straße 24	Sundern	59846	436.653,8	5.681.346,9	2,00
SR-082	Zum Bauerhahn 1	Sundern	59846	436.689,1	5.681.413,5	2,00
SR-083	Zur Rohmke 2	Sundern	59846	436.689,1	5.681.307,0	2,00
SR-084	Zum Bauerhahn 2	Sundern	59846	436.692,3	5.681.356,9	2,00
SR-085	Zur Rohmke 4	Sundern	59846	436.692,9	5.681.270,7	2,00
SR-086	Zur Rohmke 6	Sundern	59846	436.709,8	5.681.238,0	2,00

Tabelle 4.1: Fortsetzung: Auflistung der untersuchten Immissionsorte

SR-ID	Straße	Ort	PLZ	Ostwert [m]	Nordwert [m]	Höhe ü.G. [m]
SR-087	Zum Bauerhahn 20	Sundern	59846	436.719,7	5.681.510,5	2,00
SR-088	Meinkenbrachter Straße 26	Sundern	59846	436.724,2	5.681.304,3	2,00
SR-089	Zum Bauerhahn 8	Sundern	59846	436.732,3	5.681.456,6	2,00
SR-090	Zum Bauerhahn 18	Sundern	59846	436.733,9	5.681.522,5	2,00
SR-091	Zum Bauerhahn 6	Sundern	59846	436.737,4	5.681.416,1	2,00
SR-092	Zur Rohmke 3	Sundern	59846	436.735,3	5.681.247,0	2,00
SR-093	Zur Rohmke 8	Sundern	59846	436.742,9	5.681.134,6	2,00
SR-094	Zum Bauerhahn 16	Sundern	59846	436.749,9	5.681.532,7	2,00
SR-095	Zur Rohmke 8a	Sundern	59846	436.749,9	5.681.123,5	2,00
SR-096	Meinkenbrachter Straße 31	Sundern	59846	436.961,5	5.681.304,7	2,00

4.2 Vorbelastung

Die Vorbelastung (VB) am Standort Stadt Sundern (Sauerland) besteht aus insgesamt 96 WEA. In der nachfolgenden Tabelle sind die Anlagen der Vorbelastung dargestellt.
Die Informationen wurden aus dem Marktstammdatenregister [MaS21] der Bundesnetzagentur bezogen und durch die zuständige Immissionsschutzbehörde bestätigt und ggf. ergänzt und korrigiert. Betrachtet werden WEA in der näheren Umgebung, bei denen es zu einer Überschneidung der Schattenbereiche kommt. Wenn dieses Kriterium nur auf einzelne WEA eines größeren Windparks zutrifft, wird der gesamte Windpark als Vorbelastung berücksichtigt.

Tabelle 4.2: Auflistung der Windenergieanlagen der Vorbelastung mit den jeweiligen Kenndaten (Nennleistung P_N, Rotordurchmesser RD und Nabenhöhe NH).

WEA-ID	UTM Ost [m]	UTM Nord [m]	Höhe NN [m]	Hersteller	Anlagentyp	P_N [kW]	RD [m]	NH [m]	Fundamenterhöhung [m]	Mitl. Blatttiefe [m]	max. Schattenweite [m]
WEAVB001 WEA 01	430.759,0	5.681.144,0	687,20	Enercon	E-160 EP5 E3	5.560	160	167	1	2,63	1.793
WEAVB002 WEA 02	430.425,0	5.680.590,0	695,49	Enercon	E-160 EP5 E3	5.560	160	167	1	2,63	1.793
WEAVB003 WEA 03	429.860,0	5.680.456,0	677,20	Enercon	E-160 EP5 E3	5.560	160	167	1	2,63	1.793
WEAVB004 WEA 04	430.799,0	5.680.011,0	736,21	Enercon	E-160 EP5 E3	5.560	160	167	1	2,63	1.793
WEAVB005 WEA 05	429.763,0	5.679.994,0	692,93	Enercon	E-160 EP5 E3	5.560	160	167	1	2,63	1.793
WEAVB006 WEA 06	430.280,0	5.680.054,0	704,86	Enercon	E-160 EP5 E3	5.560	160	167	1	2,63	1.793
WEAVB007 WEA 07	430.389,0	5.679.577,0	732,12	Enercon	E-160 EP5 E3	5.560	160	167	1	2,63	1.793
WEAVB008 WEA 08	430.107,0	5.679.130,0	734,88	Enercon	E-160 EP5 E3	5.560	160	167	1	2,63	1.793
WEAVB009 WEA 09	430.868,0	5.679.458,0	766,58	Enercon	E-160 EP5 E3	5.560	160	167	1	2,63	1.793
WEAVB010 WEA 10	430.513,0	5.678.980,0	764,23	Enercon	E-160 EP5 E3	5.560	160	167	1	2,63	1.793
WEAVB011 WEA 11	430.915,0	5.680.630,0	661,71	Enercon	E-160 EP5 E3	5.560	160	167	1	2,63	1.793
WEAVB012 WEA 12	431.029,0	5.679.051,0	740,12	Enercon	E-160 EP5 E3	5.560	160	167	1	2,63	1.793
WEAVB013 WEA 2	437.813,0	5.680.304,0	736,47	Nordex	N163/6.X - 7MW	7.000	163	164	0	2,63	1.797
WEAVB014 WEA 5	438.092,0	5.681.605,0	689,35	Nordex	N163/6.X - 7MW	7.000	163	164	0	2,63	1.797
WEAVB015 WEA 8	438.275,0	5.682.083,0	694,23	Nordex	N163/6.X - 7MW	7.000	163	164	0	2,63	1.797
WEAVB016 WEA 10	438.368,0	5.682.481,0	655,23	Nordex	N163/6.X - 7MW	7.000	163	164	0	2,63	1.797

Tabelle 4.2: Fortsetzung: WEA der Vorbelastung mit jeweiligen Kenndaten

WEA-ID	UTM Ost [m]	UTM Nord [m]	Höhe NN [m]	Hersteller	Anlagentyp	P_N [kW]	RD [m]	NH [m]	Fundamenterhöhung [m]	Mitl. Blatttiefe [m]	max. Schattenweite [m]
WEAVB020 WEA 13	429.132,0	5.679.401,0	704,66	Enercon	E-175 EP5 E1	6.000	175	162	0	2,56	1.749
WEAVB021 WEA 14	429.527,0	5.679.205,0	712,00	Enercon	E-175 EP5 E1	6.000	175	162	0	2,56	1.749
WEAVB022 WEA 01 - Pot 1	435.491,0	5.679.562,0	769,00	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB023 WEA 02 - Pot 1	435.792,0	5.679.824,0	724,20	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB024 WEA 09-Pot 1	434.970,0	5.679.615,0	749,00	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB025 WEA 10-Pot 1	435.422,0	5.679.959,0	732,17	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB026 WEA 11-Pot 1	435.580,0	5.680.315,0	685,59	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB039 WEA K 03	438.611,0	5.681.916,0	700,15	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB040 WEA K 04	438.166,0	5.681.430,0	700,83	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB041 WEA K 05	438.745,0	5.681.421,0	718,97	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB042 WEA K 07	438.219,0	5.681.054,0	738,05	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB043 WEA K 08	438.085,0	5.680.669,0	746,58	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917

Tabelle 4.2: Fortsetzung: WEA der Vorbelastung mit jeweiligen Kenndaten

WEA-ID	UTM Ost [m]	UTM Nord [m]	Höhe NN [m]	Hersteller	Anlagentyp	P_N [kW]	RD [m]	NH [m]	Fundamenterhöhung [m]	Mitl. Blatttiefe [m]	max. Schattenweite [m]
WEAVB044 WEA M 06	439.277,0	5.682.115,0	681,58	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB063 WEA 10	440.955,0	5.680.443,0	722,04	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB064 WEA 11	441.411,0	5.680.328,0	707,37	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB065 WEA 01	438.566,0	5.681.062,0	743,55	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB066 WEA 02	438.131,0	5.680.803,0	738,59	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB067 WEA 03	438.127,0	5.679.854,0	796,79	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB068 WEA 04	438.667,0	5.679.647,0	778,55	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB069 WEA 05	439.045,0	5.680.261,0	749,00	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB070 WEA 06	439.545,0	5.680.314,0	759,00	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB071 WEA 07	439.308,0	5.679.939,0	766,63	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB072 WEA 08	439.741,0	5.679.885,0	755,30	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB073 WEA 09	440.123,0	5.680.273,0	731,99	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB074 WEA 1	437.721,0	5.686.591,0	599,00	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB075 WEA 2	438.177,0	5.686.674,0	614,33	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB076 WEA 3	438.030,0	5.686.292,0	596,71	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB077 WEA 4	438.437,0	5.686.257,0	549,18	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB082	428.522,0	5.677.466,0	585,10	Enercon	E-40/5.40	500	40	65	0	1,32	902

Tabelle 4.2: Fortsetzung: WEA der Vorbelastung mit jeweiligen Kenndaten

WEA-ID	UTM Ost [m]	UTM Nord [m]	Höhe NN [m]	Hersteller	Anlagentyp	P_N [kW]	RD [m]	NH [m]	Fundamenterhöhung [m]	Mitl. Blatttiefe [m]	max. Schattenweite [m]
WEAVB083 W3	429.603,0	5.678.263,0	729,03	Vestas	V162-6.2	6.200	162	166	0	3,01	2.053
WEAVB084 W2	429.871,0	5.677.894,0	741,40	Vestas	V162-6.2	6.200	162	166	0	3,01	2.053
WEAVB085	434.443,0	5.687.589,0	570,18	Vestas	V172-7.2	7.200	172	175	0	2,81	1.917
WEAVB089 WEA 4	433.486,0	5.678.500,0	757,72	Enercon	E-175 EP5 E1	6.000	175	162	0	2,56	1.749
WEAVB090 WEA 02	439.584,0	5.685.856,0	513,67	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB091 WEA 03	440.061,0	5.685.954,0	504,09	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB092 WEA 04	439.586,0	5.685.345,0	641,13	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB093 WEA 05	440.005,0	5.685.448,0	666,61	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB094 WEA 06	439.877,0	5.685.067,0	612,57	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB095 WEA 07	440.809,0	5.685.469,0	619,00	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB096 WEA 08	441.032,0	5.685.067,0	564,23	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB097 WEA 09	440.678,0	5.684.759,0	610,49	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEAVB098 WEA 03 - Pot 1	435.233,0	5.679.203,0	769,00	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB099 WEA 04 - Pot 1	435.893,0	5.679.340,0	729,65	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB100 WEA 05 - Pot 1	435.393,0	5.678.818,0	765,34	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917

Tabelle 4.2: Fortsetzung: WEA der Vorbelastung mit jeweiligen Kenndaten

WEA-ID	UTM Ost [m]	UTM Nord [m]	Höhe NN [m]	Hersteller	Anlagentyp	P_N [kW]	RD [m]	NH [m]	Fundamenterhöhung [m]	Mitl. Blatttiefe [m]	max. Schattenweite [m]
WEAVB103 WEA S 04	437.493,0	5.680.520,0	712,38	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB105 WEA M 09	439.950,0	5.681.637,0	653,97	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB106 WEA M 10	439.557,0	5.681.439,0	728,50	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB107 WEA M 11	439.815,0	5.681.044,0	705,81	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB110 WEA M 02	438.159,0	5.683.053,0	621,38	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB112 WEA M 04	437.742,0	5.682.460,0	655,71	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB113 WEA M 05	439.587,0	5.682.368,0	659,40	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB114 WEA M 07	439.993,0	5.682.127,0	689,62	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB115 WEA M 08	439.597,0	5.681.847,0	720,45	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB116 WEA 11	435.730,0	5.688.367,0	653,25	Vestas	V172-7.2	7.200	172	175	0	2,81	1.917
WEAVB117 WEA 8	434.864,0	5.689.536,0	597,80	Vestas	V172-7.2	7.200	172	175	0	2,81	1.917
WEAVB118 WEA 9	435.277,0	5.689.233,0	625,00	Vestas	V172-7.2	7.200	172	175	0	2,81	1.917

Tabelle 4.2: Fortsetzung: WEA der Vorbelastung mit jeweiligen Kenndaten

WEA-ID	UTM Ost [m]	UTM Nord [m]	Höhe NN [m]	Hersteller	Anlagentyp	P_N [kW]	RD [m]	NH [m]	Fundamenterhöhung [m]	Mitl. Blatttiefe [m]	max. Schattenweite [m]
WEAVB119 WEA 10	435.807,0	5.689.190,0	641,34	Vestas	V172-7.2	7.200	172	175	0	2,81	1.917
WEAVB120 WEA 9	437.906,0	5.682.326,0	704,00	Nordex	N163/6.X - 7MW	7.000	163	164	0	2,63	1.797
WEAVB121 WEA 7	437.671,0	5.681.934,0	669,31	Nordex	N163/6.X - 7MW	7.000	163	164	0	2,63	1.797
WEAVB122 WEA M 01	437.165,0	5.682.956,0	614,89	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB123 WEA M 03	437.498,0	5.682.759,0	709,24	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB124 WEA S 01/1	437.301,0	5.683.767,0	737,06	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB125 WEA K 01	437.719,0	5.681.769,0	718,61	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB126 WEA 0.5 - Pot 2	436.789,0	5.679.125,0	789,00	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB127 WEA 01 - Pot 2	437.615,0	5.679.734,0	839,11	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB128 WEA 02 - Pot 2	437.286,0	5.679.393,0	819,67	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB129 WEA K 10	437.335,0	5.679.990,0	780,04	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB130 WEA 06 - Pot 1	436.000,0	5.678.570,0	740,20	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917

Tabelle 4.2: Fortsetzung: WEA der Vorbelastung mit jeweiligen Kenndaten

WEA-ID	UTM Ost [m]	UTM Nord [m]	Höhe NN [m]	Hersteller	Anlagentyp	P_N [kW]	RD [m]	NH [m]	Fundamenterhöhung [m]	Mitl. Blatttiefe [m]	max. Schattenweite [m]
WEAVB131 WEA 07 - Pot 1	435.372,0	5.678.398,0	738,05	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB132 WEA 08 - Pot 1	435.090,0	5.677.861,0	742,36	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB133 WEA 14 - Pot 1	435.569,0	5.677.933,0	708,16	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB134 WEA 13 - Pot 1	435.281,0	5.680.832,0	672,61	Vestas	V172-7.2	7.200	172	199	0	2,81	1.917
WEAVB135 9997023	432.381,0	5.688.040,0	575,00	Vestas	V172-7.2	7.200	172	175	0	2,81	1.917
WEAVB136 9997024	432.886,0	5.688.353,0	575,00	Vestas	V172-7.2	7.200	172	175	0	2,81	1.917
WEAVB137 9997025	434.114,0	5.688.715,0	605,00	Vestas	V172-7.2	7.200	172	175	0	2,81	1.917
WEAVB138 9997026	435.172,0	5.688.096,0	628,76	Vestas	V172-7.2	7.200	172	175	0	2,81	1.917
WEAVB139 8194986.8	432.087,0	5.688.368,0	539,25	Vestas	V172-7.2	7.200	172	175	0	2,81	1.917
WEAVB140 8194986.1	433.025,0	5.688.800,0	595,00	Vestas	V172-7.2	7.200	172	175	0	2,81	1.917
WEAVB141 8194986.2	433.476,0	5.689.245,0	622,20	Vestas	V172-7.2	7.200	172	175	0	2,81	1.917
WEAVB142 8194986.3	434.573,0	5.688.960,0	625,00	Vestas	V172-7.2	7.200	172	175	0	2,81	1.917

4.3 Zusatzbelastung

Die Zusatzbelastung (ZB) im Windpark “WP Sundern Hohe Liete” besteht aus insgesamt fünf WEA der Typ N175/6.X - 6.8MW. Die einzelnen Kenndaten wurden vom Auftraggeber zur Verfügung gestellt und sind der folgenden Tabelle 4.3 zu entnehmen. Die Koordinaten werden im Koordinatensystem ETRS89 / UTM Zone 32N dargestellt.

Tabelle 4.3: Auflistung der Windenergieanlagen der Zusatzbelastung mit den jeweiligen Kenndaten (Nennleistung P_N, Rotordurchmesser RD und Nabenhöhe NH).

WEA-ID	UTM Ost [m]	UTM Nord [m]	Höhe NN [m]	Hersteller	Anlagentyp	P_N [kW]	RD [m]	NH [m]	Fundamenterhöhung [m]	Mitl. Blatttiefe [m]	max. Schattenweite [m]
WEA 1	435.197,0	5.682.798,0	679,00	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEA 2	434.701,0	5.682.532,0	688,11	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEA 3	434.924,0	5.682.114,0	737,44	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEA 4	435.410,0	5.682.149,0	716,12	Nordex	N175/6.X - 6.8MW	6.800	175	179	0	2,80	1.913
WEA 5	435.425,0	5.681.731,0	702,28	Nordex	N175/6.X - 6.8MW	6.800	175	199	0	2,80	1.913

4.4 Abstände zwischen den SR und den geplanten WEA

Aus den Koordinaten der ausgewählten SR und der WEA der Zusatzbelastung ergeben sich die folgenden horizontalen Abstände.

Tabelle 4.4: Abstände zwischen WEA und Schattenrezeptor

	Horizontaler Abstand [m]				
SR-ID	WEA 1	WEA 2	WEA 3	WEA 4	WEA 5
SR-001	1.980	1.447	1.683	2.160	2.258
SR-002	1.974	1.443	1.683	2.159	2.260
SR-003	1.983	1.448	1.676	2.155	2.248
SR-004	1.960	1.431	1.675	2.150	2.254
SR-005	1.953	1.427	1.678	2.152	2.261
SR-006	1.976	1.439	1.663	2.142	2.232
SR-007	1.944	1.416	1.665	2.140	2.247
SR-008	1.931	1.407	1.664	2.137	2.250
SR-009	1.933	1.402	1.647	2.122	2.227
SR-010	1.922	1.394	1.646	2.120	2.229
SR-011	1.912	1.388	1.646	2.118	2.233
SR-012	1.921	1.390	1.633	2.108	2.213
SR-013	1.904	1.376	1.626	2.100	2.209
SR-014	1.910	1.379	1.620	2.096	2.200
SR-015	1.877	1.347	1.596	2.070	2.179
SR-016	1.873	1.342	1.588	2.062	2.170
SR-017	1.719	1.292	1.674	2.092	2.302
SR-018	1.577	1.762	1.363	962	763
SR-019	1.746	1.913	1.500	1.120	883
SR-020	1.224	1.787	1.852	1.506	1.857
SR-021	1.729	1.905	1.497	1.110	883
SR-022	1.306	1.868	1.955	1.622	1.980
SR-023	1.255	1.818	1.885	1.539	1.889
SR-024	1.261	1.823	1.891	1.545	1.895
SR-025	1.308	1.870	1.954	1.619	1.975
SR-026	1.290	1.853	1.930	1.591	1.944
SR-027	1.697	1.892	1.493	1.091	889
SR-028	1.286	1.848	1.920	1.576	1.928
SR-029	1.275	1.837	1.903	1.556	1.905
SR-030	1.304	1.866	1.941	1.600	1.951
SR-031	1.308	1.871	1.946	1.604	1.956
SR-032	1.667	1.878	1.488	1.074	894

Tabelle 4.4: Fortsetzung: Abstände zwischen WEA und Schattenrezeptor

	Horizontaler Abstand [m]				
SR-ID	WEA 1	WEA 2	WEA 3	WEA 4	WEA 5
SR-033	1.300	1.863	1.931	1.584	1.933
SR-034	1.312	1.874	1.938	1.588	1.934
SR-035	1.322	1.885	1.948	1.595	1.940
SR-036	1.316	1.879	1.939	1.585	1.929
SR-037	1.334	1.897	1.963	1.614	1.960
SR-038	1.344	1.907	1.973	1.624	1.970
SR-039	1.350	1.912	1.977	1.625	1.970
SR-040	1.728	1.943	1.554	1.139	958
SR-041	1.692	1.923	1.544	1.118	960
SR-042	1.712	1.940	1.557	1.135	970
SR-043	1.370	1.933	1.989	1.631	1.970
SR-044	1.362	1.924	1.975	1.612	1.949
SR-045	1.701	1.936	1.558	1.130	976
SR-046	1.747	1.969	1.583	1.164	990
SR-047	1.733	1.966	1.586	1.161	1.001
SR-048	1.715	1.955	1.578	1.149	997
SR-049	1.766	1.993	1.608	1.188	1.016
SR-050	1.757	1.989	1.607	1.183	1.018
SR-051	1.726	1.969	1.595	1.163	1.016
SR-052	1.764	2.000	1.621	1.195	1.034
SR-053	1.811	2.034	1.646	1.229	1.050
SR-054	1.735	1.983	1.610	1.177	1.033
SR-055	1.851	2.063	1.669	1.260	1.065
SR-056	1.772	2.010	1.631	1.204	1.045
SR-057	1.743	1.994	1.623	1.188	1.048
SR-058	1.807	2.041	1.660	1.236	1.069
SR-059	1.821	2.052	1.668	1.247	1.075
SR-060	1.774	2.027	1.657	1.221	1.080
SR-061	1.779	2.031	1.660	1.226	1.082
SR-062	1.873	2.097	1.707	1.292	1.108
SR-063	1.785	2.036	1.664	1.230	1.085
SR-064	1.854	2.085	1.700	1.280	1.106

Tabelle 4.4: Fortsetzung: Abstände zwischen WEA und Schattenrezeptor

	Horizontaler Abstand [m]				
SR-ID	WEA 1	WEA 2	WEA 3	WEA 4	WEA 5
SR-065	1.881	2.106	1.718	1.302	1.119
SR-066	1.885	2.113	1.726	1.309	1.128
SR-067	1.854	2.092	1.711	1.287	1.120
SR-068	1.910	2.132	1.741	1.328	1.139
SR-069	1.814	2.066	1.694	1.261	1.114
SR-070	1.903	2.140	1.757	1.335	1.163
SR-071	1.976	2.199	1.806	1.395	1.202
SR-072	1.958	2.188	1.799	1.383	1.198
SR-073	2.004	2.226	1.832	1.422	1.226
SR-074	2.014	2.233	1.838	1.430	1.230
SR-075	1.966	2.201	1.814	1.396	1.216
SR-076	2.027	2.247	1.852	1.444	1.245
SR-077	2.042	2.263	1.868	1.460	1.260
SR-078	2.021	2.249	1.857	1.444	1.254
SR-079	1.996	2.231	1.844	1.426	1.245
SR-080	2.027	2.261	1.873	1.456	1.273
SR-081	2.056	2.284	1.892	1.480	1.287
SR-082	2.036	2.281	1.899	1.476	1.303
SR-083	2.109	2.335	1.941	1.531	1.333
SR-084	2.077	2.312	1.924	1.507	1.321
SR-085	2.138	2.358	1.960	1.555	1.349
SR-086	2.173	2.390	1.989	1.587	1.376
SR-087	1.994	2.262	1.894	1.457	1.313
SR-088	2.136	2.367	1.974	1.562	1.368
SR-089	2.039	2.298	1.924	1.493	1.336
SR-090	1.997	2.270	1.904	1.465	1.325
SR-091	2.069	2.322	1.943	1.516	1.350
SR-092	2.185	2.406	2.008	1.603	1.397
SR-093	2.271	2.474	2.066	1.675	1.447
SR-094	2.003	2.280	1.916	1.475	1.340
SR-095	2.284	2.486	2.077	1.687	1.458
SR-096	2.312	2.572	2.192	1.766	1.595

Zwischen dem SR-018 und der WEA 5 besteht mit 763 m der geringste Abstand.

5 Berechnungsergebnisse

In diesem Kapitel werden die Berechnungsergebnisse der Vor-, Zusatz- und Gesamtbelastung dargestellt. Grundlage der Berechnungen sind die ausgewählten SR sowie die bestehenden und geplanten WEA am Standort Stadt Sundern (Sauerland).

Dargestellt wird in den folgenden Abschnitten die berechnete maximal mögliche jährliche und tägliche Schattenwurfdauer und die jeweilige Überschreitung der zulässigen Richtwerte.

5.1 Vorbelastung

Die 96 WEA der Vorbelastung (VB) führen zu den in der nachfolgenden Tabelle angezeigten Schattenwurfzeiten an den ausgewählten SR.

Tabelle 5.1: Schattenwurfzeiten der Vorbelastung an den untersuchten SR inkl. der jeweiligen Überschreitungen der jährlichen und täglichen Richtwerte

SR-ID	Jährlich maximal mögliche Schattendauer [h/a]	Jährliche Richtwertüberschreitung > 30 h/a [h/a]	Täglich maximal mögliche Schattendauer [min/d]	Tägliche Richtwertüberschreitung > 30 min/d [min/d]
SR-001	00:00	-	0	-
SR-002	00:00	-	0	-
SR-003	00:00	-	0	-
SR-004	00:00	-	0	-
SR-005	00:00	-	0	-
SR-006	00:00	-	0	-
SR-007	00:00	-	0	-
SR-008	00:00	-	0	-
SR-009	00:00	-	0	-
SR-010	00:00	-	0	-
SR-011	00:00	-	0	-
SR-012	00:00	-	0	-
SR-013	00:00	-	0	-
SR-014	00:00	-	0	-
SR-015	00:00	-	0	-
SR-016	00:00	-	0	-
SR-017	00:00	-	0	-

Tabelle 5.1: Fortsetzung: Schattenwurfzeiten der Vorbelastung an den untersuchten SR inkl. der jeweiligen Überschreitungen der jährlichen und täglichen Richtwerte

SR-ID	Jährlich maximal mögliche Schattendauer [h/a]	Jährliche Richtwert-überschreitung > 30 h/a [h/a]	Täglich maximal mögliche Schattendauer [min/d]	Tägliche Richtwert-überschreitung > 30 min/d [min/d]
SR-018	74:36	44:36	58	28
SR-019	120:28	90:28	53	23
SR-020	28:45	-	39	9
SR-021	118:06	88:06	53	23
SR-022	67:23	37:23	38	8
SR-023	47:38	17:38	48	18
SR-024	48:47	18:47	48	18
SR-025	64:26	34:26	38	8
SR-026	55:49	25:49	38	8
SR-027	126:46	96:46	52	22
SR-028	56:36	26:36	44	14
SR-029	48:21	18:21	47	17
SR-030	62:01	32:01	40	10
SR-031	63:05	33:05	40	10
SR-032	124:34	94:34	52	22
SR-033	54:00	24:00	44	14
SR-034	48:07	18:07	46	16
SR-035	45:52	15:52	46	16
SR-036	44:53	14:53	49	19
SR-037	53:30	23:30	43	13
SR-038	55:06	25:06	42	12
SR-039	52:39	22:39	42	12
SR-040	155:09	125:09	56	26
SR-041	155:11	125:11	52	22
SR-042	155:16	125:16	54	24
SR-043	47:22	17:22	45	15
SR-044	48:44	18:44	50	20
SR-045	155:11	125:11	53	23
SR-046	170:05	140:05	57	27
SR-047	170:28	140:28	55	25
SR-048	169:50	139:50	54	24
SR-049	180:35	150:35	58	28
SR-050	178:18	148:18	57	27
SR-051	177:01	147:01	54	24
SR-052	180:05	150:05	57	27
SR-053	189:33	159:33	60	30

Tabelle 5.1: Fortsetzung: Schattenwurfzeiten der Vorbelastung an den untersuchten SR inkl. der jeweiligen Überschreitungen der jährlichen und täglichen Richtwerte

SR-ID	Jährlich maximal mögliche Schattendauer [h/a]	Jährliche Richtwert-überschreitung > 30 h/a [h/a]	Täglich maximal mögliche Schattendauer [min/d]	Tägliche Richtwert-überschreitung > 30 min/d [min/d]
SR-054	177:33	147:33	55	25
SR-055	202:58	172:58	62	32
SR-056	181:13	151:13	57	27
SR-057	178:16	148:16	56	26
SR-058	188:00	158:00	59	29
SR-059	191:43	161:43	59	29
SR-060	177:45	147:45	58	28
SR-061	178:35	148:35	58	28
SR-062	207:31	177:31	62	32
SR-063	179:56	149:56	57	27
SR-064	206:05	176:05	61	31
SR-065	208:16	178:16	62	32
SR-066	210:01	180:01	62	32
SR-067	207:03	177:03	62	32
SR-068	215:16	185:16	64	34
SR-069	184:43	154:43	60	30
SR-070	215:24	185:24	63	33
SR-071	225:50	195:50	64	34
SR-072	226:48	196:48	64	34
SR-073	222:58	192:58	65	35
SR-074	220:41	190:41	65	35
SR-075	228:35	198:35	64	34
SR-076	218:50	188:50	66	36
SR-077	213:33	183:33	66	36
SR-078	222:35	192:35	66	36
SR-079	229:13	199:13	66	36
SR-080	237:33	207:33	70	40
SR-081	245:01	215:01	74	44
SR-082	226:01	196:01	70	40
SR-083	234:56	204:56	75	45
SR-084	245:35	215:35	78	48
SR-085	233:18	203:18	75	45
SR-086	228:43	198:43	76	46
SR-087	241:01	211:01	72	42
SR-088	238:48	208:48	81	51
SR-089	239:52	209:52	73	43

Tabelle 5.1: Fortsetzung: Schattenwurfzeiten der Vorbelastung an den untersuchten SR inkl. der jeweiligen Überschreitungen der jährlichen und täglichen Richtwerte

SR-ID	Jährlich maximal mögliche Schattendauer [h/a]	Jährliche Richtwert-überschreitung > 30 h/a [h/a]	Täglich maximal mögliche Schattendauer [min/d]	Tägliche Richtwert-überschreitung > 30 min/d [min/d]
SR-090	251:56	221:56	73	43
SR-091	231:26	201:26	73	43
SR-092	230:33	200:33	81	51
SR-093	223:20	193:20	75	45
SR-094	265:32	235:32	74	44
SR-095	234:01	204:01	78	48
SR-096	270:48	240:48	105	75

5.2 Zusatzbelastung

Die fünf WEA der Zusatzbelastung (ZB) vom Typ N175/6.X - 6.8MW führen an den unterschuchten SR zu den in Tabelle 5.2 dargestellten Schattenwurfzeiten.

Tabelle 5.2: Schattenwurfzeiten der Zusatzbelastung an den untersuchten SR inkl. der jeweiligen Überschreitungen der jährlichen und täglichen Richtwerte

SR-ID	Jährlich maximal mögliche Schattendauer [h/a]	Jährliche Richtwert-überschreitung > 30 h/a [h/a]	Täglich maximal mögliche Schattendauer [min/d]	Tägliche Richtwert-überschreitung > 30 min/d [min/d]
SR-001	24:33	-	28	-
SR-002	24:22	-	28	-
SR-003	15:52	-	28	-
SR-004	24:21	-	28	-
SR-005	24:03	-	28	-
SR-006	16:22	-	28	-
SR-007	24:38	-	28	-
SR-008	09:01	-	23	-
SR-009	25:34	-	29	-
SR-010	25:04	-	29	-
SR-011	24:56	-	29	-
SR-012	26:03	-	29	-

Tabelle 5.2: Fortsetzung: Schattenwurfzeiten der Zusatzbelastung an den untersuchten SR inkl. der jeweiligen Überschreitungen der jährlichen und täglichen Richtwerte

SR-ID	Jährlich maximal mögliche Schattendauer [h/a]	Jährliche Richtwert-überschreitung > 30 h/a [h/a]	Täglich maximal mögliche Schattendauer [min/d]	Tägliche Richtwert-überschreitung > 30 min/d [min/d]
SR-013	25:57	-	29	-
SR-014	16:59	-	29	-
SR-015	27:11	-	30	-
SR-016	17:41	-	30	-
SR-017	32:21	02:21	32	2
SR-018	99:55	69:55	83	53
SR-019	40:34	10:34	61	31
SR-020	51:02	21:02	40	10
SR-021	58:43	28:43	71	41
SR-022	42:51	12:51	37	7
SR-023	39:54	09:54	34	4
SR-024	39:43	09:43	33	3
SR-025	41:27	11:27	37	7
SR-026	40:07	10:07	35	5
SR-027	92:15	62:15	83	53
SR-028	39:21	09:21	34	4
SR-029	39:00	09:00	33	3
SR-030	39:31	09:31	34	4
SR-031	39:20	09:20	35	5
SR-032	97:38	67:38	69	39
SR-033	38:37	08:37	33	3
SR-034	37:15	07:15	32	2
SR-035	36:28	06:28	31	1
SR-036	36:27	06:27	31	1
SR-037	32:22	02:22	30	-
SR-038	32:15	02:15	29	-
SR-039	31:52	01:52	29	-
SR-040	88:20	58:20	66	36
SR-041	66:15	36:15	60	30
SR-042	71:25	41:25	62	32
SR-043	30:19	00:19	29	-
SR-044	13:52	-	29	-
SR-045	61:43	31:43	58	28
SR-046	75:21	45:21	63	33
SR-047	61:59	31:59	58	28

Tabelle 5.2: Fortsetzung: Schattenwurfzeiten der Zusatzbelastung an den untersuchten SR inkl. der jeweiligen Überschreitungen der jährlichen und täglichen Richtwerte

SR-ID	Jährlich maximal mögliche Schattendauer [h/a]	Jährliche Richtwert-überschreitung > 30 h/a [h/a]	Täglich maximal mögliche Schattendauer [min/d]	Tägliche Richtwert-überschreitung > 30 min/d [min/d]
SR-048	57:32	27:32	57	27
SR-049	69:42	39:42	60	30
SR-050	64:41	34:41	59	29
SR-051	59:22	29:22	55	25
SR-052	57:59	27:59	57	27
SR-053	70:11	40:11	60	30
SR-054	61:07	31:07	52	22
SR-055	79:17	49:17	61	31
SR-056	55:31	25:31	56	26
SR-057	62:44	32:44	51	21
SR-058	57:20	27:20	56	26
SR-059	61:07	31:07	57	27
SR-060	61:59	31:59	50	20
SR-061	60:45	30:45	50	20
SR-062	66:36	36:36	58	28
SR-063	59:52	29:52	50	20
SR-064	59:23	29:23	56	26
SR-065	63:58	33:58	57	27
SR-066	61:02	31:02	56	26
SR-067	51:08	21:08	54	24
SR-068	66:42	36:42	57	27
SR-069	58:52	28:52	50	20
SR-070	50:01	20:01	53	23
SR-071	61:52	31:52	55	25
SR-072	56:08	26:08	54	24
SR-073	63:54	33:54	54	24
SR-074	65:34	35:34	56	26
SR-075	49:42	19:42	53	23
SR-076	63:19	33:19	54	24
SR-077	62:24	32:24	54	24
SR-078	54:38	24:38	53	23
SR-079	47:59	17:59	52	22
SR-080	47:00	17:00	51	21
SR-081	52:54	22:54	52	22
SR-082	30:08	00:08	32	2

Tabelle 5.2: Fortsetzung: Schattenwurfzeiten der Zusatzbelastung an den untersuchten SR inkl. der jeweiligen Überschreitungen der jährlichen und täglichen Richtwerte

SR-ID	Jährlich maximal mögliche Schattendauer [h/a]	Jährliche Richtwert-überschreitung > 30 h/a [h/a]	Täglich maximal mögliche Schattendauer [min/d]	Tägliche Richtwert-überschreitung > 30 min/d [min/d]
SR-083	30:47	00:47	32	2
SR-084	25:48	-	32	2
SR-085	36:29	06:29	31	1
SR-086	36:34	06:34	31	1
SR-087	44:15	14:15	31	1
SR-088	26:41	-	31	1
SR-089	38:25	08:25	31	1
SR-090	45:52	15:52	31	1
SR-091	33:46	03:46	31	1
SR-092	33:58	03:58	30	-
SR-093	31:57	01:57	30	-
SR-094	47:02	17:02	30	-
SR-095	31:07	01:07	30	-
SR-096	32:23	02:23	26	-

5.3 Gesamtbelastung

Die Gesamtbelastung (GB) im Windpark “WP Sundern Hohe Liete” besteht aus den WEA der Vorbelastung (VB) und den neu geplanten WEA der Zusatzbelastung (ZB).
Die Schattenwurfzeiten sind in der Tabelle 5.3 dargestellt.
Die höchste Überschreitung des jährlichen Richtwertes beträgt maximal 282 Stunden am SR-094. Die höchste Überschreitung des täglichen Richtwertes beträgt maximal 86 Minuten am SR-068.

Tabelle 5.3: Schattenwurfzeiten der Gesamtbelastung an den untersuchten SR inkl. der jeweiligen Überschreitungen der jährlichen und täglichen Richtwerte

SR-ID	Jährlich maximal mögliche Schattendauer [h/a]	Jährliche Richtwert-überschreitung > 30 h/a [h/a]	Täglich maximal mögliche Schattendauer [min/d]	Tägliche Richtwert-überschreitung > 30 min/d [min/d]
SR-001	24:33	-	28	-
SR-002	24:22	-	28	-
SR-003	15:52	-	28	-
SR-004	24:21	-	28	-
SR-005	24:03	-	28	-
SR-006	16:22	-	28	-
SR-007	24:38	-	28	-
SR-008	09:01	-	23	-
SR-009	25:34	-	29	-
SR-010	25:04	-	29	-
SR-011	24:56	-	29	-
SR-012	26:03	-	29	-
SR-013	25:57	-	29	-
SR-014	16:59	-	29	-
SR-015	27:11	-	30	-
SR-016	17:41	-	30	-
SR-017	32:21	02:21	32	2
SR-018	174:31	144:31	83	53
SR-019	161:01	131:01	61	31
SR-020	79:47	49:47	69	39
SR-021	176:50	146:50	71	41
SR-022	110:14	80:14	73	43
SR-023	87:33	57:33	69	39
SR-024	88:30	58:30	69	39
SR-025	105:53	75:53	73	43
SR-026	95:57	65:57	71	41
SR-027	219:03	189:03	99	69
SR-028	95:57	65:57	69	39
SR-029	87:21	57:21	69	39
SR-030	101:33	71:33	71	41
SR-031	102:25	72:25	71	41
SR-032	222:13	192:13	84	54
SR-033	92:39	62:39	70	40
SR-034	85:23	55:23	70	40
SR-035	82:19	52:19	70	40
SR-036	81:20	51:20	71	41

Tabelle 5.3: Fortsetzung: Schattenwurfzeiten der Gesamtbelastung an den untersuchten SR inkl. der jeweiligen Überschreitungen der jährlichen und täglichen Richtwerte

SR-ID	Jährlich maximal mögliche Schattendauer [h/a]	Jährliche Richtwertüberschreitung > 30 h/a [h/a]	Täglich maximal mögliche Schattendauer [min/d]	Tägliche Richtwertüberschreitung > 30 min/d [min/d]
SR-037	85:53	55:53	70	40
SR-038	87:20	57:20	70	40
SR-039	84:32	54:32	70	40
SR-040	243:30	213:30	90	60
SR-041	221:26	191:26	92	62
SR-042	226:41	196:41	93	63
SR-043	77:42	47:42	71	41
SR-044	62:36	32:36	72	42
SR-045	216:54	186:54	94	64
SR-046	245:26	215:26	92	62
SR-047	232:28	202:28	93	63
SR-048	227:24	197:24	94	64
SR-049	250:18	220:18	98	68
SR-050	243:00	213:00	100	70
SR-051	236:24	206:24	95	65
SR-052	238:05	208:05	103	73
SR-053	259:45	229:45	107	77
SR-054	238:41	208:41	99	69
SR-055	282:17	252:17	110	80
SR-056	236:46	206:46	105	75
SR-057	241:01	211:01	101	71
SR-058	245:20	215:20	109	79
SR-059	252:50	222:50	110	80
SR-060	239:43	209:43	105	75
SR-061	239:20	209:20	105	75
SR-062	274:08	244:08	115	85
SR-063	239:48	209:48	106	76
SR-064	265:30	235:30	113	83
SR-065	272:14	242:14	115	85
SR-066	271:03	241:03	115	85
SR-067	258:11	228:11	112	82
SR-068	281:59	251:59	116	86
SR-069	243:35	213:35	108	78
SR-070	265:26	235:26	112	82
SR-071	287:42	257:42	111	81

Tabelle 5.3: Fortsetzung: Schattenwurfzeiten der Gesamtbelastung an den untersuchten SR inkl. der jeweiligen Überschreitungen der jährlichen und täglichen Richtwerte

SR-ID	Jährlich maximal mögliche Schattendauer [h/a]	Jährliche Richtwert-überschreitung > 30 h/a [h/a]	Täglich maximal mögliche Schattendauer [min/d]	Tägliche Richtwert-überschreitung > 30 min/d [min/d]
SR-072	282:57	252:57	109	79
SR-073	286:52	256:52	107	77
SR-074	286:15	256:15	107	77
SR-075	278:18	248:18	105	75
SR-076	282:10	252:10	103	73
SR-077	275:59	245:59	97	67
SR-078	277:14	247:14	96	66
SR-079	277:11	247:11	96	66
SR-080	284:33	254:33	103	73
SR-081	297:56	267:56	100	70
SR-082	256:10	226:10	86	56
SR-083	265:44	235:44	75	45
SR-084	271:23	241:23	78	48
SR-085	269:47	239:47	75	45
SR-086	265:17	235:17	76	46
SR-087	285:18	255:18	97	67
SR-088	265:30	235:30	81	51
SR-089	278:18	248:18	98	68
SR-090	297:48	267:48	98	68
SR-091	265:12	235:12	90	60
SR-092	264:32	234:32	81	51
SR-093	255:18	225:18	75	45
SR-094	312:34	282:34	101	71
SR-095	265:07	235:07	78	48
SR-096	303:11	273:11	105	75

5.4 Grafische Darstellung der ZB

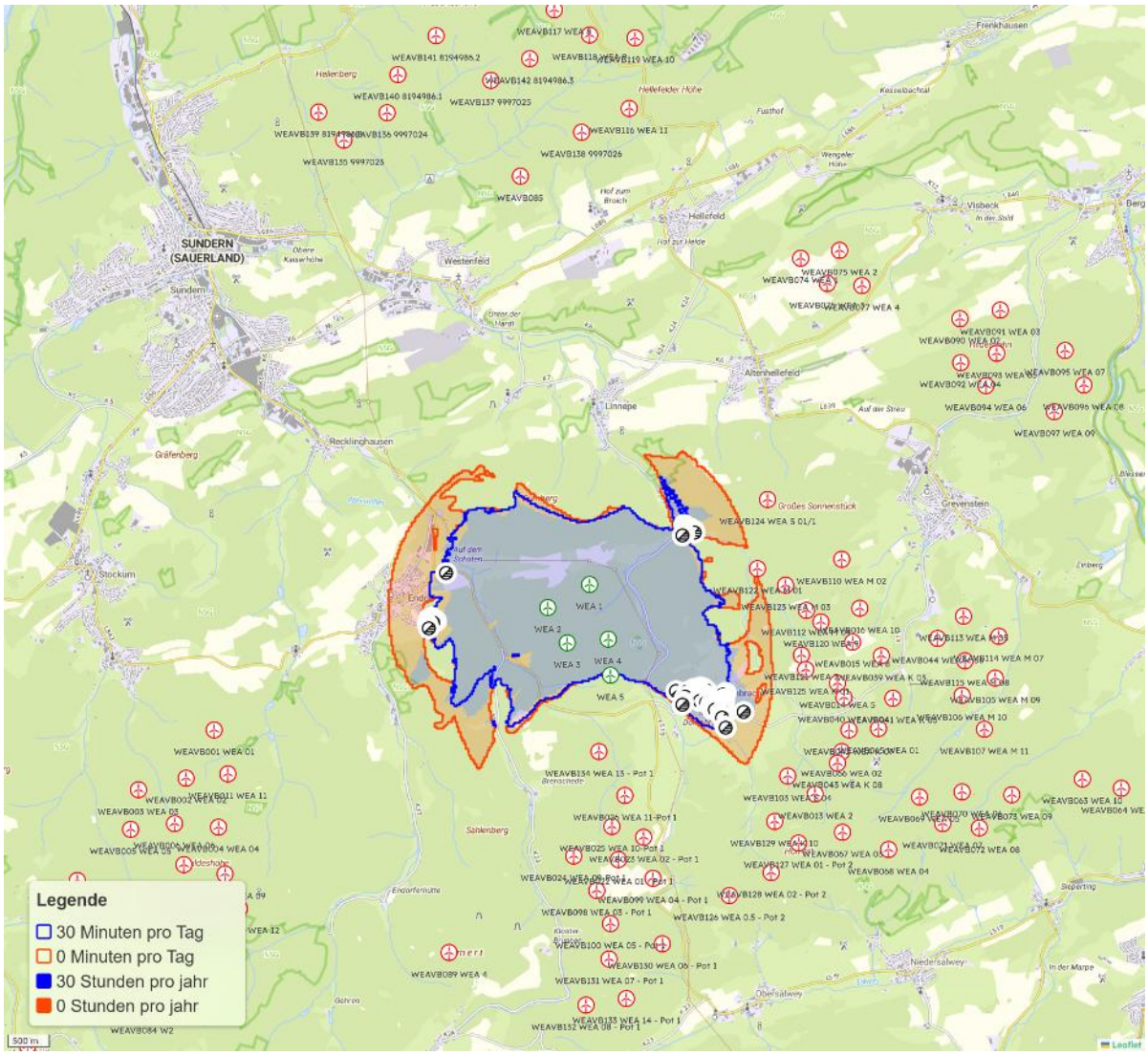


Abbildung 5.1: Übersichtsplan mit den Berechnungsergebnisse der Zusatzbelastung [Bun24]

5.5 Grafische Darstellung der GB

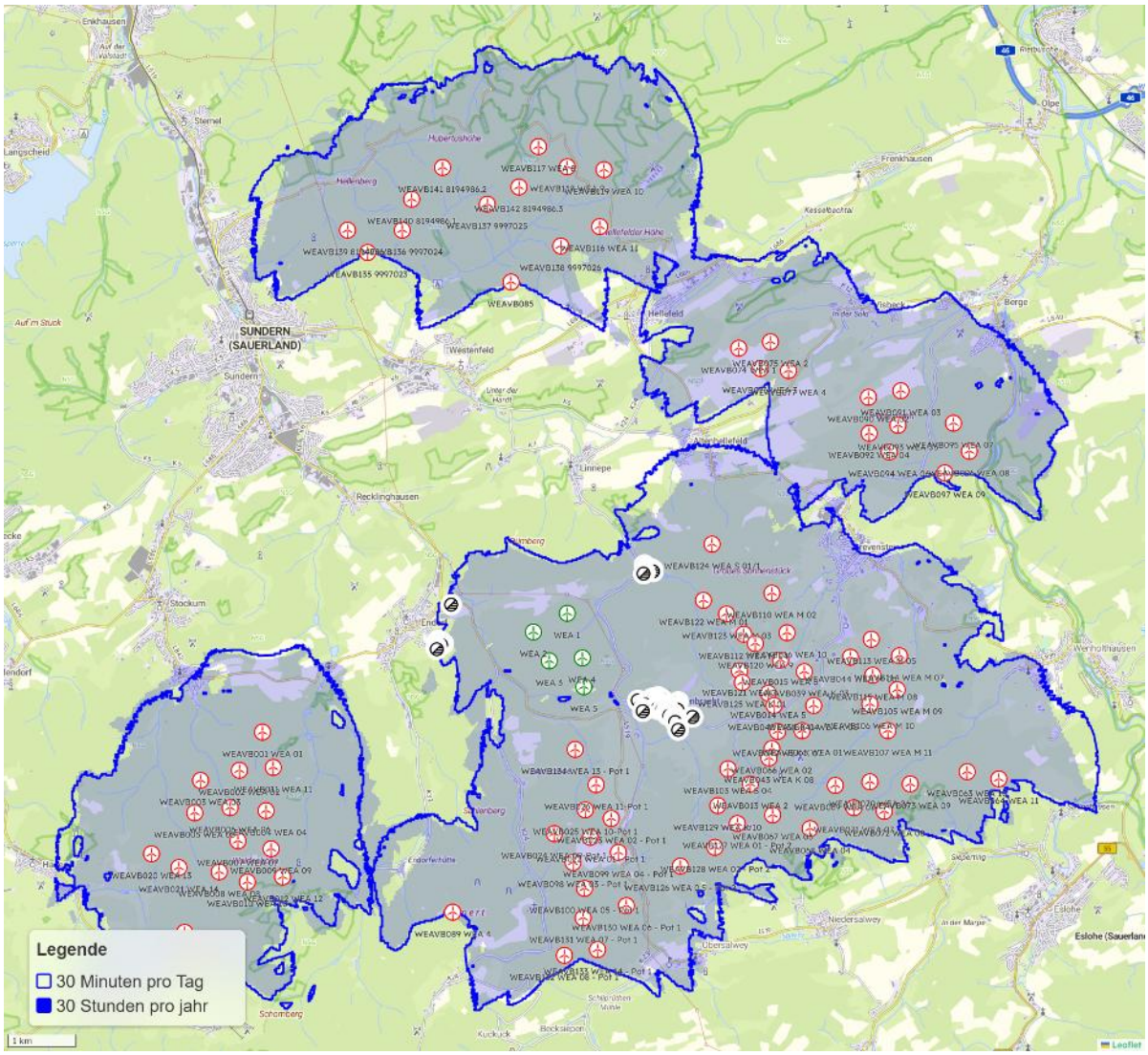


Abbildung 5.2: Übersichtsplan mit den Berechnungsergebnisse der Gesamtbelastung [Bun24]

6 Bewertung der Schattenwurfzeiten

Die Bewertung der Zusatzbelastung (ZB) in dem Windpark WP Sundern Hohe Liete erfolgt nach der Relevanz der untersuchten SR. Ein SR weist eine Relevanz auf, sobald die geplanten WEA zu einer Überschreitung der jährlichen oder täglichen Richtwerte führen. Zusätzlich darf die Zusatzbelastung (ZB) bereits durch die Vorbelastung (VB) überschrittene SR nicht weiter erhöhen.

6.1 Bewertung Jahreswerte

Die Bewertung des maximal möglichen Schattenwurfes bezogen auf den jährlichen Richtwert wird in der folgenden Tabelle 6.1 dargestellt. Die letzten beiden Spalten (Relevanz (R) und Erhöhung (E)) geben an, ob der SR nach der oben genannten Definition relevant ist und ob eine Überschreitung der Vorbelastung bereits vorhanden ist und durch die Zusatzbelastung weiter erhöht wird.

Tabelle 6.1: Die Bewertung des maximal möglichen Schattenwurfs bezogen auf den jährlichen Richtwert. Dargestellt werden die Vorbelastung (VB), die Gesamt- belastung (GB), die Überschreitung der Gesamtbelastung und die Erhöhung der Gesamtbelastung durch die Zusatzbelastung

SR-ID	Jährlich maximal mögliche Schattendauer VB [h/a]	Jährlich maximal mögliche Schattendauer GB [h/a]	Überschreitung Richtwert 30 $\frac{h}{a}$ durch GB [h/a]	Ü	Erhöhung der VB durch die ZB [h/a]	E	R
SR-001	00:00	24:33	-	Nein	24:33	Ja	Nein
SR-002	00:00	24:22	-	Nein	24:22	Ja	Nein
SR-003	00:00	15:52	-	Nein	15:52	Ja	Nein
SR-004	00:00	24:21	-	Nein	24:21	Ja	Nein
SR-005	00:00	24:03	-	Nein	24:03	Ja	Nein
SR-006	00:00	16:22	-	Nein	16:22	Ja	Nein
SR-007	00:00	24:38	-	Nein	24:38	Ja	Nein
SR-008	00:00	09:01	-	Nein	09:01	Ja	Nein
SR-009	00:00	25:34	-	Nein	25:34	Ja	Nein
SR-010	00:00	25:04	-	Nein	25:04	Ja	Nein
SR-011	00:00	24:56	-	Nein	24:56	Ja	Nein

Tabelle 6.1: Fortsetzung: Die Bewertung des maximal möglichen Schattenwurfs bezogen auf den jährlichen Richtwert. Dargestellt werden die Vorbelastung (VB), die Gesamt- belastung (GB), die Überschreitung der Gesamtbelastung und die Erhöhung der Gesamtbelastung durch die Zusatzbelastung

SR-ID	Jährlich maximal mögliche Schattendauer VB [h/a]	Jährlich maximal mögliche Schattendauer GB [h/a]	Überschreitung Richtwert 30 $\frac{h}{a}$ durch GB [h/a]	Ü	Erhöhung der VB durch die ZB [h/a]	E	R
SR-012	00:00	26:03	-	Nein	26:03	Ja	Nein
SR-013	00:00	25:57	-	Nein	25:57	Ja	Nein
SR-014	00:00	16:59	-	Nein	16:59	Ja	Nein
SR-015	00:00	27:11	-	Nein	27:11	Ja	Nein
SR-016	00:00	17:41	-	Nein	17:41	Ja	Nein
SR-017	00:00	32:21	02:21	Ja	32:21	Ja	Ja
SR-018	74:36	174:31	144:31	Ja	99:55	Ja	Ja
SR-019	120:28	161:01	131:01	Ja	40:33	Ja	Ja
SR-020	28:45	79:47	49:47	Ja	51:02	Ja	Ja
SR-021	118:06	176:50	146:50	Ja	58:43	Ja	Ja
SR-022	67:23	110:14	80:14	Ja	42:50	Ja	Ja
SR-023	47:38	87:33	57:33	Ja	39:54	Ja	Ja
SR-024	48:47	88:30	58:30	Ja	39:43	Ja	Ja
SR-025	64:26	105:53	75:53	Ja	41:27	Ja	Ja
SR-026	55:49	95:57	65:57	Ja	40:07	Ja	Ja
SR-027	126:46	219:03	189:03	Ja	92:16	Ja	Ja
SR-028	56:36	95:57	65:57	Ja	39:21	Ja	Ja
SR-029	48:21	87:21	57:21	Ja	39:00	Ja	Ja
SR-030	62:01	101:33	71:33	Ja	39:31	Ja	Ja
SR-031	63:05	102:25	72:25	Ja	39:20	Ja	Ja
SR-032	124:34	222:13	192:13	Ja	97:38	Ja	Ja
SR-033	54:00	92:39	62:39	Ja	38:38	Ja	Ja
SR-034	48:07	85:23	55:23	Ja	37:16	Ja	Ja
SR-035	45:52	82:19	52:19	Ja	36:27	Ja	Ja
SR-036	44:53	81:20	51:20	Ja	36:26	Ja	Ja
SR-037	53:30	85:53	55:53	Ja	32:22	Ja	Ja
SR-038	55:06	87:20	57:20	Ja	32:14	Ja	Ja
SR-039	52:39	84:32	54:32	Ja	31:52	Ja	Ja
SR-040	155:09	243:30	213:30	Ja	88:20	Ja	Ja
SR-041	155:11	221:26	191:26	Ja	66:15	Ja	Ja
SR-042	155:16	226:41	196:41	Ja	71:24	Ja	Ja
SR-043	47:22	77:42	47:42	Ja	30:20	Ja	Ja

Tabelle 6.1: Fortsetzung: Die Bewertung des maximal möglichen Schattenwurfs bezogen auf den jährlichen Richtwert. Dargestellt werden die Vorbelastung (VB), die Gesamt- belastung (GB), die Überschreitung der Gesamtbelastung und die Erhöhung der Gesamtbelastung durch die Zusatzbelastung

SR-ID	Jährlich maximal mögliche Schattendauer VB [h/a]	Jährlich maximal mögliche Schattendauer GB [h/a]	Überschreitung Richtwert 30 $\frac{h}{a}$ durch GB [h/a]	Ü	Erhöhung der VB durch die ZB [h/a]	E	R
SR-044	48:44	62:36	32:36	Ja	13:52	Ja	Ja
SR-045	155:11	216:54	186:54	Ja	61:43	Ja	Ja
SR-046	170:05	245:26	215:26	Ja	75:21	Ja	Ja
SR-047	170:28	232:28	202:28	Ja	61:59	Ja	Ja
SR-048	169:50	227:24	197:24	Ja	57:33	Ja	Ja
SR-049	180:35	250:18	220:18	Ja	69:42	Ja	Ja
SR-050	178:18	243:00	213:00	Ja	64:41	Ja	Ja
SR-051	177:01	236:24	206:24	Ja	59:22	Ja	Ja
SR-052	180:05	238:05	208:05	Ja	57:59	Ja	Ja
SR-053	189:33	259:45	229:45	Ja	70:11	Ja	Ja
SR-054	177:33	238:41	208:41	Ja	61:07	Ja	Ja
SR-055	202:58	282:17	252:17	Ja	79:18	Ja	Ja
SR-056	181:13	236:46	206:46	Ja	55:32	Ja	Ja
SR-057	178:16	241:01	211:01	Ja	62:44	Ja	Ja
SR-058	188:00	245:20	215:20	Ja	57:20	Ja	Ja
SR-059	191:43	252:50	222:50	Ja	61:07	Ja	Ja
SR-060	177:45	239:43	209:43	Ja	61:58	Ja	Ja
SR-061	178:35	239:20	209:20	Ja	60:45	Ja	Ja
SR-062	207:31	274:08	244:08	Ja	66:36	Ja	Ja
SR-063	179:56	239:48	209:48	Ja	59:52	Ja	Ja
SR-064	206:05	265:30	235:30	Ja	59:24	Ja	Ja
SR-065	208:16	272:14	242:14	Ja	63:58	Ja	Ja
SR-066	210:01	271:03	241:03	Ja	61:02	Ja	Ja
SR-067	207:03	258:11	228:11	Ja	51:08	Ja	Ja
SR-068	215:16	281:59	251:59	Ja	66:42	Ja	Ja
SR-069	184:43	243:35	213:35	Ja	58:52	Ja	Ja
SR-070	215:24	265:26	235:26	Ja	50:01	Ja	Ja
SR-071	225:50	287:42	257:42	Ja	61:52	Ja	Ja
SR-072	226:48	282:57	252:57	Ja	56:08	Ja	Ja
SR-073	222:58	286:52	256:52	Ja	63:54	Ja	Ja
SR-074	220:41	286:15	256:15	Ja	65:34	Ja	Ja
SR-075	228:35	278:18	248:18	Ja	49:42	Ja	Ja

Tabelle 6.1: Fortsetzung: Die Bewertung des maximal möglichen Schattenwurfs bezogen auf den jährlichen Richtwert. Dargestellt werden die Vorbelastung (VB), die Gesamt- belastung (GB), die Überschreitung der Gesamtbelastung und die Erhöhung der Gesamtbelastung durch die Zusatzbelastung

SR-ID	Jährlich maximal mögliche Schattendauer VB [h/a]	Jährlich maximal mögliche Schattendauer GB [h/a]	Überschreitung Richtwert 30 $\frac{h}{a}$ durch GB [h/a]	Ü	Erhöhung der VB durch die ZB [h/a]	E	R
SR-076	218:50	282:10	252:10	Ja	63:19	Ja	Ja
SR-077	213:33	275:59	245:59	Ja	62:25	Ja	Ja
SR-078	222:35	277:14	247:14	Ja	54:39	Ja	Ja
SR-079	229:13	277:11	247:11	Ja	47:58	Ja	Ja
SR-080	237:33	284:33	254:33	Ja	47:00	Ja	Ja
SR-081	245:01	297:56	267:56	Ja	52:54	Ja	Ja
SR-082	226:01	256:10	226:10	Ja	30:09	Ja	Ja
SR-083	234:56	265:44	235:44	Ja	30:47	Ja	Ja
SR-084	245:35	271:23	241:23	Ja	25:47	Ja	Ja
SR-085	233:18	269:47	239:47	Ja	36:29	Ja	Ja
SR-086	228:43	265:17	235:17	Ja	36:34	Ja	Ja
SR-087	241:01	285:18	255:18	Ja	44:16	Ja	Ja
SR-088	238:48	265:30	235:30	Ja	26:41	Ja	Ja
SR-089	239:52	278:18	248:18	Ja	38:26	Ja	Ja
SR-090	251:56	297:48	267:48	Ja	45:52	Ja	Ja
SR-091	231:26	265:12	235:12	Ja	33:46	Ja	Ja
SR-092	230:33	264:32	234:32	Ja	33:58	Ja	Ja
SR-093	223:20	255:18	225:18	Ja	31:58	Ja	Ja
SR-094	265:32	312:34	282:34	Ja	47:02	Ja	Ja
SR-095	234:01	265:07	235:07	Ja	31:06	Ja	Ja
SR-096	270:48	303:11	273:11	Ja	32:23	Ja	Ja

Der jährliche Richtwert der Gesamtbelastung wird an insgesamt 80 der 96 untersuchten SR überschritten.
In Tabelle 6.1 werden die detaillierten Ergebnisse zu Erhöhungen dargestellt.

6.2 Bewertung Tageswerte

Die Bewertung des maximal möglichen Schattenwurfs bezogen auf den täglichen Richtwert wird in der folgenden Tabelle 6.2 dargestellt. Die letzten beiden Spalten (Relevanz (R)

und Erhöhung (E)) geben an, ob der SR nach der oben genannten Definition relevant ist und ob eine Überschreitung der Vorbelastung bereits vorhanden ist und durch die Zusatzbelastung weiter erhöht wird.

Tabelle 6.2: Die Bewertung des maximal möglichen Schattenwurfs bezogen auf den täglichen Richtwert. Dargestellt werden die Vorbelastung (VB), die Gesamt- belastung (GB), die Überschreitung der Gesamtbelastung und die Erhöhung der Gesamtbelastung durch die Zusatzbelastung.

SR-ID	Täglich maximal mögliche Schattendauer VB [min/d]	Täglich maximal mögliche Schattendauer GB [min/d]	Überschreitung Richtwert 30 $\frac{min}{d}$ durch GB [min/d]	Ü	Erhöhung der VB durch die ZB [min/d]	E	R
SR-001	0	28	-	Nein	28	Ja	Nein
SR-002	0	28	-	Nein	28	Ja	Nein
SR-003	0	28	-	Nein	28	Ja	Nein
SR-004	0	28	-	Nein	28	Ja	Nein
SR-005	0	28	-	Nein	28	Ja	Nein
SR-006	0	28	-	Nein	28	Ja	Nein
SR-007	0	28	-	Nein	28	Ja	Nein
SR-008	0	23	-	Nein	23	Ja	Nein
SR-009	0	29	-	Nein	29	Ja	Nein
SR-010	0	29	-	Nein	29	Ja	Nein
SR-011	0	29	-	Nein	29	Ja	Nein
SR-012	0	29	-	Nein	29	Ja	Nein
SR-013	0	29	-	Nein	29	Ja	Nein
SR-014	0	29	-	Nein	29	Ja	Nein
SR-015	0	30	-	Nein	30	Ja	Nein
SR-016	0	30	-	Nein	30	Ja	Nein
SR-017	0	32	2	Ja	32	Ja	Ja
SR-018	58	83	53	Ja	25	Ja	Ja
SR-019	53	61	31	Ja	8	Ja	Ja
SR-020	39	69	39	Ja	30	Ja	Ja
SR-021	53	71	41	Ja	18	Ja	Ja
SR-022	38	73	43	Ja	35	Ja	Ja
SR-023	48	69	39	Ja	21	Ja	Ja
SR-024	48	69	39	Ja	21	Ja	Ja
SR-025	38	73	43	Ja	35	Ja	Ja
SR-026	38	71	41	Ja	33	Ja	Ja
SR-027	52	99	69	Ja	47	Ja	Ja

Tabelle 6.2: Fortsetzung: Die Bewertung des maximal möglichen Schattenwurfs bezogen auf den täglichen Richtwert. Dargestellt werden die Vorbelastung (VB), die Gesamt- belastung (GB), die Überschreitung der Gesamtbelastung und die Erhöhung der Gesamtbelastung durch die Zusatzbelastung.

SR-ID	Täglich maximal mögliche Schattendauer VB [min/d]	Täglich maximal mögliche Schattendauer GB [min/d]	Überschreitung Richtwert 30 $\frac{min}{d}$ durch GB [min/d]	Ü	Erhöhung der VB durch die ZB [min/d]	E	R
SR-028	44	69	39	Ja	25	Ja	Ja
SR-029	47	69	39	Ja	22	Ja	Ja
SR-030	40	71	41	Ja	31	Ja	Ja
SR-031	40	71	41	Ja	31	Ja	Ja
SR-032	52	84	54	Ja	32	Ja	Ja
SR-033	44	70	40	Ja	26	Ja	Ja
SR-034	46	70	40	Ja	24	Ja	Ja
SR-035	46	70	40	Ja	24	Ja	Ja
SR-036	49	71	41	Ja	22	Ja	Ja
SR-037	43	70	40	Ja	27	Ja	Ja
SR-038	42	70	40	Ja	28	Ja	Ja
SR-039	42	70	40	Ja	28	Ja	Ja
SR-040	56	90	60	Ja	34	Ja	Ja
SR-041	52	92	62	Ja	40	Ja	Ja
SR-042	54	93	63	Ja	39	Ja	Ja
SR-043	45	71	41	Ja	26	Ja	Ja
SR-044	50	72	42	Ja	22	Ja	Ja
SR-045	53	94	64	Ja	41	Ja	Ja
SR-046	57	92	62	Ja	35	Ja	Ja
SR-047	55	93	63	Ja	38	Ja	Ja
SR-048	54	94	64	Ja	40	Ja	Ja
SR-049	58	98	68	Ja	40	Ja	Ja
SR-050	57	100	70	Ja	43	Ja	Ja
SR-051	54	95	65	Ja	41	Ja	Ja
SR-052	57	103	73	Ja	46	Ja	Ja
SR-053	60	107	77	Ja	47	Ja	Ja
SR-054	55	99	69	Ja	44	Ja	Ja
SR-055	62	110	80	Ja	48	Ja	Ja
SR-056	57	105	75	Ja	48	Ja	Ja
SR-057	56	101	71	Ja	45	Ja	Ja
SR-058	59	109	79	Ja	50	Ja	Ja
SR-059	59	110	80	Ja	51	Ja	Ja

Tabelle 6.2: Fortsetzung: Die Bewertung des maximal möglichen Schattenwurfs bezogen auf den täglichen Richtwert. Dargestellt werden die Vorbelastung (VB), die Gesamt- belastung (GB), die Überschreitung der Gesamtbelastung und die Erhöhung der Gesamtbelastung durch die Zusatzbelastung.

SR-ID	Täglich maximal mögliche Schattendauer VB [min/d]	Täglich maximal mögliche Schattendauer GB [min/d]	Überschreitung Richtwert 30 $\frac{min}{d}$ durch GB [min/d]	Ü	Erhöhung der VB durch die ZB [min/d]	E	R
SR-060	58	105	75	Ja	47	Ja	Ja
SR-061	58	105	75	Ja	47	Ja	Ja
SR-062	62	115	85	Ja	53	Ja	Ja
SR-063	57	106	76	Ja	49	Ja	Ja
SR-064	61	113	83	Ja	52	Ja	Ja
SR-065	62	115	85	Ja	53	Ja	Ja
SR-066	62	115	85	Ja	53	Ja	Ja
SR-067	62	112	82	Ja	50	Ja	Ja
SR-068	64	116	86	Ja	52	Ja	Ja
SR-069	60	108	78	Ja	48	Ja	Ja
SR-070	63	112	82	Ja	49	Ja	Ja
SR-071	64	111	81	Ja	47	Ja	Ja
SR-072	64	109	79	Ja	45	Ja	Ja
SR-073	65	107	77	Ja	42	Ja	Ja
SR-074	65	107	77	Ja	42	Ja	Ja
SR-075	64	105	75	Ja	41	Ja	Ja
SR-076	66	103	73	Ja	37	Ja	Ja
SR-077	66	97	67	Ja	31	Ja	Ja
SR-078	66	96	66	Ja	30	Ja	Ja
SR-079	66	96	66	Ja	30	Ja	Ja
SR-080	70	103	73	Ja	33	Ja	Ja
SR-081	74	100	70	Ja	26	Ja	Ja
SR-082	70	86	56	Ja	16	Ja	Ja
SR-083	75	75	45	Ja	-	Nein	Ja
SR-084	78	78	48	Ja	-	Nein	Ja
SR-085	75	75	45	Ja	-	Nein	Ja
SR-086	76	76	46	Ja	-	Nein	Ja
SR-087	72	97	67	Ja	25	Ja	Ja
SR-088	81	81	51	Ja	-	Nein	Ja
SR-089	73	98	68	Ja	25	Ja	Ja
SR-090	73	98	68	Ja	25	Ja	Ja
SR-091	73	90	60	Ja	17	Ja	Ja

Tabelle 6.2: Fortsetzung: Die Bewertung des maximal möglichen Schattenwurfs bezogen auf den täglichen Richtwert. Dargestellt werden die Vorbelastung (VB), die Gesamt- belastung (GB), die Überschreitung der Gesamtbelastung und die Erhöhung der Gesamtbelastung durch die Zusatzbelastung.

SR-ID	Täglich maximal mögliche Schattendauer VB [min/d]	Täglich maximal mögliche Schattendauer GB [min/d]	Überschreitung Richtwert 30 $\frac{min}{d}$ durch GB [min/d]	Ü	Erhöhung der VB durch die ZB [min/d]	E	R
SR-092	81	81	51	Ja	-	Nein	Ja
SR-093	75	75	45	Ja	-	Nein	Ja
SR-094	74	101	71	Ja	27	Ja	Ja
SR-095	78	78	48	Ja	-	Nein	Ja
SR-096	105	105	75	Ja	-	Nein	Ja

Der tägliche Richtwert der Gesamtbelastung wird an insgesamt 80 der 96 untersuchten SR überschritten.
In Tabelle 6.2 werden die detaillierten Ergebnisse zu Erhöhungen dargestellt.

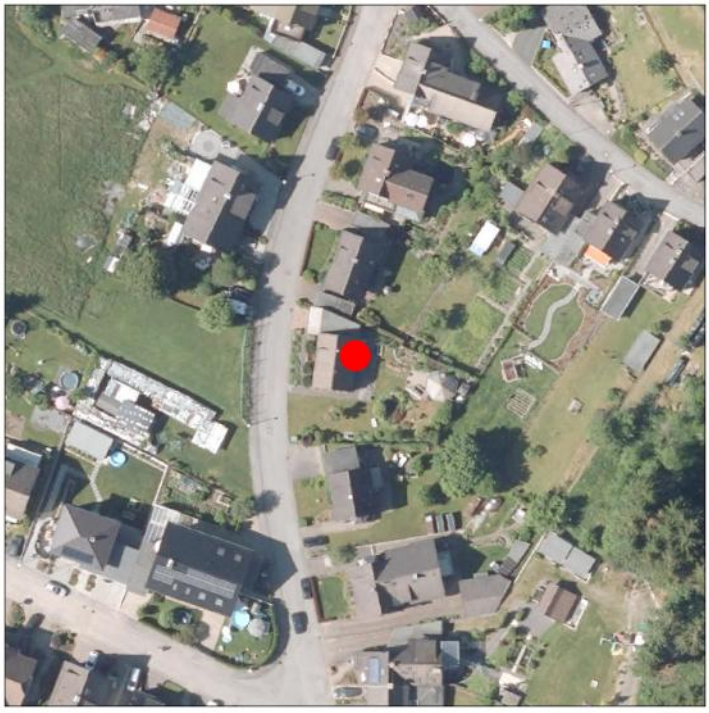
7 Interaktive Karte



Die interaktive Karte dient der Darstellung einiger bedeutender Ergebnisse des Berichtes. Sowohl alle relevanten WEA der Vor- und Zusatzbelastung als auch die untersuchten Schattenrezeptoren sind in der Karte berücksichtigt.
Über die Auswahl können die Beschattungsbereiche dargestellt werden. Hiermit lassen sich die Bereiche analysieren bei denen eine Überschreitung der gesetzlich festgelegten Richtwerte der Tages- bzw. Jahreswerte auftritt. Es wird zwischen der Vor-, Zusatz- und Gesamtbelastung unterschieden.
Das Öffnen der interaktiven Karte ist nur im Adobe Acrobat Reader möglich.

8 Ortstermin

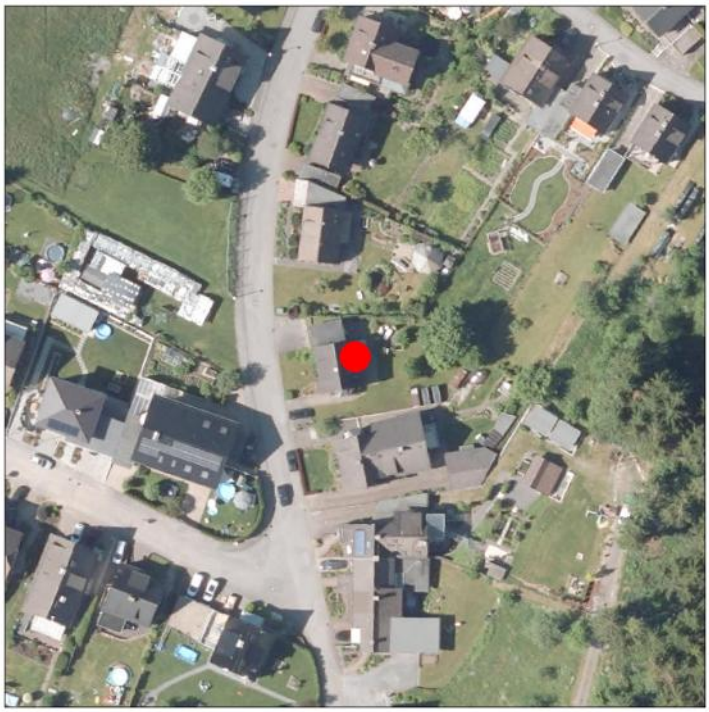
Die Immissionsorte wurden den offiziellen Satellitenbildern entnommen und sind nachfolgend dargestellt.



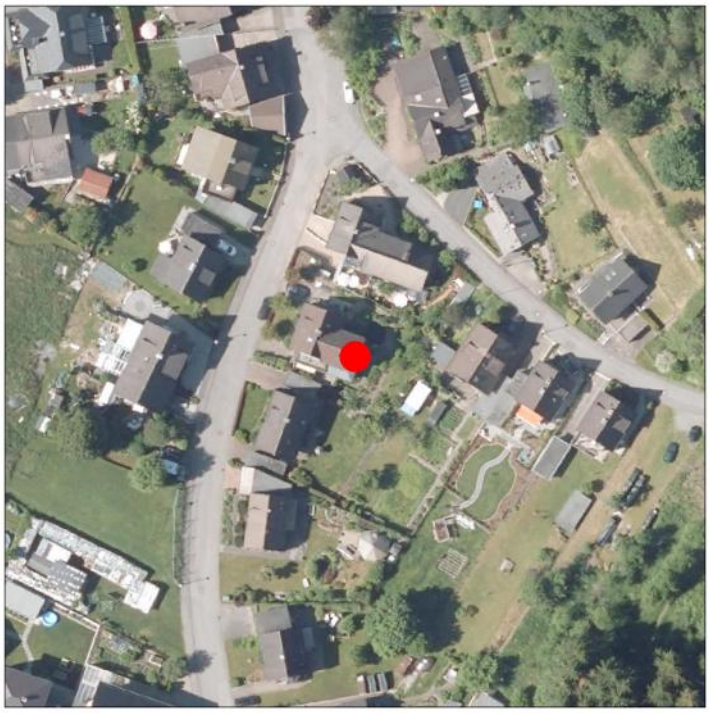
SR-001: In der Sierpke 17, 59846 Sundern (Sauerland)



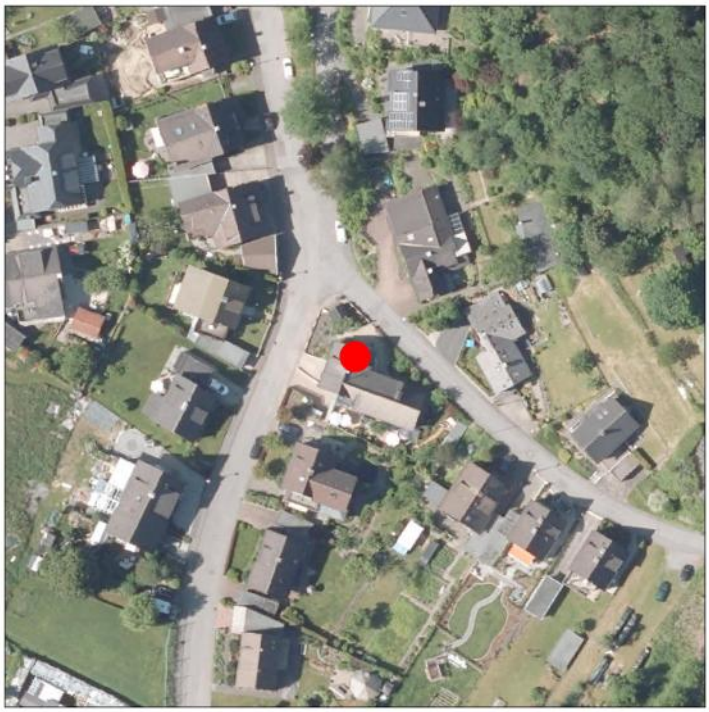
SR-002: In der Sierpke 15, 59846 Sundern (Sauerland)



SR-003: In der Sierpke 19, 59846 Sundern



SR-004: In der Sierpke 13, 59846 Sundern (Sauerland)



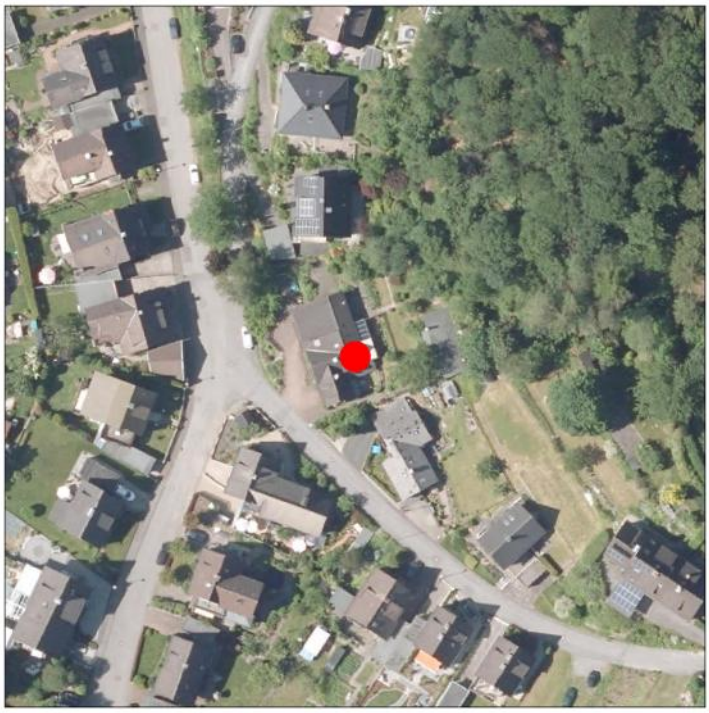
SR-005: Am Hüttenberg 2, 59846 Sundern (Sauerland)



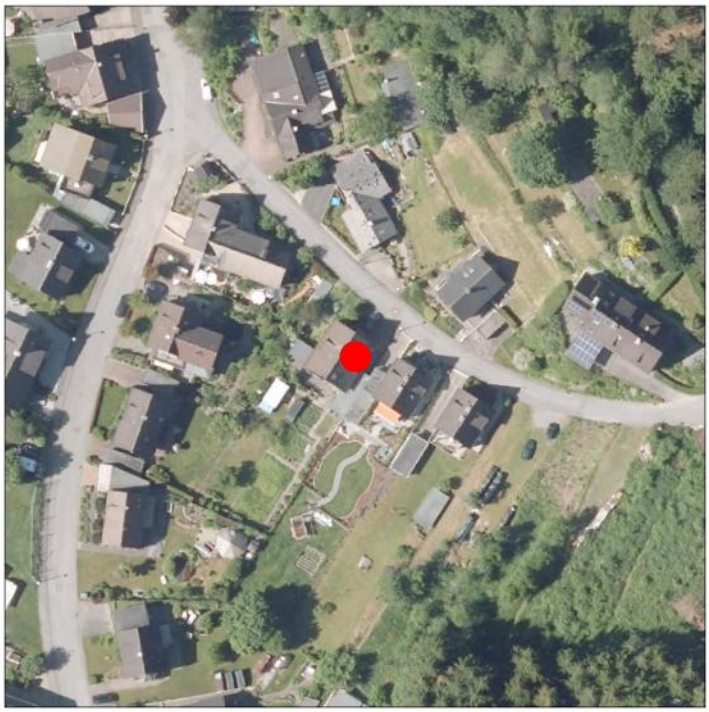
SR-006: In der Sierpke 21, 59846 Sundern (Sauerland)



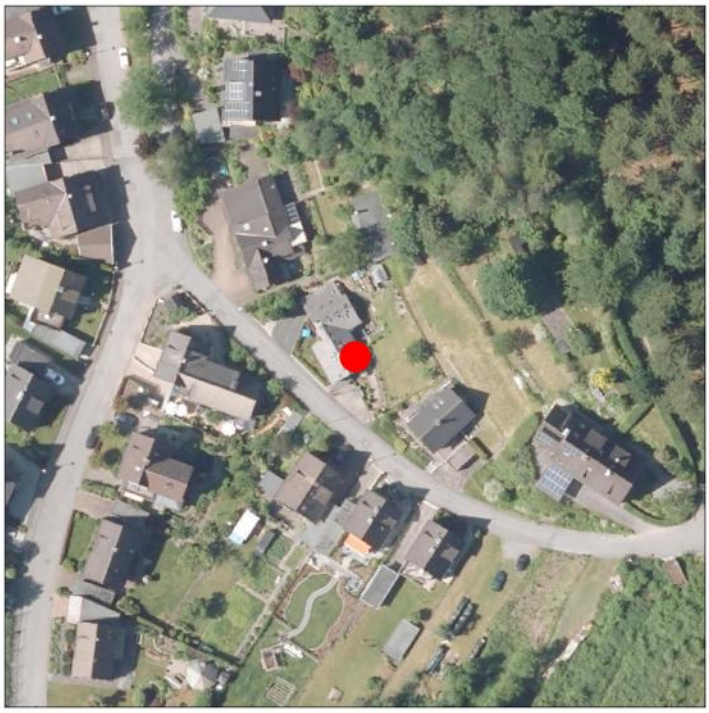
SR-007: Am Hüttenberg 2a, 59846 Sundern



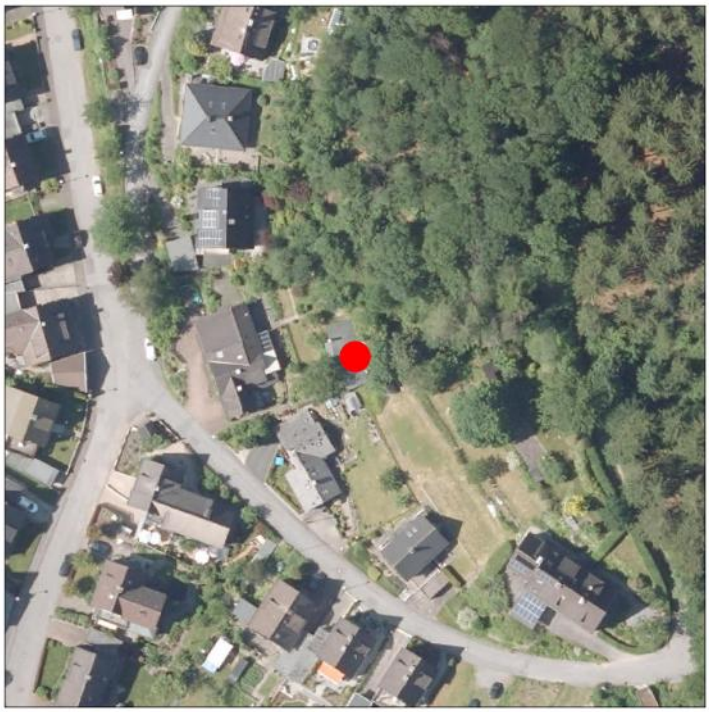
SR-008: Am Hüttenberg 1, 59846 Sundern (Sauerland)



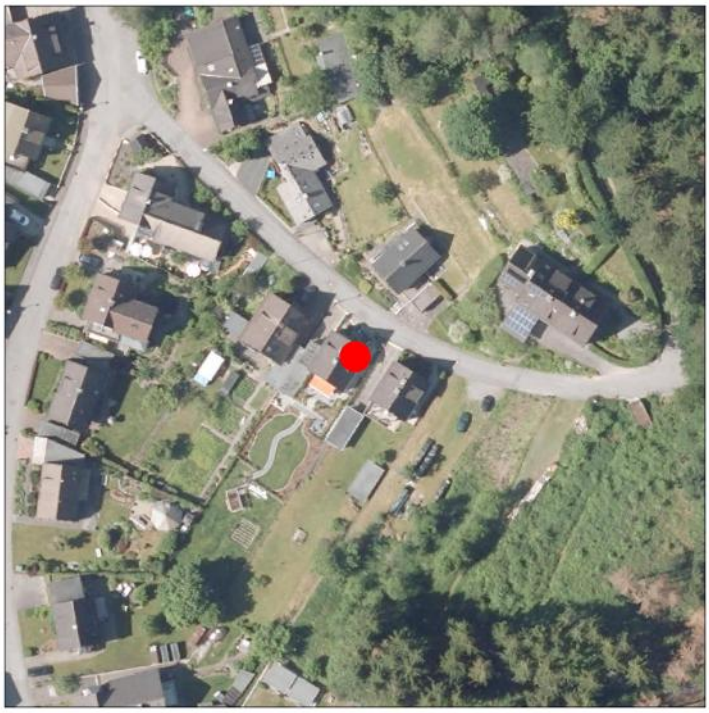
SR-009: Am Hüttenberg 4, 59846 Sundern (Sauerland)



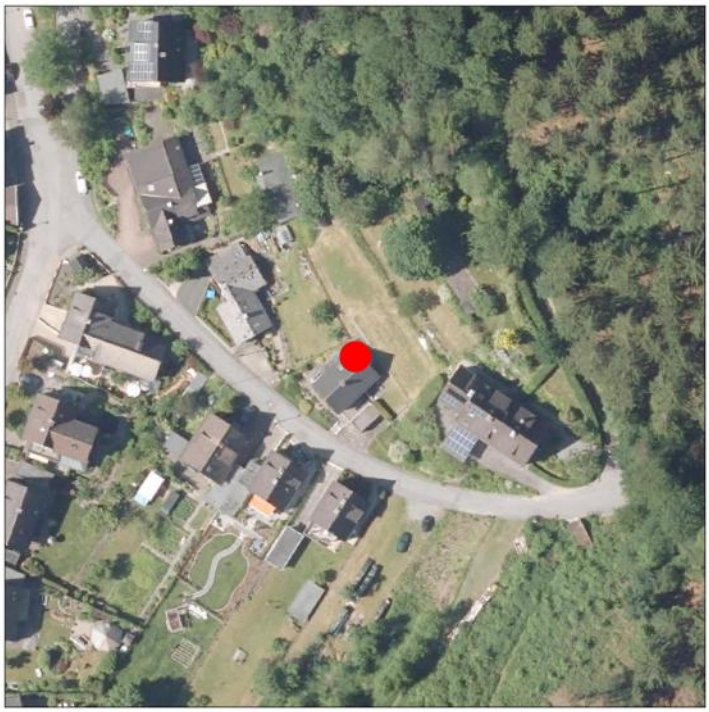
SR-010: Am Hüttenberg 5, 59846 Sundern



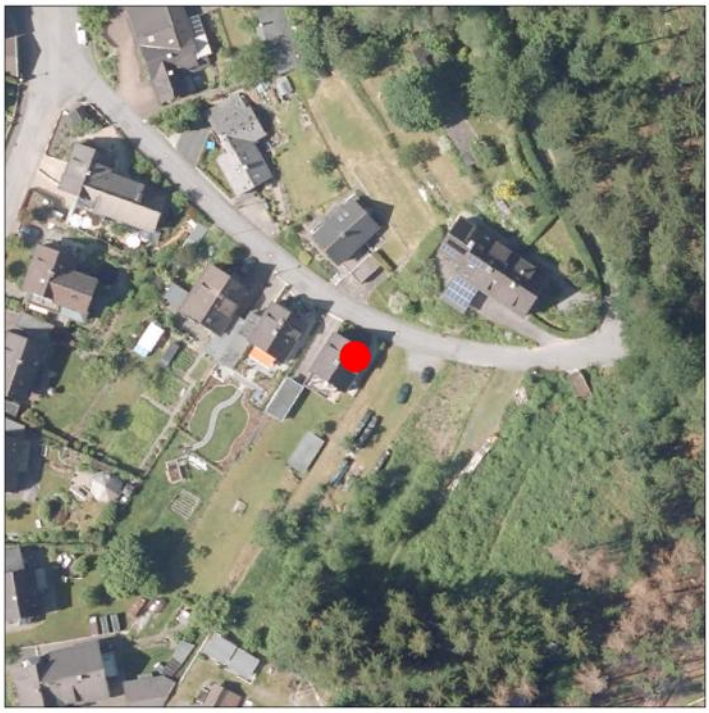
SR-011: Am Hüttenberg 3, 59846 Sundern (Sauerland)



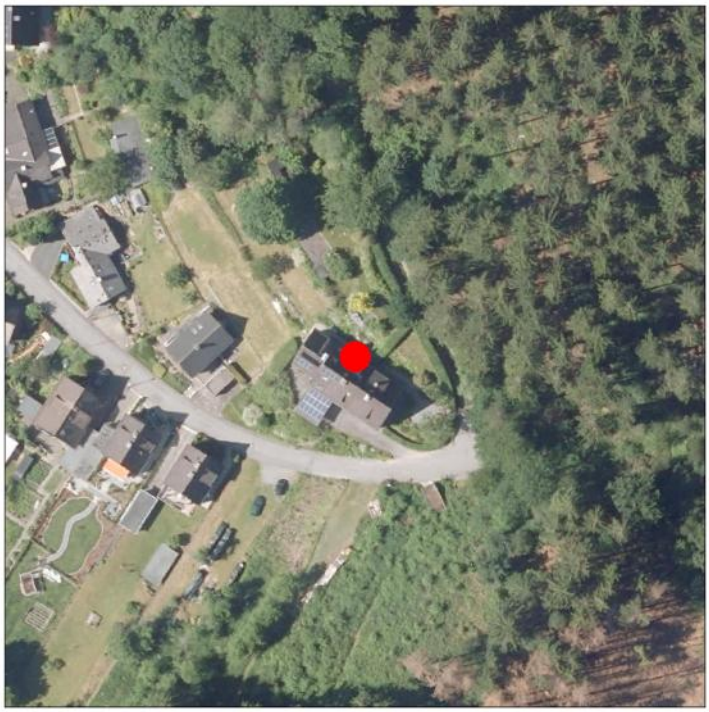
SR-012: Am Hüttenberg 6, 59846 Sundern (Sauerland)



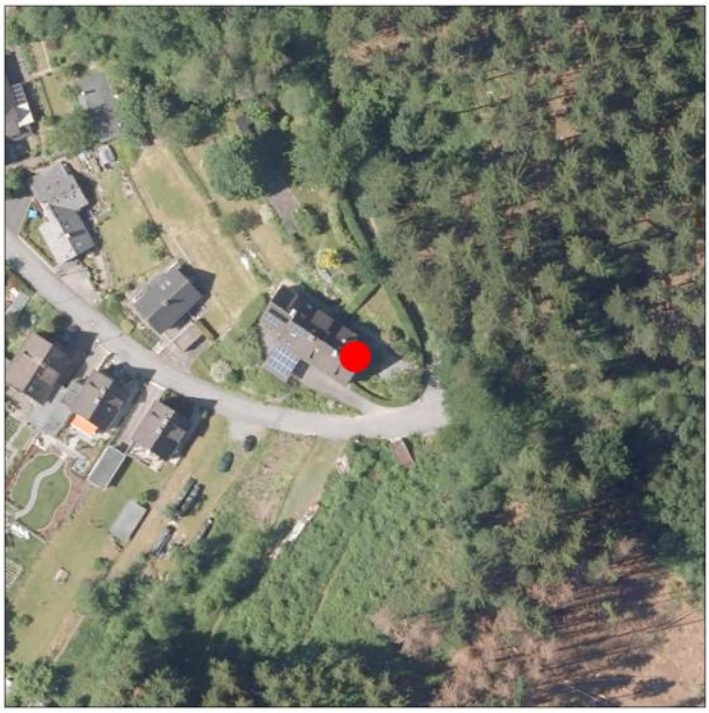
SR-013: Am Hüttenberg 7, 59846 Sundern (Sauerland)



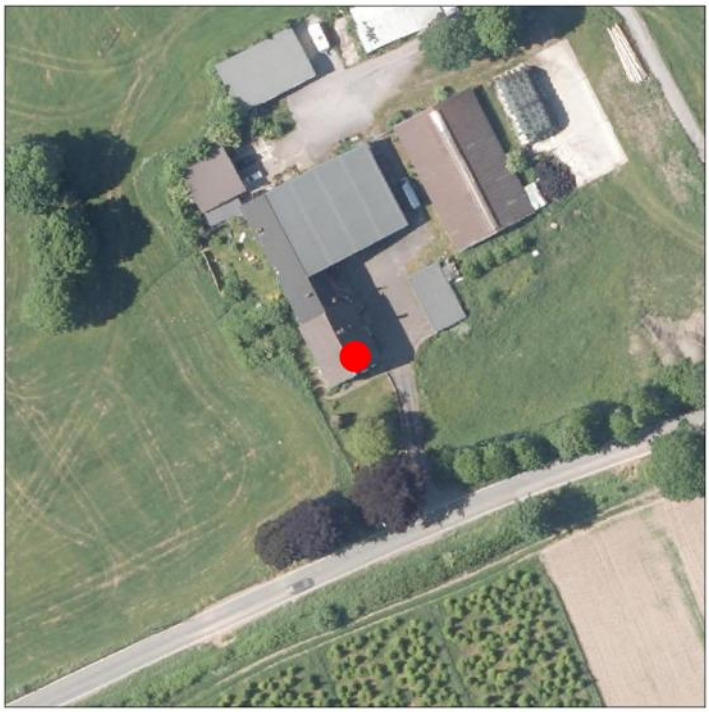
SR-014: Am Hüttenberg 8, 59846 Sundern (Sauerland)



SR-015: Am Hüttenberg 9, 59846 Sundern (Sauerland)



SR-016: Am Hüttenberg 11, 59846 Sundern



SR-017: Auf dem Schoten 1, 59846 Sundern



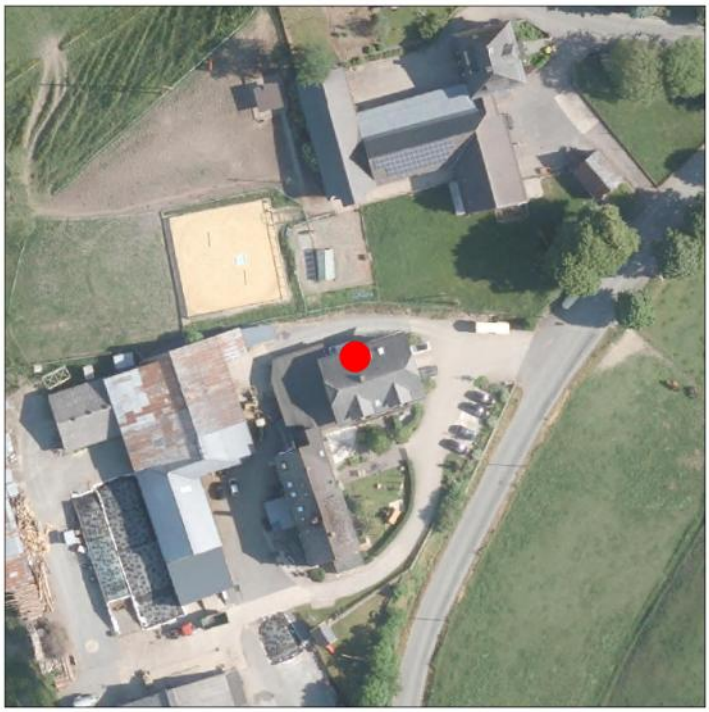
SR-018: Im Senkel 10, 59846 Sundern



SR-019: Meinkenbrachter Straße 1, 59846 Sundern



SR-020: Linneperhütte 7, 59846 Sundern



SR-021: Meinkenbrachter Straße 1, 59846 Sundern (Sauerland)



SR-022: Zum Backofen 1, 59846 Sundern



SR-023: Linneperhütte 5a, 59846 Sundern



SR-024: Linneperhütte 5, 59846 Sundern



SR-025: Zum Backofen 3, 59846 Sundern



SR-026: Linneperhütte 1, 59846 Sundern



SR-027: Im Senkel 1, 59846 Sundern



SR-028: An der Eiche 1, 59846 Sundern



SR-029: Linneperhütte 3, 59846 Sundern



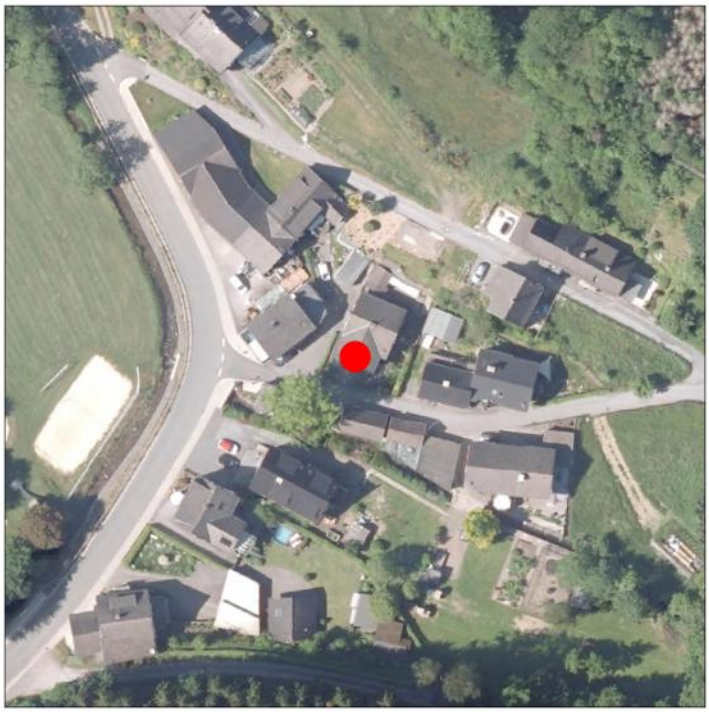
SR-030: An der Eiche 3, 59846 Sundern



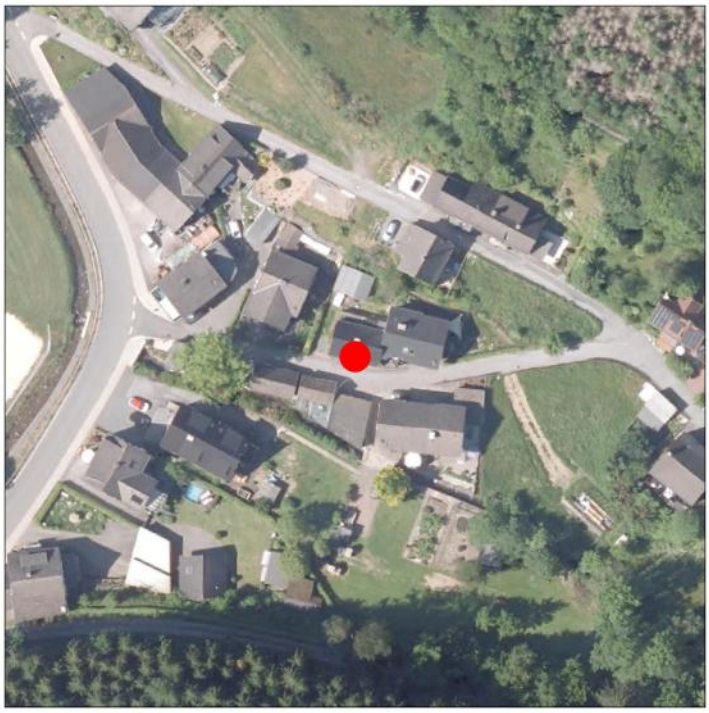
SR-031: An der Eiche 5, 59846 Sundern



SR-032: Im Senkel 2, 59846 Sundern



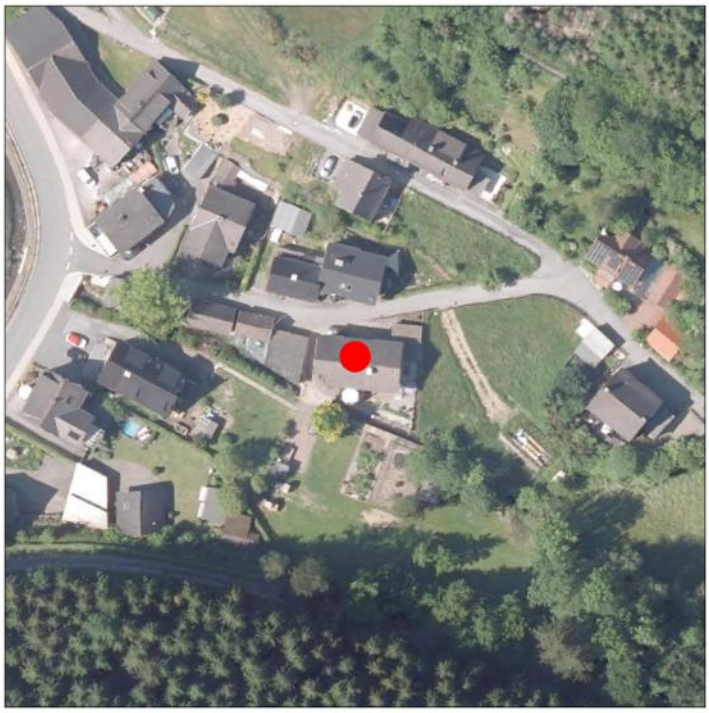
SR-033: An der Eiche 7, 59846 Sundern



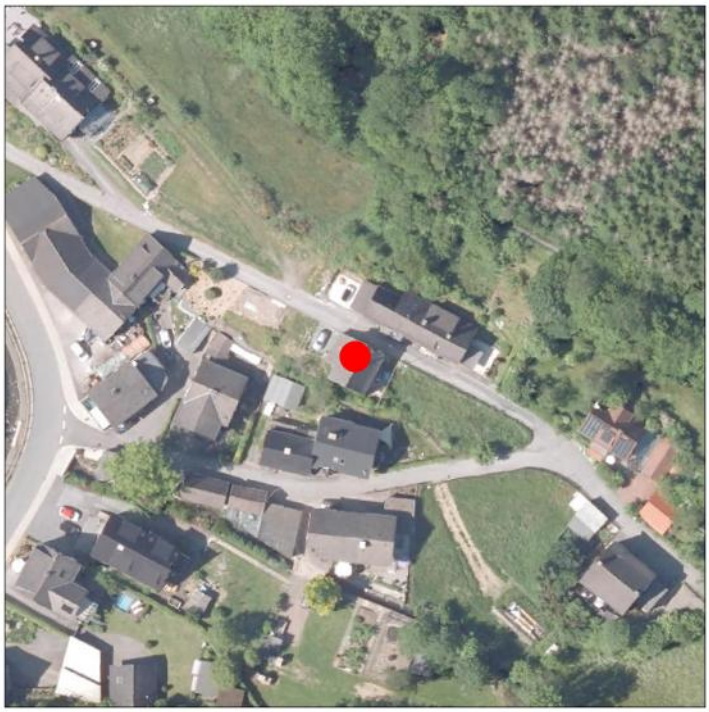
SR-034: An der Eiche 11, 59846 Sundern



SR-035: An der Eiche 13, 59846 Sundern



SR-036: An der Eiche 2, 59846 Sundern



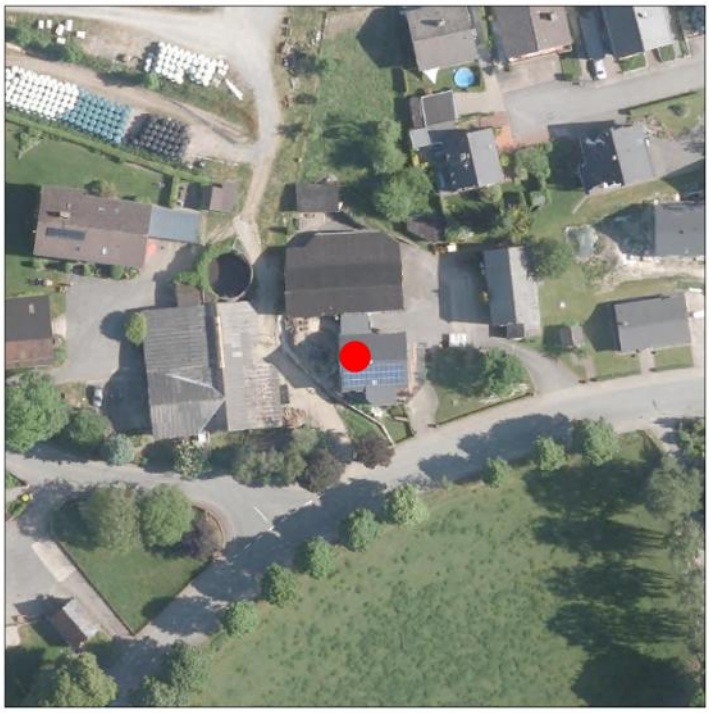
SR-037: Zum Backofen 2, 59846 Sundern



SR-038: Zum Backofen 9, 59846 Sundern



SR-039: Zum Backofen 11, 59846 Sundern



SR-040: Meinkenbrachter Straße 3, 59846 Sundern



SR-041: Am Alten Brunnen 16, 59846 Sundern



SR-042: Am Alten Brunnen 18, 59846 Sundern



SR-043: Zum Backofen 15, 59846 Sundern



SR-044: Zum Backofen 4, 59846 Sundern



SR-045: Am Alten Brunnen 14, 59846 Sundern



SR-046: Meinkenbrachter Straße 3a, 59846 Sundern



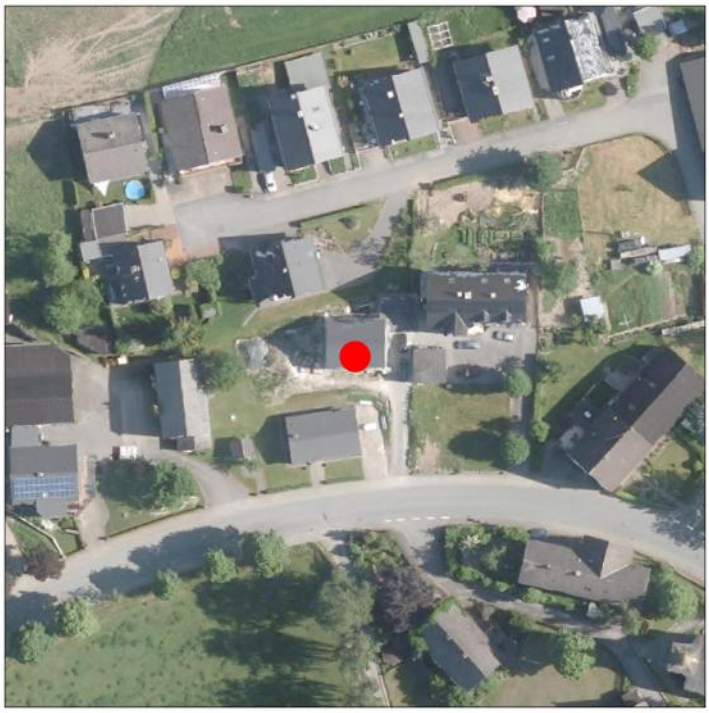
SR-047: Am Alten Brunnen 20, 59846 Sundern



SR-048: Am Alten Brunnen 12, 59846 Sundern



SR-049: Meinkenbrachter Straße 5, 59846 Sundern



SR-050: Meinkenbrachter Straße 5a, 59846 Sundern



SR-051: Am Alten Brunnen 10, 59846 Sundern



SR-052: Meinkenbrachter Straße 7, 59846 Sundern



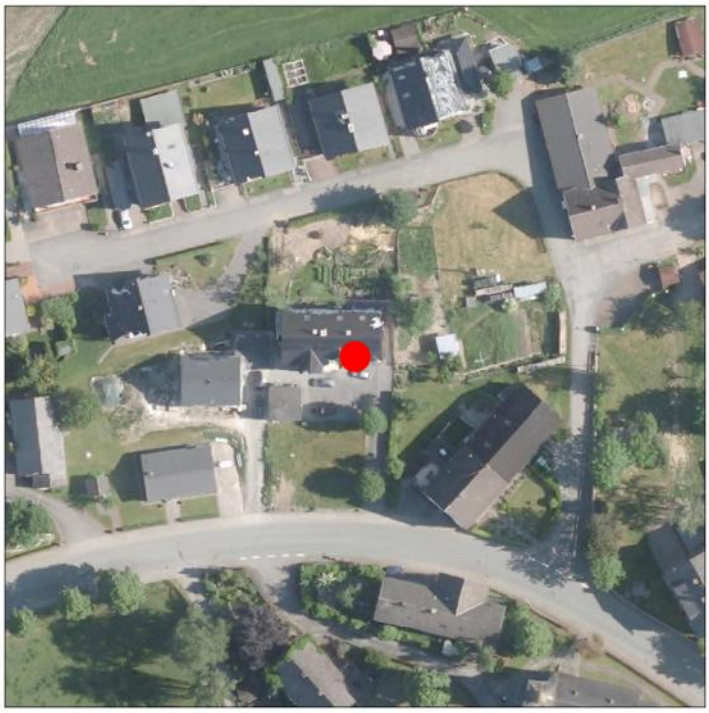
SR-053: Brinkweg 2, 59846 Sundern



SR-054: Am Alten Brunnen 8, 59846 Sundern



SR-055: Meinkenbrachter Straße 10, 59846 Sundern



SR-056: Meinkenbrachter Straße 7a, 59846 Sundern



SR-057: Am Alten Brunnen 6, 59846 Sundern



SR-058: Meinkenbrachter Straße 9, 59846 Sundern



SR-059: Meinkenbrachter Straße 12, 59846 Sundern



SR-060: Am Alten Brunnen 2, 59846 Sundern



SR-061: Am Alten Brunnen 2a, 59846 Sundern



SR-062: Brinkweg 4, 59846 Sundern



SR-063: Am Alten Brunnen 2b, 59846 Sundern



SR-064: Meinkenbrachter Straße 14, 59846 Sundern



SR-065: Brinkweg 6, 59846 Sundern



SR-066: Brinkweg 6a, 59846 Sundern



SR-067: Meinkenbrachter Straße 11, 59846 Sundern



SR-068: Brinkweg 8, 59846 Sundern



SR-069: Am Alten Brunnen 5, 59846 Sundern



SR-070: Meinkenbrachter Straße 13, 59846 Sundern



SR-071: August-Essleben-Straße 2, 59846 Sundern



SR-072: Meinkenbrachter Straße 18, 59846 Sundern



SR-073: August-Essleben-Straße 4a, 59846 Sundern



SR-074: August-Essleben-Straße 4b, 59846 Sundern



SR-075: Meinkenbrachter Straße 15, 59846 Sundern



SR-076: August-Essleben-Straße 6, 59846 Sundern



SR-077: August-Essleben-Straße 8, 59846 Sundern



SR-078: Meinkenbrachter Straße 22, 59846 Sundern



SR-079: Meinkenbrachter Straße 17, 59846 Sundern



SR-080: Meinkenbrachter Straße 19, 59846 Sundern



SR-081: Meinkenbrachter Straße 24, 59846 Sundern



SR-082: Zum Bauerhahn 1, 59846 Sundern



SR-083: Zur Rohmke 2, 59846 Sundern



SR-084: Zum Bauerhahn 2, 59846 Sundern



SR-085: Zur Rohmke 4, 59846 Sundern



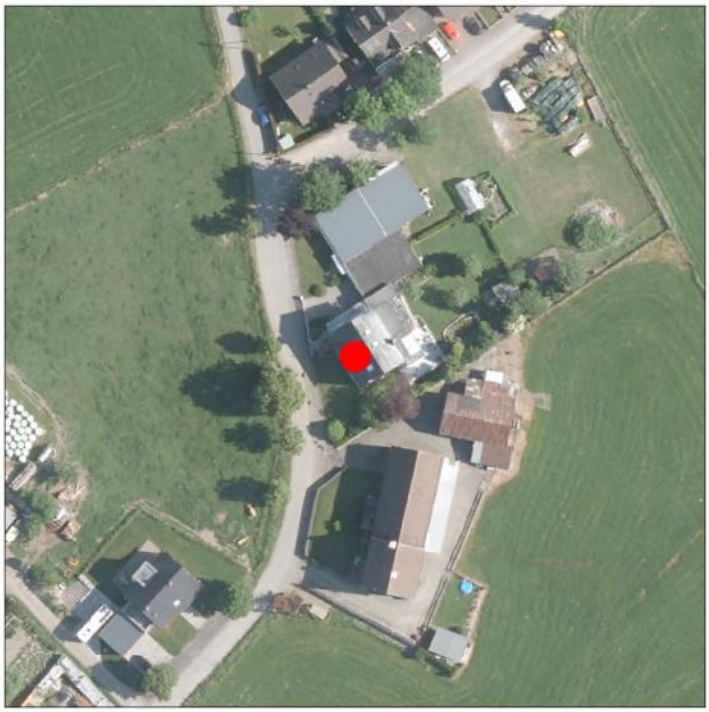
SR-086: Zur Rohmke 6, 59846 Sundern



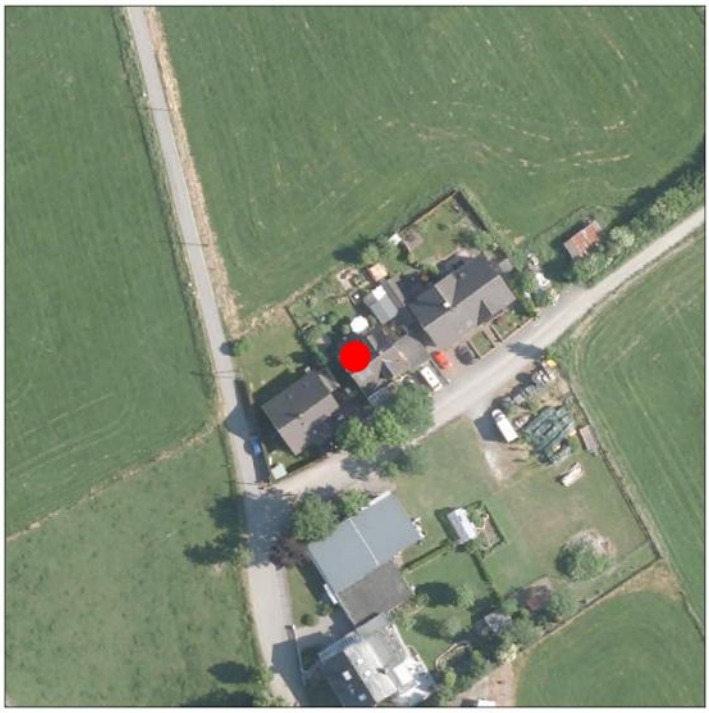
SR-087: Zum Bauerhahn 20, 59846 Sundern



SR-088: Meinkenbrachter Straße 26, 59846 Sundern



SR-089: Zum Bauerhahn 8, 59846 Sundern



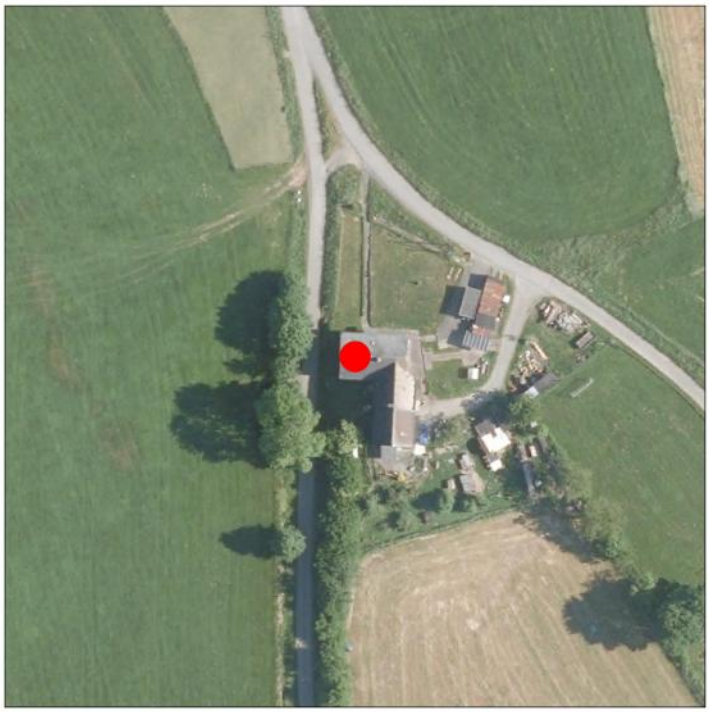
SR-090: Zum Bauerhahn 18, 59846 Sundern



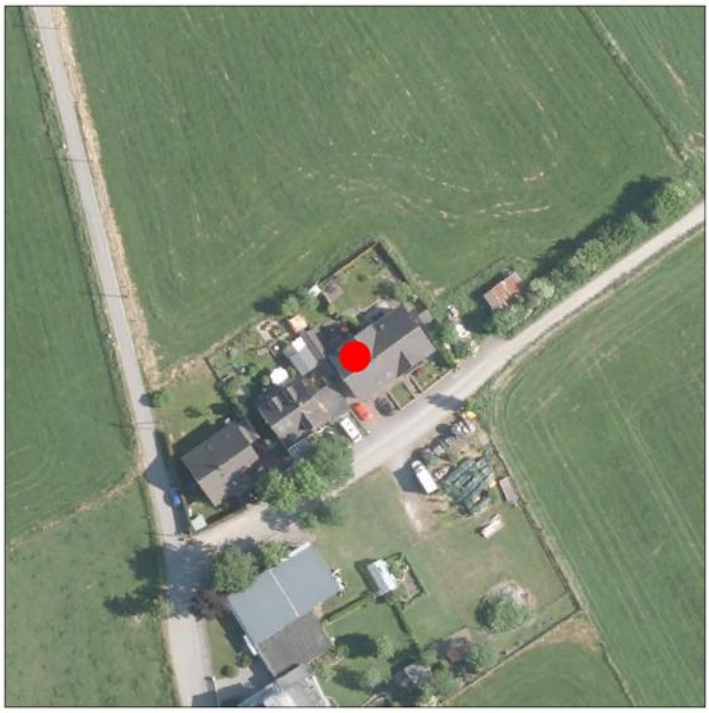
SR-091: Zum Bauerhahn 6, 59846 Sundern



SR-092: Zur Rohmke 3, 59846 Sundern



SR-093: Zur Rohmke 8, 59846 Sundern



SR-094: Zum Bauerhahn 16, 59846 Sundern



SR-095: Zur Rohmke 8a, 59846 Sundern



SR-096: Meinkenbrachter Straße 31, 59846 Sundern

Literaturverzeichnis

[BIm21] BImSchG: Bundes-Immissionsschutzgesetz in der Fassung der Bekanntmachung vom 17. Mai 2013 (BGBl. I S. 1274; 2021 I S. 123), das zuletzt durch Artikel 10 des Gesetzes vom 27. Juli 2021 (BGBl. I S. 3146) geändert worden ist. 2021

[Bun24] Bundesamt für Kartographie und Geodäsie: GeoBasis-DE / BKG (2024) dl-de/by-2-0. 2024

[lai20] (LAI), Bund/Länder-Arbeitsgemeinschaft I. (Hrsg.): Hinweise zur Ermittlung und Beurteilung der optischen Immissionen von Windkraftanlagen Aktualisierung 2019 (WKA-Schattenwurfhinweise). 2020

[MaS21] MaStR: Marktstammdatenregister. `https://www.marktstammdatenregister.de/MaStR`. Version: 2021

A Kalender der Gesamtbelastung pro SR

Nachfolgend ist der Kalender der 96 untersuchten Schattenrezeptoren mit den Schattenzeiten über das gesamte Jahr dargestellt.

WEA Legende

Tabellen-ID	WEA-ID
0	WEA 1
1	WEA 2
2	WEA 3
3	WEA 4
4	WEA 5
5	WEAVB001 WEA 01
6	WEAVB002 WEA 02
7	WEAVB003 WEA 03
8	WEAVB004 WEA 04
9	WEAVB005 WEA 05
10	WEAVB006 WEA 06
11	WEAVB007 WEA 07
12	WEAVB008 WEA 08
13	WEAVB009 WEA 09
14	WEAVB010 WEA 10
15	WEAVB011 WEA 11
16	WEAVB012 WEA 12
17	WEAVB013 WEA 2
18	WEAVB014 WEA 5
19	WEAVB015 WEA 8
20	WEAVB016 WEA 10
21	WEAVB020 WEA 13
22	WEAVB021 WEA 14
23	WEAVB022 WEA 01 - Pot 1
24	WEAVB023 WEA 02 - Pot 1
25	WEAVB024 WEA 09-Pot 1
26	WEAVB025 WEA 10-Pot 1
27	WEAVB026 WEA 11-Pot 1

Tabelle A.1: Fortsetzung: WEA Legende

Tabellen-ID	WEA-ID
28	WEAVB039 WEA K 03
29	WEAVB040 WEA K 04
30	WEAVB041 WEA K 05
31	WEAVB042 WEA K 07
32	WEAVB043 WEA K 08
33	WEAVB044 WEA M 06
34	WEAVB063 WEA 10
35	WEAVB064 WEA 11
36	WEAVB065 WEA 01
37	WEAVB066 WEA 02
38	WEAVB067 WEA 03
39	WEAVB068 WEA 04
40	WEAVB069 WEA 05
41	WEAVB070 WEA 06
42	WEAVB071 WEA 07
43	WEAVB072 WEA 08
44	WEAVB073 WEA 09
45	WEAVB074 WEA 1
46	WEAVB075 WEA 2
47	WEAVB076 WEA 3
48	WEAVB077 WEA 4
49	WEAVB082
50	WEAVB083 W3
51	WEAVB084 W2
52	WEAVB085
53	WEAVB089 WEA 4
54	WEAVB090 WEA 02
55	WEAVB091 WEA 03
56	WEAVB092 WEA 04
57	WEAVB093 WEA 05
58	WEAVB094 WEA 06
59	WEAVB095 WEA 07
60	WEAVB096 WEA 08
61	WEAVB097 WEA 09

Tabelle A.1: Fortsetzung: WEA Legende

Tabellen-ID	WEA-ID
62	WEAVB098 WEA 03 - Pot 1
63	WEAVB099 WEA 04 - Pot 1
64	WEAVB100 WEA 05 - Pot 1
65	WEAVB103 WEA S 04
66	WEAVB105 WEA M 09
67	WEAVB106 WEA M 10
68	WEAVB107 WEA M 11
69	WEAVB110 WEA M 02
70	WEAVB112 WEA M 04
71	WEAVB113 WEA M 05
72	WEAVB114 WEA M 07
73	WEAVB115 WEA M 08
74	WEAVB116 WEA 11
75	WEAVB117 WEA 8
76	WEAVB118 WEA 9
77	WEAVB119 WEA 10
78	WEAVB120 WEA 9
79	WEAVB121 WEA 7
80	WEAVB122 WEA M 01
81	WEAVB123 WEA M 03
82	WEAVB124 WEA S 01/1
83	WEAVB125 WEA K 01
84	WEAVB126 WEA 0.5 - Pot 2

Tabelle A.1: Fortsetzung: WEA Legende

Tabellen-ID	WEA-ID
85	WEAVB127 WEA 01 - Pot 2
86	WEAVB128 WEA 02 - Pot 2
87	WEAVB129 WEA K 10
88	WEAVB130 WEA 06 - Pot 1
89	WEAVB131 WEA 07 - Pot 1
90	WEAVB132 WEA 08 - Pot 1
91	WEAVB133 WEA 14 - Pot 1
92	WEAVB134 WEA 13 - Pot 1
93	WEAVB135 9997023
94	WEAVB136 9997024
95	WEAVB137 9997025
96	WEAVB138 9997026
97	WEAVB139 8194986.8
98	WEAVB140 8194986.1
99	WEAVB141 8194986.2
100	WEAVB142 8194986.3

Erklärung der nachfolgenden SR Schattenkalender Tabellen

	Monat		
Tag im Monat	Sonnenaufgang (HH:MM)		Erster Schattenwurf einer WEA (HH:MM - Tabellen-ID)
	Sonnenuntergang (HH:MM)	Schattenminuten	Letzter Schattenwurf einer WEA (HH:MM - Tabellen-ID)
.			

Tabelle A.2: Fortsetzung: Erklärung der nachfolgenden SR Schattenkalender Tabellen

	Monat
. .	
Sonne [h]	Monatliche Sonnenstunden
Schatten [min]	Monatliche Summe der Schattenminuten

An einem Tag können mehrere Schattenzeiträume entstehen. Bei diesen wurde der erste und letzte Zeitstempel gewählt. Dadurch sind die Schattenwurfzeiten nicht immer durchgängig und die Summe der Schattenminuten kann entsprechend abweichen.

Gesamtbelastung Schattenrezeptor: SR-001, (In der Sierpke 17, Sundern (Sauerland))

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
1	08:33		08:07		07:15		07:05	08:22-2	06:02	07:27-1	05:19		05:16		05:52		06:41		07:28		07:20		08:10	
	16:30	0	17:17	0	18:08	0	20:00	23 08:44-2	20:49	27 07:53-1	21:34	0	21:48	0	21:17	0	20:17	0	19:08	0	17:04	0	16:25	0
2	08:33		08:05		07:13		07:03	08:21-2	06:00	07:27-1	05:18		05:17		05:54		06:42		07:30		07:22		08:12	
	16:31	0	17:19	0	18:09	0	20:01	23 08:43-2	20:51	26 07:52-1	21:35	0	21:48	0	21:16	0	20:15	0	19:06	0	17:02	0	16:24	0
3	08:33		08:04		07:10		07:01	08:21-2	05:58	07:28-1	05:17		05:18		05:55		06:44		07:31		07:24		08:13	
	16:32	0	17:21	0	18:11	0	20:03	23 08:43-2	20:53	25 07:52-1	21:36	0	21:47	0	21:14	0	20:13	0	19:04	0	17:00	0	16:24	0
4	08:33		08:02		06:58		06:58	08:21-2	05:56	07:28-1	05:16		05:18		05:57	07:44-1	06:46		06:23-2	07:33	0	07:26		08:14	
	16:34	0	17:22	0	18:13	0	20:05	22 08:42-2	20:54	24 07:51-1	21:37	0	21:47	0	21:12	10 07:53-1	20:10	10	08:32-2	19:02	0	16:58	0	16:23	0
5	08:32		08:01		06:56		06:56	08:22-2	05:55	07:29-1	05:16		05:19		05:58	07:42-1	06:47		08:20-2	07:35	0	07:28		08:16	
	16:35	0	17:24	0	18:15	0	20:06	20 08:41-2	20:56	22 07:50-1	21:38	0	21:46	0	21:11	14 07:55-1	20:08	15	08:34-2	18:59	0	16:57	0	16:23	0
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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		108		441		185		0		0		468		272		0		0		0	

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engineering@noxt.de · 20. August 2025

Gesamtbelastung Schattenrezeptor: SR-002, (In der Sierpke 15, Sundern (Sauerland))

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
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	17:01	0	17:57	0	18:45	0	20:36	25	07:56-1	21:23	0	21:49	0	21:30	0	20:36	19	07:57-1	19:27	0	18:21	0	16:32	0	16:23	0
24	08:18		07:25		06:23		06:15		07:31-1	05:26		05:13		05:41		06:28		07:40-1	07:17		08:06		08:00		08:32	
	17:03	0	17:59	0	18:47	0	20:38	26	07:56-1	21:24	0	21:49	0	21:29	0	20:34	16	07:55-1	19:25	0	18:19	0	16:31	0	16:24	0
25	08:17		07:23		06:21		06:13		07:30-1	05:25		05:13		05:42		06:30		07:42-1	07:19		08:08		08:01		08:32	
	17:05	0	18:01	0	18:48	8	07:40-2	20:39	27	07:56-1	21:26	0	21:49	0	21:28	0	20:32	12	07:53-1	19:22	0	18:17	0	16:30	0	16:24	0
26	08:15		07:21		07:19		08:30-2	06:11		05:24		05:14		05:43		06:31		07:20			08:10		08:03		08:33	
	17:06	0	18:02	0	19:50	14	08:43-2	20:41	27	07:56-1	21:27	0	21:49	0	21:26	0	20:30	0	19:20	0	18:15	0	16:29	0	16:25	0
27	08:14		07:19		07:16		08:28-2	06:09		07:30-1	05:23		05:14		05:45		06:33		07:22		08:12		08:05		08:33	
	17:08	0	18:04	0	19:51	17	08:44-2	20:43	27	07:56-1	21:28	0	21:49	0	21:25	0	20:28	0	19:18	0	18:13	0	16:28	0	16:26	0
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	17:10	0	18:06	0	19:53	19	08:45-2	20:44	28	07:56-1	21:30	0	21:49	0	21:23	0	20:26	0	19:15	0	18:11	0	16:27	0	16:26	0
29	08:11				07:12		08:25-2	06:06		07:29-1	05:21		05:15		05:48		06:36		07:25		07:15		08:08		08:33	
	17:12	0			19:55	22	08:46-2	20:46	28	07:56-1	21:31	0	21:48	0	21:22	0	20:24	0	19:13	0	17:09	0	16:26	0	16:27	0
30	08:10				07:10		08:25-2	06:04		07:29-1	05:20		05:16		05:49		06:38		07:26		07:17		08:09		08:33	
	17:13	0			19:56	22	08:46-2	20:48	27	07:55-1	21:32	0	21:48	0	21:20	0	20:21	0	19:11	0	17:07	0	16:25	0	16:28	0
31	08:08				07:07		08:24-2				05:19				05:51		06:39				07:19				08:33	
	17:15	0			19:58	23	08:46-2				21:33	0			21:19	0	20:19	0			17:05	0			16:29	0
Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		125		446		156		0		0		466		269		0		0		0	

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-003, (In der Sierpke 19, Sundern)

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
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3	08:33		08:04		07:10		07:01		05:58		07:23-1	05:17		05:18		05:55		07:38-1	06:44	07:31		07:24		08:13	
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	16:47	0	17:41	0	18:30	0	20:21	0	21:10	0		21:45	0	21:40	0	20:54	28	07:58-1	19:48	18:40	0	16:43	0	16:21	0
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	16:51	0	17:46	0	18:35	0	20:26	0	21:15	0		21:47	0	21:37	0	20:49	25	07:56-1	19:41	18:33	0	16:39	0	16:21	0
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21	08:21		07:31		06:30		06:21		07:33-1		05:30		05:12		05:37		06:23		07:35-1	07:12	08:01		07:55		08:30	
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	17:03	0	17:59	0	18:47	0	20:38	23	07:49-1	0	21:24	0	21:49	0	21:29	0	20:34	0	19:25	0	18:19	0	16:31	0	16:24	0
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27	08:14		07:19		07:16		06:09		07:25-1		05:23		05:14		05:45		06:33		07:22		08:12		08:05		08:33	
	17:08	0	18:04	0	19:51	0	20:43	26	07:50-1	0	21:28	0	21:49	0	21:25	0	20:28	0	19:18	0	18:13	0	16:28	0	16:26	0
28	08:13		07:17		07:14		06:07		07:24-1		05:22		05:15		05:46		06:35		07:23		08:13		08:06		08:33	
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29	08:11				07:12		06:06		07:24-1		05:21		05:15		05:48		06:36		07:25		08:08		08:08		08:33	
	17:12	0			19:55	0	20:46	27	07:50-1		21:31	0	21:48	0	21:22	0	20:24	0	19:13	0	17:09	0	16:26	0	16:27	0
30	08:10				07:10		06:04		07:23-1		05:20		05:16		05:49		06:38		07:26		07:17		08:09		08:33	
	17:13	0			19:56	0	20:48	28	07:50-1		21:32	0	21:48	0	21:20	0	20:21	0	19:11	0	17:07	0	16:25	0	16:28	0
31	08:08				07:07						05:19				05:51		06:39				07:19				08:33	
	17:15	0			19:58	0					21:33	0			21:19	0	20:19	0			17:05	0			16:29	0
Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		0		232		241		0		0		479		0		0		0		0	

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Gesamtbelastung Schattenrezeptor: SR-004, (In der Sierpke 13, Sundern (Sauerland))

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
1	08:33		08:07		07:15		07:05	08:25-2	06:02	07:32-1	05:19		05:16		05:52		06:41		07:28		07:20		08:10	
	16:30	0	17:17	0	18:08	0	20:00	23 08:47-2	20:49	25 07:56-1	21:34	0	21:48	0	21:17	0	20:17	0	19:08	0	17:04	0	16:25	0
2	08:33		08:05		07:13		07:03	08:25-2	06:00	07:33-1	05:18		05:17		05:54		06:42		07:30		07:22		08:12	
	16:31	0	17:19	0	18:09	0	20:01	23 08:47-2	20:51	23 07:55-1	21:35	0	21:48	0	21:16	0	20:15	0	19:06	0	17:02	0	16:24	0
3	08:33		08:04		07:10		07:01	08:26-2	05:58	07:33-1	05:17		05:18		05:55		06:44		07:31		07:24		08:13	
	16:32	0	17:21	0	18:11	0	20:03	21 08:46-2	20:53	22 07:54-1	21:36	0	21:47	0	21:14	0	20:13	0	19:04	0	17:00	0	16:24	0
4	08:33		08:02		07:08		06:58	08:26-2	05:56	07:34-1	05:16		05:18		05:57		06:46		07:33		07:26		08:14	
	16:34	0	17:22	0	18:13	0	20:05	20 08:45-2	20:54	20 07:53-1	21:37	0	21:47	0	21:12	0	20:10	0	19:02	0	16:58	0	16:23	0
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8	08:31		07:56		06:59		06:49		05:49		05:14		05:22		06:03		07:44-1	06:52	08:21-2	07:39		07:33		08:19	
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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		143		451		131		0		0		465		271		0		0		0	

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engineering@noxt.de · 20. August 2025

noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-005, (Am Hüttenberg 2, Sundern (Sauerland))

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
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29	08:11				07:12		08:29-2	06:06	07:36-1	05:21		05:15		05:48		06:36		07:25		07:15		08:08		08:33	
	17:12	0			19:55	23 08:51-2	20:46	25 08:00-1	21:31	0	21:48	0	21:22	0	20:24	0	19:13	0	17:09	0	16:26	0	16:27	0
30	08:10				07:10		08:29-2	06:04	07:36-1	05:20		05:16		05:49		06:38		07:26		07:17		08:09		08:33	
	17:13	0			19:56	23 08:51-2	20:48	24 07:59-1	21:32	0	21:48	0	21:20	0	20:21	0	19:11	0	17:07	0	16:25	0	16:28	0
31	08:08				07:07		08:29-2		05:19				05:51		06:39				07:19				08:33	
	17:15	0			19:58	22 08:50-2			21:33	0			21:19	0	20:19	0			17:05	0			16:29	0
Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		174		461		79		0		0		458		272		0		0		0

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-006, (In der Sierpke 21, Sundern (Sauerland))

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
1	08:33		08:07		07:15		07:05		06:02		05:19		05:16		05:52		06:41		07:28		07:20		08:10	
	16:30	0	17:17	0	18:08	0	20:00	0	20:49	28	21:34	0	21:48	0	21:17	15	20:17	0	19:08	0	17:04	0	16:25	0
2	08:33		08:05		07:13		07:03		06:00		05:18		05:17		05:54		06:42		07:30		07:22		08:12	
	16:31	0	17:19	0	18:09	0	20:01	0	20:51	27	21:35	0	21:48	0	21:16	17	20:15	0	19:06	0	17:02	0	16:24	0
3	08:33		08:04		07:10		07:01		05:58		05:17		05:18		05:55		06:44		07:31		07:24		08:13	
	16:32	0	17:21	0	18:11	0	20:03	0	20:53	27	21:36	0	21:47	0	21:14	19	20:13	0	19:04	0	17:00	0	16:24	0
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5	08:32		08:01		07:06		06:56		05:55		05:16		05:19		05:58		06:47		07:35		07:28		08:16	
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6	08:32		07:59		07:04		06:54		05:53		05:15		05:20		06:00		06:49		07:36		07:29		08:17	
	16:36	0	17:26	0	18:16	0	20:08	0	20:57	26	21:39	0	21:46	0	21:09	25	20:06	0	18:57	0	16:55	0	16:22	0
7	08:32		07:57		07:02		06:52		05:51		05:15		05:21		06:01		06:50		07:38		07:31		08:18	
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	16:38	0	17:30	0	18:20	0	20:11	0	21:01	23	21:41	0	21:45	0	21:06	26	20:01	0	18:53	0	16:52	0	16:21	0
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	16:40	0	17:32	0	18:21	0	20:13	0	21:02	22	21:42	0	21:44	0	21:04	28	19:59	0	18:50	0	16:50	0	16:21	0
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	16:41	0	17:33	0	18:23	0	20:15	0	21:04	19	21:43	0	21:43	0	21:02	28	19:57	0	18:48	0	16:49	0	16:21	0
11	08:30		07:50		06:53		06:43		05:44		05:13		05:25		06:08		06:57		07:44		07:38		08:23	
	16:42	0	17:35	0	18:25	0	20:16	0	21:05	17	21:43	0	21:43	0	21:00	28	19:55	0	18:46	0	16:47	0	16:21	0
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	16:44	0	17:37	0	18:26	0	20:18	0	21:07	15	21:44	0	21:42	0	20:58	28	19:52	0	18:44	0	16:46	0	16:21	0
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	16:45	0	17:39	0	18:28	0	20:20	0	21:09	10	07:37-1	21:45	0	21:41	0	20:56	27	07:55-1	19:50	0	18:42	0	16:44	0	16:21	0
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	16:47	0	17:41	0	18:30	0	20:21	0	21:10	0	21:45	0	21:40	0	20:54	27	07:55-1	19:48	0	18:40	0	16:43	0	16:21	0
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	16:48	0	17:43	0	18:32	0	20:23	0	21:12	0	21:46	0	21:39	0	20:53	26	07:54-1	19:45	0	18:37	0	16:41	0	16:21	0
16	08:26		07:41		06:42		06:32		05:37		05:12		05:30		06:15		07:04		07:53		07:47		08:27	
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	16:51	0	17:46	0	18:35	0	20:26	0	21:15	0	21:47	0	21:37	0	20:49	24	07:53-1	19:41	0	18:33	0	16:39	0	16:21	0
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	16:53	0	17:48	0	18:37	0	20:28	0	21:16	0	21:47	0	21:36	0	20:47	22	07:52-1	19:38	0	18:31	0	16:37	0	16:21	0
19	08:23		07:35		06:35		06:26		05:33		05:12		05:34		06:20		07:09		07:58		07:52		08:29	
	16:55	0	17:50	0	18:38	0	20:29	0	21:18	0	21:48	0	21:35	0	20:45	19	07:50-1	19:36	0	18:29	0	16:36	0	16:21	0
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	16:58	0	17:53	0	18:42	0	20:33	0	21:20	0	21:48	0	21:33	0	20:41	12	07:46-1	19:31	0	18:25	0	16:34	0	16:22	0
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23	08:19		07:27		06:26		06:17		07:28-1	05:28		05:13		05:39		06:27		07:15		08:05		07:58		08:31	
	17:01	0	17:57	0	18:45	0	20:36	16	07:43-1	21:23	0	21:49	0	21:30	0	20:36	0	19:27	0	18:21	0	16:32	0	16:23	0
24	08:18		07:25		06:23		06:15		07:26-1	05:26		05:13		05:41		06:28		07:17		08:06		08:00		08:32	
	17:03	0	17:59	0	18:47	0	20:38	20	07:45-1	21:24	0	21:49	0	21:29	0	20:34	0	19:25	0	18:19	0	16:31	0	16:24	0
25	08:17		07:23		06:21		06:13		07:25-1	05:25		05:13		05:42		06:30		07:19		08:08		08:01		08:32	
	17:05	0	18:01	0	18:48	0	20:39	22	07:46-1	21:26	0	21:49	0	21:28	0	20:32	0	19:22	0	18:17	0	16:30	0	16:24	0
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27	08:14		07:19		07:16		06:09		07:23-1	05:23		05:14		05:45		06:33		07:22		08:12		08:05		08:34	
	17:08	0	18:04	0	19:51	0	20:43	25	07:47-1	21:28	0	21:49	0	21:25	0	20:28	0	19:18	0	18:13	0	16:28	0	16:26	0
28	08:13		07:17		07:14		06:07		07:22-1	05:22		05:15		05:46		06:35		07:23		08:13		08:06		08:33	
	17:10	0	18:06	0	19:53	0	20:44	26	07:47-1	21:30	0	21:49	0	21:23	0	20:26	0	19:15	0	18:11	0	16:27	0	16:26	0
29	08:11				07:12		06:06		07:22-1	05:21		05:15		05:48		06:36		07:25		07:15		08:08		08:33	
	17:12	0			19:55	0	20:46	27	07:48-1	21:31	0	21:48	0	21:22	0	20:24	0	19:13	0	17:09	0	16:26	0	16:27	0
30	08:10				07:10		06:04		07:21-1	05:20		05:16		05:49		06:38		07:26		07:17		08:09		08:33	
	17:13	0			19:56	0	20:48	28	07:48-1	21:32	0	21:48	0	21:20	0	20:21	0	19:11	0	17:07	0	16:25	0	16:28	0
31	08:08				07:07					05:19				05:51		07:38-1	06:39			07:19				08:33	
	17:15	0			19:58	0				21:33	0			21:19	11	07:48-1	20:19	0		17:05	0			16:29	0
Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		198		291		0		11		483		0		0		0		0

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Gesamtbelastung Schattenrezeptor: SR-007, (Am Hüttenberg 2a, Sundern)

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
1	08:33		08:07		07:15		07:05	08:28-2	06:02	07:35-1	05:19		05:16		05:52		06:41		07:28		07:20		08:10	
	16:30	0	17:17	0	18:08	0	20:00	22 08:49-2	20:49	24 07:58-1	21:34	0	21:48	0	21:17	0	20:17	0	19:08	0	17:04	0	16:25	0
2	08:33		08:05		07:13		07:03	08:28-2	06:00	07:36-1	05:18		05:17		05:54		06:42		07:30		07:22		08:12	
	16:31	0	17:19	0	18:09	0	20:01	21 08:48-2	20:51	22 07:57-1	21:35	0	21:48	0	21:16	0	20:15	0	19:06	0	17:02	0	16:24	0
3	08:33		08:04		07:10		07:01	08:28-2	05:58	07:36-1	05:17		05:18		05:55		06:44		07:31		07:24		08:13	
	16:32	0	17:21	0	18:11	0	20:03	20 08:47-2	20:53	21 07:56-1	21:36	0	21:47	0	21:14	0	20:13	0	19:04	0	17:00	0	16:24	0
4	08:33		08:02		07:08		06:58	08:29-2	05:56	07:38-1	05:16		05:18		05:57		06:46		07:33		07:26		08:14	
	16:34	0	17:22	0	18:13	0	20:05	18 08:46-2	20:54	17 07:54-1	21:37	0	21:47	0	21:12	0	20:10	0	19:02	0	16:58	0	16:23	0
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	16:35	0	17:24	0	18:15	0	20:06	15 08:44-2	20:56	14 07:52-1	21:38	0	21:46	0	21:11	0	20:08	0	18:59	0	16:57	0	16:23	0
6	08:32		07:59		07:04		06:54	08:33-2	05:53	07:41-1	05:15		05:20		06:00		06:49		07:29		07:29		08:17	
	16:36	0	17:26	0	18:16	0	20:08	9 08:41-2	20:57	10 07:50-1	21:39	0	21:46	0	21:09	0	20:06	7	18:57	0	16:55	0	16:22	0
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	16:37	0	17:28	0	18:18	0	20:10	0	20:59	0	21:45	0	21:45	0	21:07	9 07:59-1	20:04	12	18:55	0	16:53	0	16:22	0
8	08:31		07:56		06:59		06:49		05:49		05:14		05:22		06:03	07:48-1	06:52		07:39		07:33		08:19	
	16:38	0	17:30	0	18:20	0	20:11	0	21:01	0	21:41	0	21:45	0	21:06	14 08:01-1	20:01	17	18:53	0	16:52	0	16:21	0
9	08:31		07:54		06:57		06:47		05:48		05:14		05:23		06:04	07:46-1	06:53		07:41		07:35		08:20	
	16:40	0	17:32	0	18:21	0	20:13	0	21:02	0	21:42	0	21:44	0	21:04	18 08:03-1	19:59	19	18:50	0	16:50	0	16:21	0
10	08:30		07:52		06:55		06:45		05:46		05:13		05:24		06:06	07:45-1	06:55		07:36		07:36		08:22	
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12	08:29		07:49		06:51		06:41		05:43		05:13		05:26		06:09	07:43-1	06:58		07:46		07:40		08:24	
	16:44	0	17:37	0	18:26	0	20:18	0	21:07	0	21:44	0	21:42	0	20:58	24 08:06-1	19:52	23	18:44	0	16:46	0	16:21	0
13	08:28		07:47		06:48		06:38		05:41		05:12		05:27		06:11	07:42-1	07:00		07:48		07:42		08:25	
	16:45	0	17:39	0	18:28	0	20:20	0	21:09	0	21:45	0	21:41	0	20:56	25 08:06-1	19:50	23	18:42	0	16:44	0	16:21	0
14	08:28		07:45		06:46		06:36		05:40		05:12		05:28		06:12	07:41-1	07:01		07:49		07:43		08:25	
	16:47	0	17:41	0	18:30	0	20:21	0	21:10	0	21:45	0	21:40	0	20:54	27 08:07-1	19:48	24	18:40	0	16:43	0	16:21	0
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16	08:26		07:41		06:42		07:46-1	05:37			05:12		05:30		06:15	07:41-1	07:04		08:19-2	07:53	07:47		08:27	
	16:50	0	17:44	0	18:33	0	20:25	8 07:53-1	21:13	0	21:46	0	21:38	0	20:51	27 08:07-1	19:43	22	18:40	0	16:40	0	16:21	0
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18	08:24		07:37		06:37		06:28	07:40-1	05:34		05:12		05:33		06:19	07:40-1	07:07		08:21-2	07:56	07:50		08:29	
	16:53	0	17:48	0	18:37	0	20:28	19 07:58-1	21:16	0	21:47	0	21:36	0	20:47	28 08:07-1	19:38	18	18:38-2	18:31	16:37	0	16:21	0
19	08:23		07:35		06:35		06:26	07:39-1	05:33		05:12		05:34		06:20	07:40-1	07:09		08:22-2	07:58	07:52		08:29	
	16:55	0	17:50	0	18:38	0	20:29	21 07:59-1	21:18	0	21:48	0	21:35	0	20:45	28 08:07-1	19:36	15	18:36-2	18:29	16:36	0	16:21	0
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	16:58	0	17:53	0	18:42	0	20:33	25 08:00-1	21:20	0	21:48	0	21:33	0	20:41	27 08:06-1	19:31	0	18:25	0	16:34	0	16:22	0
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	17:00	0	17:55	0	18:43	0	20:34	26 08:01-1	21:22	0	21:48	0	21:32	0	20:38	26 08:05-1	19:29	0	18:23	0	16:33	0	16:23	0
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	17:01	0	17:57	0	18:45	6 07:44-2	20:36	27 08:01-1	21:23	0	21:49	0	21:30	0	20:36	24 08:04-1	19:27	0	18:21	0	16:32	0	16:23	0
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	17:03	0	17:59	0	18:47	13 07:47-2	20:38	28 08:01-1	21:24	0	21:49	0	21:29	0	20:34	22 08:03-1	19:25	0	18:19	0	16:31	0	16:24	0
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	17:08	0	18:04	0	19:51	21 08:50-2	20:43	27 08:00-1	21:28	0	21:49	0	21:25	0	20:28	10 07:56-1	19:18	0	18:13	0	16:28	0	16:26	0
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	17:10	0	18:06	0	19:53	23 08:51-2	20:44	27 08:00-1	21:30	0	21:49	0	21:23	0	20:26	0	19:15	0	18:11	0	16:27	0	16:26	0
29	08:11				07:12		08:29-2	06:06	07:34-1	05:21			05:15		05:48		06:36		07:25		07:15		08:33	
	17:12	0			19:55	23 08:51-2	20:46	26 07:59-1	21:31	0	21:48	0	21:22	0	20:24	0	19:13	0	17:09	0	16:26	0	16:27	0
30	08:10				07:10		08:28-2	06:04	07:34-1	05:20			05:16		05:49		06:38		07:26		07:17		08:33	
	17:13	0			19:56	23 08:50-2	20:48	26 07:59-1	21:32	0	21:48	0	21:20	0	20:21	0	19:11	0	17:07	0	16:25	0	16:28	0
31	08:08				07:07		08:28-2		05:19				05:51		06:39				07:19				08:33	
	17:15	0			19:58	23 08:50-2			21:33	0			21:19	0	20:19	0			17:05	0			16:29	0
Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		168		459		108		0		0		468		276		0		0		0	

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Gesamtbelastung Schattenrezeptor: SR-008, (Am Hüttenberg 1, Sundern (Sauerland))

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
1	08:33		08:07		07:15		07:05	08:32-2	06:02		05:19		05:16		05:52		06:41		07:28		07:20		08:10	
	16:30	0	17:17	0	18:08	0	20:00	20 08:51-2	20:49	0	21:34	0	21:48	0	21:17	0	20:17	0	19:08	0	17:04	0	16:25	0
2	08:33		08:05		07:13		07:03	08:33-2	06:00		05:18		05:17		05:54		06:42		07:30		07:22		08:12	
	16:31	0	17:19	0	18:09	0	20:01	18 08:50-2	20:51	0	21:35	0	21:48	0	21:16	0	20:15	0	19:06	0	17:02	0	16:24	0
3	08:33		08:04		07:10		07:01	08:34-2	05:58		05:17		05:18		05:55		06:44		07:31		07:24		08:13	
	16:32	0	17:21	0	18:11	0	20:03	15 08:48-2	20:53	0	21:36	0	21:47	0	21:14	0	20:13	0	19:04	0	17:00	0	16:24	0
4	08:33		08:02		07:08		06:58	08:36-2	05:56		05:16		05:18		05:57		06:46		07:33		07:26		08:14	
	16:34	0	17:22	0	18:13	0	20:05	10 08:45-2	20:54	0	21:37	0	21:47	0	21:12	0	20:10	0	19:02	0	16:58	0	16:23	0
5	08:32		08:01		07:06		06:56		05:55		05:16		05:19		05:58		06:47		07:35		07:28		08:16	
	16:35	0	17:24	0	18:15	0	20:06	0	20:56	0	21:38	0	21:46	0	21:11	0	20:08	0	18:59	0	16:57	0	16:23	0
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	16:36	0	17:26	0	18:16	0	20:08	0	20:57	0	21:39	0	21:46	0	21:09	0	20:06	0	18:57	0	16:55	0	16:22	0
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	16:37	0	17:28	0	18:18	0	20:10	0	20:59	0	21:40	0	21:45	0	21:07	0	20:04	0	18:55	0	16:53	0	16:22	0
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9	08:31		07:54		06:57		06:47		05:48		05:14		05:23		06:04		06:53		08:29-2		07:35		08:20	
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10	08:30		07:52		06:55		06:45		05:46		05:13		05:24		06:06		06:55		08:27-2		07:36		08:22	
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	16:44	0	17:37	0	18:26	0	20:18	0	21:07	0	21:44	0	21:42	0	20:58	0	19:52	21	08:44-2		16:46	0	16:21	0
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	16:45	0	17:39	0	18:28	0	20:20	0	21:09	0	21:45	0	21:41	0	20:56	0	19:50	23	08:45-2		16:44	0	16:21	0
14	08:28		07:45		06:46		06:36		05:40		05:12		05:28		06:12		07:01		08:23-2		07:43		08:25	
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	16:48	0	17:43	0	18:32	0	20:23	0	21:12	0	21:46	0	21:39	0	20:53	0	19:45	23	08:44-2		16:41	0	16:21	0
16	08:26		07:41		06:42		06:32		05:37		05:12		05:30		06:15		07:04		08:22-2		07:47		08:27	
	16:50	0	17:44	0	18:33	0	20:25	0	21:13	0	21:46	0	21:38	0	20:51	0	19:43	23	08:44-2		16:40	0	16:21	0
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	16:51	0	17:46	0	18:35	0	20:26	0	21:15	0	21:47	0	21:37	0	20:49	0	19:41	22	08:43-2		16:39	0	16:21	0
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19	08:23		07:35		06:35		06:26		05:33		05:12		05:34		06:20		07:09		08:22-2		07:52		08:29	
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22	08:20		07:29		06:28		07:40-2	06:19		05:29		05:12		05:38		06:25		07:14		08:27-2		07:57		08:31	
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23	08:19		07:27		06:26		07:37-2	06:17		05:28		05:13		05:39		06:27		07:15		08:05		07:58		08:31	
	17:01	0	17:57	0	18:45	16	07:52-2	20:36	0	21:23	0	21:49	0	21:30	0	20:36	0	19:27	0	18:21	0	16:32	0	16:23	0
24	08:18		07:25		06:23		07:36-2	06:15		05:26		05:13		05:41		06:28		07:17		08:06		08:00		08:32	
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	17:05	0	18:01	0	18:48	21	07:54-2	20:39	0	21:26	0	21:49	0	21:28	0	20:32	0	19:22	0	18:17	0	16:30	0	16:24	0
26	08:15		07:21		07:19		08:33-2	06:11		05:24		05:14		05:43		06:31		07:20		08:10		08:03		08:33	
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	17:08	0	18:04	0	19:51	22	08:54-2	20:43	0	21:28	0	21:49	0	21:25	0	20:28	0	19:18	0	18:13	0	16:28	0	16:26	0
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	17:10	0	18:06	0	19:53	23	08:54-2	20:44	0	21:30	0	21:49	0	21:23	0	20:26	0	19:15	0	18:11	0	16:27	0	16:26	0
29	08:11				07:12		08:32-2	06:06		05:21		05:15		05:48		06:36		07:25		07:15		08:08		08:33	
	17:12	0			19:55	23	08:54-2	20:46	0	21:31	0	21:48	0	21:22	0	20:24	0	19:13	0	17:09	0	16:26	0	16:27	0
30	08:10				07:10		08:32-2	06:04		05:20		05:16		05:49		06:38		07:26		07:17		08:09		08:33	
	17:13	0			19:56	22	08:53-2	20:48	0	21:32	0	21:48	0	21:20	0	20:21	0	19:11	0	17:07	0	16:25	0	16:28	0
31	08:08				07:07		08:32-2			05:19				05:51		06:39				07:19				08:33	
	17:15	0			19:58	21	08:52-2			21:33	0			21:19	0	20:19	0			17:05	0			16:29	0
Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		202		63		0		0		0		0		277		0		0		0	

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Gesamtbelastung Schattenrezeptor: SR-009, (Am Hüttenberg 4, Sundern (Sauerland))

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
1	08:33		08:07		07:15		07:05	08:26-2	06:02	07:31-1	05:19		05:16		05:52		06:41		07:28		07:20		08:10	
	16:30	0	17:17	0	18:08	0	20:00	23 08:48-2	20:49	27 07:57-1	21:34	0	21:48	0	21:17	0	20:17	0	19:08	0	17:04	0	16:25	0
2	08:33		08:05		07:13		07:03	08:26-2	06:00	07:32-1	05:18		05:17		05:54		06:42		07:30		07:22		08:12	
	16:31	0	17:19	0	18:09	0	20:01	23 08:48-2	20:51	25 07:56-1	21:35	0	21:48	0	21:16	0	20:15	0	19:06	0	17:02	0	16:24	0
3	08:33		08:04		07:10		07:01	08:26-2	05:58	07:32-1	05:17		05:18		05:55		06:44		07:31		07:24		08:13	
	16:32	0	17:21	0	18:11	0	20:03	22 08:47-2	20:53	24 07:55-1	21:36	0	21:47	0	21:14	0	20:13	0	19:04	0	17:00	0	16:24	0
4	08:33		08:02		07:08		06:58	08:27-2	05:56	07:33-1	05:16		05:18		05:57		06:46		07:33		07:26		08:14	
	16:34	0	17:22	0	18:13	0	20:05	20 08:46-2	20:54	22 07:54-1	21:37	0	21:47	0	21:12	0	20:10	0	19:02	0	16:58	0	16:23	0
5	08:32		08:01		07:06		06:56	08:27-2	05:55	07:34-1	05:16		05:19		05:58		06:47		07:35		07:28		08:16	
	16:35	0	17:24	0	18:15	0	20:06	18 08:44-2	20:56	20 07:53-1	21:38	0	21:46	0	21:11	8	07:56-1	20:08	7 08:35-2	18:59	0	16:57	0	16:23	0
6	08:32		07:59		07:04		06:54	08:29-2	05:53	07:35-1	05:15		05:20		06:00		07:46-1	06:49	08:25-2	07:36	0	16:55	0	08:17	
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7	08:32		07:57		07:02		06:52	08:31-2	05:51	07:37-1	05:15		05:21		06:01		07:44-1	06:50	08:23-2	07:38	0	07:31	0	08:18	
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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		150		454		159		0		0		489		283		0		0		0	

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-010, (Am Hüttenberg 5, Sundern)

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
1	08:33		08:07		07:15		07:05	08:29-2	06:02	07:36-1	05:19		05:16		05:52		06:41		07:28		07:20		08:10	
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	17:06	0	18:02	0	19:50	21 08:52-2	20:41	28 08:02-1	21:27	0	21:49	0	21:26	0	20:30	18 08:01-1	19:20	0	18:15	0	16:29	0	16:25	0
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	17:08	0	18:04	0	19:51	22 08:52-2	20:43	27 08:01-1	21:28	0	21:49	0	21:25	0	20:28	14 07:59-1	19:18	0	18:13	0	16:28	0	16:26	0
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	17:10	0	18:06	0	19:53	23 08:52-2	20:44	27 08:01-1	21:30	0	21:49	0	21:23	0	20:26	7 07:55-1	19:15	0	18:11	0	16:27	0	16:26	0
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	17:12	0			19:55	23 08:52-2	20:46	26 08:00-1	21:31	0	21:48	0	21:22	0	20:24	0	19:13	0	17:09	0	16:26	0	16:27	0
30	08:10				07:10		08:29-2	06:04	07:35-1	05:20	05:16		05:49		06:38		07:26		07:17		08:09		08:33	
	17:13	0			19:56	24 08:52-2	20:48	25 07:59-1	21:32	0	21:48	0	21:20	0	20:21	0	19:11	0	17:07	0	16:25	0	16:28	0
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	17:15	0			19:58	23 08:51-2			21:33	0			21:19	0	20:19	0			17:05	0			16:29	0
Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		183		461		98		0		0		480		283		0		0		0	

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-011, (Am Hüttenberg 3, Sundern (Sauerland))

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
1	08:33		08:07		07:15		07:05	08:33-2	06:02	07:41-1	05:19		05:16		05:52		06:41		07:28		07:20		08:10	
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26	08:15		07:21		07:19		06:11	07:38-1	05:24		05:14		05:43		06:31	07:44-1	07:20			08:10		08:03		08:33	
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31	08:08				07:07		06:32-2			05:19				05:51		06:39					07:19				08:33	
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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		222		476		45		0		0		473		280		0		0		0	

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Gesamtbelastung Schattenrezeptor: SR-012, (Am Hüttenberg 6, Sundern (Sauerland))

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		148		448		179		0		0		499		289		0		0		0	

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engineering@noxt.de · 20. August 2025

Gesamtbelastung Schattenrezeptor: SR-013, (Am Hüttenberg 7, Sundern (Sauerland))

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
1	08:33		08:07		07:15		07:05	08:29-2	06:02	07:34-1	05:19		05:16		05:52		06:41		07:28		07:20		08:10	
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	17:10	0	18:06	0	19:53	23 08:52-2	20:44	28 08:01-1	21:30	0	21:49	0	21:23	0	20:26	0	19:15	0	0	18:11	16:27	0	16:26	0
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	17:12	0			19:55	24 08:52-2	20:46	28 08:00-1	21:31	0	21:48	0	21:22	0	20:24	0	19:13	0	17:09	0	16:26	0	16:27	0
30	08:10				07:10	08:29-2	06:04	07:34-1	05:20		05:16		05:49		06:38		07:26		07:17		08:09		08:33	
	17:13	0			19:56	24 08:52-2	20:48	26 07:59-1	21:32	0	21:48	0	21:20	0	20:21	0	19:11	0	17:07	0	16:25	0	16:28	0
31	08:08				07:07	08:29-2			05:19				05:51		06:39				07:19				08:33	
	17:15	0			19:58	23 08:51-2			21:33	0			21:19	0	20:19	0			17:05	0			16:29	0
Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		180		468		125		0		0		497		288		0		0		0	

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Gesamtbelastung Schattenrezeptor: SR-014, (Am Hüttenberg 8, Sundern (Sauerland))

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
1	08:33		08:07		07:15		07:05		06:02		07:29-1	05:19		05:16		05:52		06:41		07:28		07:20		08:10	
	16:30	0	17:17	0	18:08	0	20:00	0	20:49	28	07:56-1	21:34	0	21:48	0	21:17	0	20:17	0	19:08	0	17:04	0	16:25	0
2	08:33		08:05		07:13		07:03		06:00		07:29-1	05:18		05:17		05:54		06:42		07:30		07:22		08:12	
	16:31	0	17:19	0	18:09	0	20:01	0	20:51	28	07:56-1	21:35	0	21:48	0	21:16	0	20:15	0	19:06	0	17:02	0	16:24	0
3	08:33		08:04		07:10		07:01		05:58		07:30-1	05:17		05:18		05:55		07:49-1	06:44	07:31		07:24		08:13	
	16:32	0	17:21	0	18:11	0	20:03	0	20:53	26	07:55-1	21:36	0	21:47	0	21:14	6	07:54-1	20:13	19:04	0	17:00	0	16:24	0
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	16:34	0	17:22	0	18:13	0	20:05	0	20:54	25	07:54-1	21:37	0	21:47	0	21:12	13	07:57-1	20:10	19:02	0	16:58	0	16:23	0
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	16:35	0	17:24	0	18:15	0	20:06	0	20:56	23	07:53-1	21:38	0	21:46	0	21:11	16	07:59-1	20:08	18:59	0	16:57	0	16:23	0
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	16:36	0	17:26	0	18:16	0	20:08	0	20:57	21	07:52-1	21:39	0	21:46	0	21:09	19	08:00-1	20:06	18:57	0	16:55	0	16:22	0
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	16:40	0	17:32	0	18:21	0	20:13	0	21:02	12	07:47-1	21:42	0	21:44	0	21:04	25	08:03-1	19:59	18:50	0	16:50	0	16:21	0
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	16:47	0	17:41	0	18:30	0	20:21	0	21:10	0		21:45	0	21:40	0	20:54	29	08:04-1	19:48	18:40	0	16:43	0	16:21	0
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	16:50	0	17:44	0	18:33	0	20:25	0	21:13	0		21:46	0	21:38	0	20:51	29	08:04-1	19:43	18:35	0	16:40	0	16:21	0
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	16:51	0	17:46	0	18:35	0	20:26	0	21:15	0		21:47	0	21:37	0	20:49	28	08:03-1	19:41	18:33	0	16:39	0	16:21	0
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19	08:23		07:35		06:35		06:26		07:39-1	05:33		05:12		05:34		06:20		07:37-1	07:09	07:58		07:52		08:29	
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20	08:22		07:33		06:32		06:23		07:36-1	05:31		05:12		05:35		06:22		07:37-1	07:11	08:00		07:53		08:30	
	16:56	0	17:52	0	18:40	0	20:31	18	07:53-1	21:19	0	21:48	0	21:34	0	20:43	25	08:01-1	19:34	18:27	0	16:35	0	16:22	0
21	08:21		07:31		06:30		06:21		07:35-1	05:30		05:12		05:37		06:23		07:38-1	07:12	08:01		07:55		08:30	
	16:58	0	17:53	0	18:42	0	20:33	21	07:55-1	21:20	0	21:48	0	21:33	0	20:41	23	08:00-1	19:31	18:25	0	16:34	0	16:22	0
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24	08:18		07:25		06:23		06:15		07:31-1	05:26		05:13		05:41		06:28		07:41-1	07:17	08:06		08:00		08:32	
	17:03	0	17:59	0	18:47	0	20:38	27	07:57-1	21:24	0	21:49	0	21:29	0	20:34	15	07:55-1	19:25	18:19	0	16:31	0	16:24	0
25	08:17		07:23		06:21		06:13		07:31-1	05:25		05:13		05:42		06:30		07:44-1	07:19	08:08		08:01		08:32	
	17:05	0	18:01	0	18:48	0	20:39	27	07:57-1	21:26	0	21:49	0	21:28	0	20:32	9	07:52-1	19:22	18:17	0	16:30	0	16:24	0
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27	08:14		07:19		07:16		06:09		07:30-1	05:23		05:14		05:45		06:33			07:22	08:12		08:05		08:33	
	17:08	0	18:04	0	19:51	0	20:43	28	07:57-1	21:28	0	21:49	0	21:25	0	20:28	0		19:18	18:13	0	16:28	0	16:26	0
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29	08:11				07:12		06:06		07:29-1	05:21		05:15		05:48		06:36			07:25	07:15		08:08		08:33	
	17:12	0			19:55	0	20:46	29	07:57-1	21:31	0	21:48	0	21:22	0	20:24	0		19:13	17:09	0	16:26	0	16:27	0
30	08:10				07:10		06:04		07:29-1	05:20		05:16		05:49		06:38			07:26	07:17		08:09		08:33	
	17:13	0			19:56	0	20:48	29	07:57-1	21:32	0	21:48	0	21:20	0	20:21	0		19:11	17:07	0	16:25	0	16:28	0
31	08:08				07:07					05:19				05:51		06:39				07:19				08:33	
	17:15	0			19:58	0				21:33	0			21:19	0	20:19	0			17:05	0			16:29	0
Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		0		303		204		0		0		512		0		0		0		0	

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Gesamtbelastung Schattenrezeptor: SR-015, (Am Hüttenberg 9, Sundern (Sauerland))

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
1	08:33		08:07		07:15		07:05	08:28-2	06:02	07:32-1	05:19		05:16		05:52		06:41		07:28		07:20		08:10	
	16:30	0	17:17	0	18:08	0	20:00	24 08:51-2	20:49	27 07:58-1	21:34	0	21:48	0	21:17	0	20:17	0	19:08	0	17:04	0	16:25	0
2	08:33		08:05		07:13		07:03	08:28-2	06:00	07:32-1	05:18		05:17		05:54		06:42		07:30		07:22		08:12	
	16:31	0	17:19	0	18:09	0	20:01	23 08:50-2	20:51	26 07:57-1	21:35	0	21:48	0	21:16	0	20:15	0	19:06	0	17:02	0	16:24	0
3	08:33		08:04		07:10		07:01	08:29-2	05:58	07:33-1	05:17		05:18		05:55		06:44		07:31		07:24		08:13	
	16:32	0	17:21	0	18:11	0	20:03	20 08:48-2	20:53	24 07:56-1	21:36	0	21:47	0	21:14	0	20:13	0	19:04	0	17:00	0	16:24	0
4	08:33		08:02		07:08		06:58	08:30-2	05:56	07:34-1	05:16		05:18		05:57		06:46		07:33		07:26		08:14	
	16:34	0	17:22	0	18:13	0	20:05	18 08:47-2	20:54	22 07:55-1	21:37	0	21:47	0	21:12	0	20:10	0	19:02	0	16:58	0	16:23	0
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7	08:32		07:57		07:02		06:52		05:51	07:38-1	05:15		05:21		06:01		07:45-1	06:50		08:27-2	07:38		07:31		08:18	
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	16:38	0	17:30	0	18:20	0	20:11	0	21:01	9 07:48-1	21:41	0	21:45	0	21:06	20	08:03-1	20:01	17	08:41-2	18:53	0	16:52	0
9	08:31		07:54		06:57		06:47		05:48		05:14		05:23		06:04		07:43-1	06:53		08:23-2	07:41		08:20	
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	16:50	0	17:44	0	18:33	0	20:25	0	21:13	0	21:46	0	21:38	0	20:51	30	08:07-1	19:43	23	08:42-2	18:35	0	16:40	0
17	08:25		07:39		06:39		06:30	07:43-1	05:35		05:12		05:32		06:17		07:38-1	07:06		08:20-2	07:54		08:28	
	16:51	0	17:46	0	18:35	0	20:26	12 07:54-1	21:15	0	21:47	0	21:37	0	20:49	29	08:06-1	19:41	22	08:41-2	18:33	0	16:39	0
18	08:24		07:37		06:37		06:28	07:40-1	05:34		05:12		05:33		06:19		07:38-1	07:07		08:20-2	07:56		08:29	
	16:53	0	17:48	0	18:37	0	20:28	17 07:56-1	21:16	0	21:47	0	21:36	0	20:47	29	08:06-1	19:38	20	08:39-2	18:31	0	16:37	0
19	08:23		07:35		06:35		06:26	07:38-1	05:33		05:12		05:34		06:20		07:38-1	07:09		08:21-2	07:58		08:29	
	16:55	0	17:50	0	18:38	0	20:29	20 07:57-1	21:18	0	21:48	0	21:35	0	20:45	29	08:06-1	19:36	18	08:38-2	18:29	0	16:36	0
20	08:22		07:33		06:32		06:23	07:36-1	05:31		05:12		05:35		06:22		07:38-1	07:11		08:23-2	08:00		07:53		08:30	
	16:56	0	17:52	0	18:40	0	20:31	23 07:58-1	21:19	0	21:48	0	21:34	0	20:43	28	08:05-1	19:34	14	08:36-2	18:27	0	16:35	0
21	08:21		07:31		06:30		06:21	07:35-1	05:30		05:12		05:37		06:23		07:39-1	07:12		08:26-2	08:01		07:55		08:30	
	16:58	0	17:53	0	18:42	0	20:33	25 07:59-1	21:20	0	21:48	0	21:33	0	20:41	26	08:04-1	19:31	7	08:32-2	18:25	0	16:34	0
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	17:00	0	17:55	0	18:43	0	20:34	27 08:00-1	21:22	0	21:48	0	21:32	0	20:38	26	08:04-1	19:29	0		18:23	0	16:33	0
23	08:19		07:27		06:26		06:17	07:33-1	05:28		05:13		05:39		06:27		07:40-1	07:15			08:05		07:58		08:31	
	17:01	0	17:57	0	18:45	10	20:36	28 08:00-1	21:23	0	21:49	0	21:30	0	20:36	23	08:02-1	19:27	0		18:21	0	16:32	0
24	08:18		07:25		06:23		06:15	07:33-1	05:26		05:13		05:41		06:28		07:41-1	07:17			08:06		08:00		08:32	
	17:03	0	17:59	0	18:47	15	20:38	28 08:00-1	21:24	0	21:49	0	21:29	0	20:34	21	08:01-1	19:25	0		18:19	0	16:31	0
25	08:17		07:23		06:21		06:13	07:32-1	05:25		05:13		05:42		06:30		07:42-1	07:19			08:08		08:01		08:32	
	17:05	0	18:01	0	18:48	19	07:51-2	20:39 29 08:00-1	21:26	0	21:49	0	21:28	0	20:32	18	07:59-1	19:22	0		18:17	0	16:30	0
26	08:15		07:21		07:19		08:31-2	06:11	07:32-1	05:24			05:14		06:31		07:44-1	07:20			08:10		08:03		08:33	
	17:06	0	18:02	0	19:50	21	08:51-2	20:41 29	08:00-1	21:27	0		21:49	0	20:30	14	07:57-1	19:20	0		18:15	0	16:29	0	16:25	0
27	08:14		07:19		07:16		08:30-2	06:09	07:32-1	05:23			05:14		06:33		07:48-1	07:22			08:12		08:05		08:34	
	17:08	0	18:04	0	19:51	23	08:52-2	20:43 29	08:00-1	21:28	0		21:49	0	20:28	5	07:52-1	19:18	0		18:13	0	16:28	0	16:26	0
28	08:13		07:17		07:14		08:30-2	06:07	07:32-1	05:22			05:15		06:35			07:23			08:13		08:06		08:33	
	17:10	0	18:06	0	19:53	23	08:52-2	20:44 29	08:00-1	21:30	0		21:49	0	20:26	0	19:15	0			18:11	0	16:27	0	16:26	0
29	08:11				07:12		08:29-2	06:06	07:32-1	05:21			05:15		06:36		07:25				07:15		08:08		08:33	
	17:12	0			19:55	24	08:52-2	20:46 28	07:59-1	21:31	0		21:22	0	20:24	0	19:13	0			17:09	0	16:26	0	16:27	0
30	08:10				07:10		08:28-2	06:04	07:32-1	05:20			05:16		06:38		07:26				07:17		08:09		08:33	
	17:13	0			19:56	25	08:52-2	20:48 28	07:59-1	21:32	0		21:48	0	20:21	0	19:11	0			17:07	0	16:25	0	16:28	0
31	08:08				07:07		08:28-2			05:19					06:39						07:19				08:33	
	17:15	0			19:58	24	08:51-2			21:33	0				21:19	0					17:05	0			16:29	0
Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		184		462		160		0		0		523		303		0		0		0	

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Gesamtbelastung Schattenrezeptor: SR-016, (Am Hüttenberg 11, Sundern)

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
1	08:33		08:07		07:15		07:05		06:02		07:31-1	05:19		05:16		05:52		06:41		07:28		07:20		08:10	
	16:30	0	17:17	0	18:08	0	20:00	0	20:49	28	07:58-1	21:34	0	21:48	0	21:17	0	20:17	0	19:08	0	17:04	0	16:25	0
2	08:33		08:05		07:13		07:03		06:00		07:31-1	05:18		05:17		05:54		06:42		07:30		07:22		08:12	
	16:31	0	17:19	0	18:09	0	20:01	0	20:51	27	07:57-1	21:35	0	21:48	0	21:16	0	20:15	0	19:06	0	17:02	0	16:24	0
3	08:33		08:04		07:10		07:01		05:58		07:31-1	05:17		05:18		05:55		06:44		07:31		07:24		08:13	
	16:32	0	17:21	0	18:11	0	20:03	0	20:53	26	07:56-1	21:36	0	21:47	0	21:14	0	20:13	0	19:04	0	17:00	0	16:24	0
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	16:34	0	17:22	0	18:13	0	20:05	0	20:54	25	07:56-1	21:37	0	21:47	0	21:12	10	07:57-1	20:10	19:02	0	16:58	0	16:23	0
5	08:32		08:01		07:06		06:56		05:55		07:32-1	05:16		05:19		05:58		07:46-1	06:47			07:28		08:16	
	16:35	0	17:24	0	18:15	0	20:06	0	20:56	23	07:54-1	21:38	0	21:46	0	21:11	15	08:00-1	20:08	18:59	0	16:57	0	16:23	0
6	08:32		07:59		07:04		06:54		05:53		07:33-1	05:15		05:20		06:00		07:44-1	06:49	07:36		07:29		08:17	
	16:36	0	17:26	0	18:16	0	20:08	0	20:57	21	07:53-1	21:39	0	21:46	0	21:09	18	08:01-1	20:06	18:57	0	16:55	0	16:22	0
7	08:32		07:57		07:02		06:52		05:51		07:35-1	05:15		05:21		06:01	07:43-1	06:50		07:38		07:31		08:18	
	16:37	0	17:28	0	18:18	0	20:10	0	20:59	18	07:52-1	21:40	0	21:45	0	21:07	20	08:02-1	20:04	18:55	0	16:53	0	16:22	0
8	08:31		07:56		06:59		06:49		05:49		07:36-1	05:14		05:22		06:03	07:42-1	06:52		07:39		07:33		08:19	
	16:38	0	17:30	0	18:20	0	20:11	0	21:01	15	07:50-1	21:41	0	21:45	0	21:06	22	08:03-1	20:01	18:53	0	16:52	0	16:21	0
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	16:44	0	17:37	0	18:26	0	20:18	0	21:07	0		21:44	0	21:42	0	20:58	28	08:06-1	19:52	18:44	0	16:46	0	16:21	0
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	16:47	0	17:41	0	18:30	0	20:21	0	21:10	0		21:45	0	21:40	0	20:54	29	08:06-1	19:48	18:40	0	16:43	0	16:21	0
15	08:27		07:43		06:44		06:34		05:38			05:12		05:29		06:14	07:37-1	07:03		07:51		07:45		08:26	
	16:48	0	17:43	0	18:32	0	20:23	0	21:12	0		21:46	0	21:39	0	20:53	30	08:06-1	19:45	18:37	0	16:41	0	16:21	0
16	08:26		07:41		06:42		06:32		05:37			05:12		05:30		06:15	07:37-1	07:04		07:53		07:47		08:27	
	16:50	0	17:44	0	18:33	0	20:25	0	21:13	0		21:46	0	21:38	0	20:51	30	08:06-1	19:43	18:35	0	16:40	0	16:21	0
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18	08:24		07:37		06:37		06:28		07:41-1	05:34		05:12		05:33		06:19	07:37-1	07:07		07:56		07:50		08:29	
	16:53	0	17:48	0	18:37	0	20:28	13	07:53-1	21:16	0	21:47	0	21:36	0	20:47	29	08:05-1	19:38	18:31	0	16:37	0	16:21	0
19	08:23		07:35		06:35		06:26		07:38-1	05:33		05:12		05:34		06:20	07:37-1	07:09		07:58		07:52		08:29	
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	16:56	0	17:52	0	18:40	0	20:31	21	07:56-1	21:19	0	21:48	0	21:34	0	20:43	27	08:04-1	19:34	18:27	0	16:35	0	16:22	0
21	08:21		07:31		06:30		06:21		07:35-1	05:30		05:12		05:37		06:23	07:38-1	07:12		08:01		07:55		08:30	
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22	08:20		07:29		06:28		06:19		07:34-1	05:29		05:12		05:38		06:25	07:39-1	07:14		08:03		07:57		08:31	
	17:00	0	17:55	0	18:43	0	20:34	25	07:58-1	21:22	0	21:48	0	21:32	0	20:38	24	08:02-1	19:29	18:23	0	16:33	0	16:23	0
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	17:01	0	17:57	0	18:45	0	20:36	27	07:59-1	21:23	0	21:49	0	21:30	0	20:36	21	08:00-1	19:27	18:21	0	16:32	0	16:23	0
24	08:18		07:25		06:23		06:15		07:32-1	05:26		05:13		05:41		06:28		07:41-1	07:17		08:06		08:00		08:32	
	17:03	0	17:59	0	18:47	0	20:38	28	07:59-1	21:24	0	21:49	0	21:29	0	20:34	19	07:59-1	19:25	18:19	0	16:31	0	16:24	0
25	08:17		07:23		06:21		06:13		07:31-1	05:25		05:13		05:42		06:30		07:43-1	07:19		08:08		08:01		08:32	
	17:05	0	18:01	0	18:48	0	20:39	29	07:59-1	21:26	0	21:49	0	21:28	0	20:32	14	07:56-1	19:22	18:17	0	16:30	0	16:24	0
26	08:15		07:21		07:19		06:11		07:31-1	05:24		05:14		05:43		06:31	07:46-1	07:20		08:10		08:03		08:33	
	17:06	0	18:02	0	19:50	0	20:41	29	07:59-1	21:27	0	21:49	0	21:26	0	20:30	7	07:52-1	19:20	18:15	0	16:29	0	16:25	0
27	08:14		07:19		07:16		06:09		07:31-1	05:23		05:14		05:45		06:33			07:22	08:12		08:05		08:33	
	17:08	0	18:04	0	19:51	0	20:43	29	07:59-1	21:28	0	21:49	0	21:25	0	20:28	0		19:18	18:13	0	16:28	0	16:26	0
28	08:13		07:17		07:14		06:07		07:30-1	05:22		05:15		05:46		06:35		07:23		08:13		08:06		08:33	
	17:10	0	18:06	0	19:53	0	20:44	30	07:59-1	21:30	0	21:49	0	21:23	0	20:26	0		19:15	18:11	0	16:27	0	16:26	0
29	08:11				07:12		06:06		07:30-1	05:21		05:15		05:48		06:36		07:25		07:15		08:08		08:33	
	17:12	0			19:55	0	20:46	30	07:59-1	21:31	0	21:48	0	21:22	0	20:24	0	19:13	0	17:09	0	16:26	0	16:27	0
30	08:10				07:10		06:04		07:30-1	05:20		05:16		05:49		06:38		07:26		07:17		08:09		08:33	
	17:13	0			19:56	0	20:48	29	07:58-1	21:32	0	21:48	0	21:20	0	20:21	0	19:11	0	17:07	0	16:25	0	16:28	0
31	08:08				07:07					05:19				05:51		06:39				07:19				08:33	
	17:15	0			19:58	0				21:33	0			21:19	0	20:19	0			17:05	0			16:29	0
Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]		0		0		0		333		194		0		0		534		0		0		0		0	

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-017, (Auf dem Schoten 1, Sundern)

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
1	08:33		08:07		07:15		08:41-2	07:05	08:09-0	06:02		05:19		05:16		05:52		06:41		07:28	08:53-1	07:20		08:10	
	16:30	0	17:17	0	18:08	23	09:03-2	20:00	21	08:29-0	20:49	0	21:34	0	21:48	0	21:17	0	20:17	0	19:08	12	09:04-1	17:04	0	16:25	0
2	08:33		08:05		07:13		08:40-2	07:03		08:08-0	06:00		05:18		05:17		05:54		06:42	08:11-0	07:30		07:22		08:12	
	16:31	0	17:19	0	18:09	24	09:03-2	20:01	23	08:30-0	20:51	0	21:35	0	21:48	0	21:16	0	20:15	8	08:18-0	19:06	0	17:02	0	16:24	0
3	08:33		08:04		07:10		08:40-2	07:01		08:08-0	05:58		05:17		05:18		05:55		06:44	08:08-0	07:31		07:24		08:13	
	16:32	0	17:21	0	18:11	23	09:02-2	20:03	22	08:29-0	20:53	0	21:36	0	21:47	0	21:14	0	20:13	14	08:21-0	19:04	0	17:00	0	16:24	0
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	16:34	0	17:22	0	18:13	23	09:02-2	20:05	23	08:29-0	20:54	0	21:37	0	21:47	0	21:12	0	20:10	17	08:22-0	19:02	0	16:58	0	16:23	0
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31	08:08				07:07		08:10-0				05:19				05:51		06:39					07:19				08:33	
	17:15	0			19:58	20	08:29-0				21:33	0			21:19	0	20:19	0				17:05	0			16:29	0
Sonne [h]	262		279		368			415		483		495		499		452		380		332		268		247	
Schatten [min]	0		105		664			197		0		0		0		0		687		288		0		0	

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-018, (Im Senkel 10, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33	14:12-27	08:07	08:58-65	07:15		07:05			06:02	06:49-79	05:19	18:54-4	05:16		19:01-4	05:52		19:09-4	06:41		07:28			07:20	08:25-65	08:10									
	16:30	23	14:34-27	17:17	41	16:19-92	18:08	0		20:49	36	07:30-83	21:34	79	20:25-2	21:48	82	20:33-2	21:17	38	19:46-4	20:17	0		19:08	0		17:04	58	15:55-92	16:25	0					
2	08:33		14:12-27	08:05		08:57-65	07:13			07:03			06:00			06:49-79	05:18		18:54-4	05:17		19:01-4	05:54		07:06-79	06:42		07:30			07:22	08:25-65	08:12			14:05-27
	16:31	23	14:34-27	17:19	46	16:21-92	18:09	0		20:51	31	07:27-83	21:35	79	20:25-2	21:48	82	20:33-2	21:16	43	19:45-4	20:15	0		19:06	0		17:02	57	15:54-92	16:24	8	14:12-27			
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	16:32	22	14:34-27	17:21	50	16:22-92	18:11	0		20:53	24	07:12-79	21:36	79	20:26-2	21:47	81	20:33-2	21:14	45	19:44-4	20:13	0		19:04	0		17:00	58	15:54-92	16:24	11	14:14-27			
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	16:34	21	14:34-27	17:22	52	16:23-92	18:13	0		20:05	0		20:54	23	07:11-79	21:37	80	20:26-2	21:47	82	20:33-2	21:12	45	19:42-4	20:10	0		19:02	0		16:58	57	15:54-92	16:23	14	14:16-27			
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Sonne [h]		262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]		268			956			0			518			1562			2451			2013			959			0			455			609			681		

noxt! engineering GmbH
Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

Gesamtbelastung Schattenrezeptor: SR-019, (Meinkenbrachter Straße 1, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33	14:29-26	08:07				07:15	16:20-92	07:05				06:02	06:55-83	05:19	06:38-79	05:16		19:40-4	05:52		06:38-79	06:41		07:28			07:20			08:10			09:28-87		
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Sonne [h]		262			279				368			415			495			499			452			380				332			268			247		
Schatten [min]		1206			852			163			79			1150			1577			1169			535			0			926			827			1178		

noxt! engineering GmbH
Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

Gesamtbelastung Schattenrezeptor: SR-020, (Linneperhütte 7, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33		08:07	14:55-3	07:15	08:23-80	07:05		06:02			05:19			05:16		07:15-82	05:52		06:41			07:28	08:54-80	07:20		15:13-2	08:10		14:37-3
	16:30	0	17:17	39	16:00-2	18:08	60	16:54-1	20:00	0	20:49	0	21:34	0	21:48	6	07:20-82	21:17	0	20:17	0		19:08	64	17:25-0	17:04	20	15:32-2	16:25	8	14:44-3
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	17:15	39	15:59-2				19:58	0							21:33	0				20:19	0					15:31-2						16:29	0	
Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	511			622			1120			0			0			254			6			0			312			1156			799			8		

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engineering@noxt.de · 20. August 2025

Gesamtbelastung Schattenrezeptor: SR-021, (Meinkenbrachter Straße 1, Sundern (Sauerland))

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33	09:50-87	08:07				07:15		07:05	06:02			06:57-83	05:19		19:27-4	05:16		19:31-4	05:52		06:41-79	06:41		07:28			07:20		08:10			09:30-87		
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	17:03	19	10:12-87	17:59	34		16:50-92	18:47	0	20:38	2	07:11-83	21:24	52		20:02-4	21:49	70	20:41-2	21:29	43	20:05-4	20:34	0		19:25	0	18:19	52	17:20-92	16:31	48	14:41-27	16:24	34	14:57-27		
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Sonne [h]		262			279				368			415			495			499			452			380			332			268			247		
Schatten [min]		1153			910			98			117			1342			1969			1502			618			0		864			776			1261		

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Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

Gesamtbelastung Schattenrezeptor: SR-022, (Zum Backofen 1, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33	14:43-3	08:07			07:15			08:38-80	07:05			06:02			05:19			07:17-82	05:16		07:21-82	05:52		06:41			07:28			07:20			08:10		14:24-3
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	17:06	21	15:08-3	18:02	70	16:40-1	19:50	0		20:41	0		21:27	28	07:46-82	21:49	37	0	07:56-82	21:26	0		20:30	0	19:20	0		18:15	37	17:15-1	16:29	25		14:45-3		16:25	0	
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	17:08	20	15:08-3	18:04	67	16:37-0	19:51	0		20:43	0		21:28	29	07:47-82	21:49	37	0	07:56-82	21:25	0		20:28	0	19:18	0		18:13	36	17:13-1	16:28	25		14:45-3		16:26	2	14:47-3
28	08:13		14:51-3	07:17		08:38-80	07:14			06:07			05:22		07:18-82	05:15			07:20-82	05:46			06:35		07:23			08:13			09:20-70	08:06			14:22-3		08:33		14:45-3
	17:10	17	15:07-3	18:06	66	16:36-0	19:53	0		20:44	0		21:30	30	07:47-82	21:49	38	0	07:57-82	21:23	0		20:26	0	19:15	0		18:11	33	17:17-1	16:27	24		14:45-3		16:26	5	14:49-3
29	08:11		14:52-3				07:12			06:06			05:21		07:18-82	05:15			07:20-82	05:48			06:36		07:25			07:15			08:19-70	08:08			14:22-3		08:33		14:44-3
	17:12	14	15:05-3				19:55	0		20:46	0		21:31	31	07:48-82	21:48	38	0	07:57-82	21:22	0		20:24	0	19:13	0		17:09	27	16:08-1	16:26	24		14:45-3		16:27	8	14:51-3
30	08:10		14:55-3				07:10			06:04			05:20		07:17-82	05:16			07:21-82	05:49			06:38		07:26			07:17			08:19-70	08:09			14:23-3		08:33		14:44-3
	17:13	9	15:03-3				19:56	0		20:48	0		21:32	33	07:49-82	21:48	37	0	07:57-82	21:20	0		20:21	0	19:11	0		17:07	23	08:41-70	16:25	23		14:45-3		16:28	9	14:52-3
31	08:08						07:07						05:19		07:17-82					05:51			06:39					07:19			08:19-70						08:33		14:44-3
	17:15	0					19:58	0					21:33	33	07:49-82					21:19	0		20:19	0				17:05	22	08:40-70						16:29	10	14:53-3
Sonne [h]		262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]		621			1093			457			0			311			1108			743			0			0			1463			553			265		

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Gesamtbelastung Schattenrezeptor: SR-023, (Linneperhütte 5a, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33		08:07	14:56-3	07:15	08:27-80	07:05		06:02			05:19			05:16		07:16-82	05:52		06:41			07:28		08:09-69	07:20		08:16-70	08:10		14:37-3					
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	16:31	0	17:19	20	15:16-3	18:09	66	16:50-1	20:01	0		20:51	0		21:35	0		21:48	10	07:26-82	21:16	0		20:15	0		19:06	60	17:23-0	17:02	4	08:23-70	16:24	5	14:44-3		
3	08:33		08:04		14:59-3	07:10		08:24-80	07:01			05:58			05:17			05:18		07:19-82	05:55			06:44			07:31		09:00-80	07:24			08:13				
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5	08:32		08:01		15:05-3	07:06		08:23-80	06:56			05:55			05:16			05:19			05:58			06:47			07:35		08:59-80	07:28			08:16				
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6	08:32		07:59			07:04		08:22-80	06:54			05:53			05:20			06:00			06:00			06:49			07:36		08:59-80	07:29		14:33-3	08:17				
	16:36	0	17:26	0		18:16	69	16:48-0	20:08	0		20:57	0		21:39	0		21:46	0		21:09	0		20:06	0		18:57	68	17:24-0	16:55	9	14:41-3	16:22	0			
7	08:32		07:57			07:02		08:22-80	06:52			05:51			05:15			05:21			06:01			06:50			07:38		08:59-80	07:31		14:30-3	08:18				
	16:37	0	17:28	0		18:18	68	16:47-0	20:10	0		20:59	0		21:40	0		21:45	0		21:07	0		20:04	0		18:55	69	17:24-0	16:53	14	14:43-3	16:21	0			
8	08:31		07:56			06:59		08:21-80	06:49			05:49			05:14			05:22			06:03			06:52			07:39		08:58-80	07:33		14:28-3	08:19				
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9	08:31		07:54		08:51-70	06:57		08:21-80	06:47			05:48			05:14		07:16-82	05:23			06:04			06:53			07:41		08:59-80	07:35		14:27-3	08:20				
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11	08:30		14:56-3	07:50		08:45-70	06:53		06:43			05:44			05:13		07:13-82	05:25			06:08			06:57			07:44		08:59-80	07:38		14:26-3	08:23				
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	16:44	13	15:07-3	17:37	17	09:00-70	18:26	59	16:42-0	20:18	0		21:07	0		21:44	12	07:23-82	21:42	0		20:58	0		19:52	0		18:44	66	17:26-1	16:46	25	14:49-3	16:21	0			
13	08:28		14:54-3	07:47		08:43-70	06:48		06:38			07:27-69	06:38		05:12		07:11-82	05:27			06:11			07:00			07:48		09:01-80	07:42		14:25-3	08:25				
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15	08:27		14:53-3	07:43		08:41-70	06:44		06:34			07:22-69	06:34		05:38		07:11-82	05:29			06:14			07:03			07:51		09:03-80	07:45		14:25-3	08:26				
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16	08:26		14:53-3	07:41		08:41-70	06:42		06:32			07:21-69	06:32		05:37		07:11-82	05:30			06:15			07:04			07:53		09:05-80	07:47		14:25-3	08:27				
	16:50	20	15:12-3	17:44	23	09:03-70	18:33	48	08:52-80	20:25	0		21:13	0		21:46	16	07:26-82	21:38	0		20:51	0		19:43	0		18:35	52	17:27-1	16:40	26	14:50-3	16:21	0			
17	08:25		14:52-3	07:39		08:41-70	06:39		06:30			07:20-69	06:30		05:35		07:10-82	05:32			06:17			07:06			07:54		09:07-80	07:48		14:25-3	08:28				
	16:51	22	15:13-3	17:46	23	09:03-70	18:35	46	08:50-80	20:26	0		21:15	0		21:47	18	07:27-82	21:37	0		20:49	0		19:41	0		18:33	45	17:27-1	16:39	27	14:51-3	16:21	0			
18	08:24		14:52-3	07:37		08:41-70	06:37			07:19-69	06:28			0		05:34			05:12		07:10-82	05:33			06:19			07:07		08:14-69	07:56		09:11-80	07:50		14:25-3	08:29		
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19	08:23		14:52-3	07:35		08:41-70	06:35			07:19-69	06:26			0		05:33			05:12		07:11-82	05:34			06:20			07:09		08:10-69	07:58		09:16-70	07:52		14:25-3	08:29		
	16:55	24	15:15-3	17:50	36	16:51-1	18:38	37	08:44-80	20:29	0		21:18	0		21:48	18	07:28-82	21:35	0		20:45	0		19:36	10		08:19-69	18:29	36	17:26-1	16:36	27	14:51-3	16:21	0			
20	08:22		14:52-3	07:33		08:41-70	06:32			07:19-69	06:23			0		05:31			05:12		07:11-82	05:35			06:22			07:11		08:07-69	08:00		09:14-70	07:53		14:26-3	08:30		
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21	08:21		14:52-3	07:31		08:42-70	06:30		06:21			07:19-69	06:21		05:30		07:11-82	05:37			06:23			07:12			08:06-69	08:01		09:13-70	07:55		14:26-3	08:30				
	16:58	25	15:16-3	17:53	39	16:54-1	18:42	19	07:37-69	20:33	0		21:20	0		21:48	18	07:28-82	21:33	0		20:41	0		19:31	17		08:22-69	18:25	38	17:24-1	16:34	26	14:51-3	16:22	0			
22	08:20		14:52-3	07:29		08:43-70	06:28		06:19			07:19-69	06:19		05:29		07:11-82	05:38			06:25			07:14			08:05-69	08:03		09:12-70	07:57		14:27-3	08:31				
	17:00	26	15:17-3	17:55	38	16:54-1	18:43	18	07:36-69	20:34	0		21:22	0		21:48	19	07:29-82	21:32	0		20:38	0		19:29	18		08:22-69	18:23	36	17:23-1	16:33	25	14:51-3	16:23	0			
23	08:19		14:52-3	07:27		08:44-70	06:26		06:17			07:20-69	06:17		05:28		07:11-82	05:39			06:27			07:15			08:04-69	08:05		09:12-70	07:58		14:28-3	08:31				
	17:01	26	15:17-3	17:57	37	16:55-1	18:45	16	07:35-69	20:36	0		21:23	0		21:49	19	07:29-82	21:30	0		20:36	0		19:27	20		08:23-69	18:21	34	17:21-1	16:32	23	14:50-3	16:24	0			
24	08:18		14:52-3	07:25		08:39-80	06:23			07:21-69	06:15			0		05:26			05:13		07:12-82	05:41			06:28			07:17		08:03-69	08:06		09:11-70	08:00		14:28-3	08:32		
	17:03	27	15:18-3	17:59	46	16:55-1	18:47	13	07:33-69	20:38	0		21:24	0		21:49	18	07:29-82	21:29	0		20:34	0		19:25	33		09:26-80	18:19	26	17:16-1	16:31	23	14:50-3	16:24	0			
25	08:17		14:52-3	07:23		08:34-80	06:21			07:23-69	06:13			0		05:25			05:13		07:12-82	05:42			06:30			07:19		08:03-69	08:08		09:11-70	08:01		14:29-3	08:32		
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26	08:15		14:52-3	07:21		08:32-80	07:19			06:11				0		05:24			05:14		07:12-82	05:43			06:31			07:20		08:03-69	08:10		09:11-70	08:03		14:30-3	08:33		
	17:06	27	15:18-3	18:02	53	16:54-1	19:50	0		20:41	0			0		21:27	0		21:49	18	07:29-82	21:26	0		20:30	0		19:20	44	09:31-80	18:15	23	09:33-70	16:29	21	14:50-3	16:25	0	
27	08:14		14:53-3	07:19		08:30-80	07:16			06:09				0		05:23			05:14		07:13-82	05:45			06:33			07:22		08:03-69	08:12		09:11-70	08:05		14:31-3	08:34		
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28	08:13		14:53-3	07:17		08:28-80	07:14			06:07				0		05:22			05:15		07:14-82	05:46			06:35			07:23		08:03-69	08:13		09:12-70	08:06		14:33-3	08:33		
	17:10	26	15:18-3	18:06	62	16:53-1	19:53	0		20:44	0			0		21:30	0		21:49	16	07:29-82	21:23	0		20:26	0		19:15	48	09:34-80	18:11	21	09:32-70	16:27	17	14:49-3	16:26	0	
29	08:11		14:54-3			07:12				06:06				0		05:21			05:15		07:14-82	05:48			06:36			07:25		08:04-69	07:15		08:12-70	08:08		14:34-3	08:33		
	17:12	25	15:18-3			19:55	0			20:46	0			0		21:31	0		21:48	15	07:28-82	21:22	0		20:24	0		19:13	59	17:18-0	17:09	20	08:31-70	16:26	15	14:48-3	16:27	0	
30	08:10		14:54-3			07:10				06:04				0		05:20			05:16		07:15-82	05:49			06:38			07:26		08:06-69	07:17		08:13-70	08:09		14:35-3	08:33		
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31	08:08		14:55-3			07:07										05:19						05:51			06:39						07:19		08:14-70				08:33		
	17:15	23	15:17-3			19:58	0									21:33	0								20:19	0										16:29	0	
Sonne [h]	262			279			368			415			495			499			452			380			332			268			247					
Schatten [min]	478			722			1229			0			338			29			0			415			1467			561			15					

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-024, (Linneperhütte 5, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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	16:30	0	17:17	20	15:16-3	18:08	66	16:51-7	20:00	0		20:49	0		21:34	0		21:48	14	07:29-82	21:17	0		20:17	0		19:08	62	17:21-0	17:04	13	08:28-70	16:25	10		14:46-3
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Sonne [h]	262			279			368			415			483		495			499		452			380			332			268			247		
Schatten [min]	482			733			1201			0			0		388			48		0			394			1487			561			17		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-025, (Zum Backofen 3, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33	14:47-3	08:07			07:15	08:38-80	07:05				06:02			05:19	07:17-82	05:16		07:20-82	05:52		06:41			07:28			07:20			08:19-70	08:10		14:26-3	
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Sonne [h]		262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]		615			1056			503			0			232			1078			648			0			0			1481			557			183		

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Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

Gesamtbelastung Schattenrezeptor: SR-026, (Linneperhütte 1, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33		08:07	14:58-3	07:15	08:33-80	07:05		06:02			05:19			07:16-82	05:16		07:17-82	05:52		06:41			07:28	09:17-80	07:20		08:18-70	08:10		14:30-3
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	17:15	16	15:11-3			19:58	0							07:35-82								20:19	0		17:05	21		08:37-70						16:29	0	
Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	563			917			693			0			61			923			390			0			26			1528			563			93		

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Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

Gesamtbelastung Schattenrezeptor: SR-027, (Im Senkel 1, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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16	08:26		09:57-87	07:41		09:04-65	06:42			06:32			05:37		06:38-79	05:12		05:48-70	05:30		19:20-4	06:15		07:11-83	07:04		07:40-29	07:53			16:50-92	07:47		08:27			09:45-87
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Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	976			955			93			377			1934			2619			2100			948			221			652			744			1524		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-028, (An der Eiche 1, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33		08:07	14:58-3	07:15	08:31-80	07:05		06:02			05:19			05:16	07:15-82	05:52		06:41			07:28	08:07-69	07:20		08:17-70	08:10		14:34-3	
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Sonne [h]	262			279			368			415			495			499			452			380			332			268			247				
Schatten [min]	526			857			1021			0			713			211			0			257			1551			567			54				

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-029, (Linneperhütte 3, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33		08:07	14:58-3	07:15	08:28-80	07:05		06:02			05:19			05:16		07:17-82	05:52		06:41		07:28	08:07-69	07:20		08:16-70	08:10		14:38-3
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	17:06	26	15:19-3	18:02	59	16:54-1	19:50	0	20:41	0		21:27	0		21:49	17	07:30-82	21:26	0		20:30	0	19:20	39	09:32-80	18:15	23	09:35-70	16:29	20	14:51-3	16:25	0				
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	17:08	26	15:20-3	18:04	63	16:54-1	19:51	0	20:43	0		21:28	0		21:49	17	07:30-82	21:25	0		20:28	0	19:18	43	09:34-80	18:13	22	09:34-70	16:28	19	14:51-3	16:26	0				
28	08:13		14:55-3	07:17		08:29-80	07:14		06:07			05:22			05:15		07:16-82	05:46			06:35		07:23		08:04-69	08:13		09:13-70	08:06		14:34-3	08:33					
	17:10	26	15:20-3	18:06	66	16:53-1	19:53	0	20:44	0		21:30	0		21:49	16	07:30-82	21:23	0		20:26	0	19:15	46	09:36-80	18:11	22	09:34-70	16:27	17	14:50-3	16:26	0				
29	08:11		14:56-3			07:12			06:06			05:21			05:15		07:16-82	05:48			06:36		07:25		08:04-69	07:15		08:13-70	08:08		14:35-3	08:33					
	17:12	24	15:19-3			19:55	0		20:46	0		21:31	0		21:48	14	07:29-82	21:22	0		20:24	0	19:13	49	17:14-0	17:09	22	08:34-70	16:26	16	14:50-3	16:27	0				
30	08:10		14:56-3			07:10			06:04			05:20			05:16		07:16-82	05:49			06:38		07:26		08:06-69	07:17		08:14-70	08:09		14:37-3	08:33					
	17:13	24	15:19-3			19:56	0		20:48	0		21:32	0		21:48	14	07:29-82	21:20	0		20:21	0	19:11	61	17:19-0	17:07	20	08:33-70	16:25	13	14:49-3	16:28	0				
31	08:08		14:57-3			07:07						05:19									06:39					07:19		08:15-70				08:33					
	17:15	23	15:19-3			19:58	0					21:33	0								21:19	0				17:05	18	08:32-70				16:29	0				
Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	480			762			1178			0			0			334			29			0			368			1506			568			17		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-030, (An der Eiche 3, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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	16:32	0	17:21	0		18:11	68	16:43-0	20:03	0		20:53	0		21:36		23	07:37-82	21:47	29	07:46-82	21:14	0	20:13	0		19:04	50		17:11-0	17:00	17	08:36-70	16:24	15	14:48-3
4	08:33		08:02			07:08		08:33-80	06:58			05:56			05:16			07:14-82	05:18		07:18-82	05:57		06:46			07:33			08:13-69	07:26		08:21-70	08:14		14:35-3
	16:34	0	17:22	0		18:13	67	16:42-0	20:05	0		20:54	0		21:37		25	07:38-82	21:47	29	07:46-82	21:12	0	20:10	0		19:02	53		17:14-0	16:58	15	08:35-70	16:23	14	14:48-3
5	08:32		14:54-3	08:01		07:06		08:33-80	06:56			05:55			05:16			07:14-82	05:19		07:19-82	05:58		06:47			07:35			09:12-80	07:28		08:23-70	08:16		14:37-3
	16:35	6	14:59-3	17:24	0	18:15	66	16:42-0	20:06	0		20:56	0		21:38		25	07:38-82	21:46	28	07:46-82	21:11	0	20:08	0		18:59	53		17:15-0	16:57	11	08:33-70	16:23	11	14:47-3
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7	08:32		14:52-3	07:57		08:52-70	07:02		08:34-80	06:52			05:51			05:15			07:13-82	05:21		07:20-82	06:01		06:50			07:38			09:10-80	07:31			08:18		14:41-3
	16:37	12	15:03-3	17:28	14	09:05-70	18:18	58	16:39-0	20:10	0		20:59	0		21:40	28	07:40-82	21:45	26	07:45-82	21:07	0	20:04	0		18:55	61		17:17-0	16:53	0		16:22	5	14:45-3
8	08:31		14:52-3	07:56		08:50-70	06:59		08:34-80	06:49			05:49			05:14			07:13-82	05:22		07:21-82	06:03		06:52			07:39			09:10-80	07:33			08:19		
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19	08:23		14:50-3	07:35		08:46-80	06:35		07:26-69	06:26			05:33			05:12			07:13-82	05:34			06:20		07:09			07:58			09:10-80	07:52			14:24-3		08:29	
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	17:06	25	15:16-3	18:02	70	16:49-1	19:50	0		20:41	0		21:27	0		21:49	32	07:46-82	21:26	0		20:30	0	19:20	20	08:27-69	18:15	32	17:16-1	16:29	24		14:50-3		16:25	0
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28	08:13		14:54-3	07:17		08:34-80	07:14			06:07			05:22			05:15			07:16-82	05:46			06:35		07:23			08:07-69	08:13		09:17-70	08:06			14:29-3		08:33	
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30	08:10		14:56-3				07:10			06:04			05:20		07:19-82	05:16			07:16-82	05:49			06:38		07:26			08:07-69	07:17		08:17-70	08:09			14:31-3		08:33	
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	17:15	16	15:13-3				19:58	0					21:33	16	07:33-82					21:19	0		20:19	0	17:05	21	08:38-70									16:29	0	
Sonne [h]	262			279			368			415			483			495			499			452			380			332			268						
Schatten [min]	557			939			897			0			39			888			349			0			178			1582			576						89

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Gesamtbelastung Schattenrezeptor: SR-031, (An der Eiche 5, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33		08:07	15:00-3	07:15	08:35-80	07:05		06:02			05:19			07:16-82	05:16		07:17-82	05:52		06:41			07:28	08:08-69	07:20		08:18-70	08:10		14:32-3	
	16:30	0	17:17	12	15:11-3	18:08	68	16:44-0	20:00	0		21:34	21	0	07:36-82	21:48	31	07:47-82	21:17	0	20:17	0		19:08	37	09:39-80	17:04	21	08:38-70	16:25	18	14:49-3	
2	08:33		08:05		15:04-3	07:13		08:34-80	07:03			06:00			07:16-82	05:17		07:17-82	05:54		06:42			07:30	08:09-69	07:22		08:19-70	08:12		14:33-3	
	16:31	0	17:19	4	15:07-3	18:09	68	16:43-0	20:01	0		20:51	22	0	07:37-82	21:48	31	07:47-82	21:16	0	20:15	0		19:06	39	09:41-80	17:02	20	08:38-70	16:24	17	14:49-3	
3	08:33		08:04			07:10		08:34-80	07:01			05:58			07:15-82	05:18		07:18-82	05:55		06:44			07:31	08:10-69	07:24		08:20-70	08:13		14:34-3	
	16:32	0	17:21	0		18:11	68	16:43-0	20:03	0		20:53	24	0	07:38-82	21:47	30	07:47-82	21:14	0	20:13	0		19:04	46	17:09-0	17:00	18	08:37-70	16:24	16	14:49-3	
4	08:33		08:02			07:08		08:34-80	06:58			05:56			07:14-82	05:18		07:18-82	05:57		06:46			07:33	08:12-69	07:26		08:21-70	08:14		14:35-3	
	16:34	2	14:57-3	17:22	0	18:13	66	16:42-0	20:05	0		20:54	0		07:39-82	21:47	26	07:47-82	21:12	0	20:10	0		19:02	53	17:13-0	16:58	16	08:36-70	16:23	14	14:48-3	
5	08:32		14:54-3	08:01		08:57-70	07:06		06:56			05:55			07:14-82	05:19		07:19-82	05:58		06:47			07:35	09:14-80	07:28		08:23-70	08:16		14:37-3	
	16:35	7	15:00-3	17:24	5	09:01-70	18:15	64	16:41-0	20:06	0	20:56	0		07:39-82	21:46	29	07:47-82	21:11	0	20:08	0		18:59	51	17:15-0	16:57	12	08:34-70	16:23	12	14:48-3	
6	08:32		14:53-3	07:59		08:53-70	07:04		06:54			05:53			07:14-82	05:20		07:19-82	06:00		06:49			07:36	09:16-80	07:29		08:26-70	08:17		14:38-3	
	16:36	10	15:02-3	17:26	12	09:04-70	18:16	62	16:40-0	20:08	0	20:57	0		07:40-82	21:46	28	07:46-82	21:09	0	20:06	0		18:57	56	17:16-0	16:55	6	08:31-70	16:22	10	14:47-3	
7	08:32		14:52-3	07:57		08:52-70	07:02		06:52			05:51			07:13-82	05:21		07:20-82	06:01		06:50			07:38	09:11-80	07:31			08:18		14:40-3	
	16:37	13	15:04-3	17:28	15	09:06-70	18:18	58	16:39-0	20:10	0	20:59	0		07:41-82	21:45	27	07:46-82	21:07	0	20:04	0		18:55	61	17:17-0	16:53	0		16:22	7	14:46-3	
8	08:31		14:52-3	07:56		08:51-70	06:59		06:49			05:49			07:13-82	05:22		07:21-82	06:03		06:52			07:39	09:11-80	07:33			08:19			
	16:38	14	15:05-3	17:30	17	09:07-70	18:20	53	16:37-0	20:11	0	21:01	0		07:41-82	21:45	26	07:46-82	21:06	0	20:01	0		18:53	62	17:17-0	16:52	0		16:21	0		
9	08:31		14:51-3	07:54		08:50-70	06:57		06:47			05:48			07:13-82	05:23		07:21-82	06:04		06:53			07:41	09:10-80	07:35		14:32-3	08:20			
	16:40	16	15:06-3	17:32	19	09:08-70	18:21	46	16:35-0	20:13	0	21:02	0		07:42-82	21:44	25	07:45-82	21:04	0	19:59	0		18:50	66	17:18-0	16:50	8	14:39-3	16:21	0		
10	08:30		14:51-3	07:52		08:49-70	06:55		07:33-69	06:45		05:46			07:13-82	05:24		07:22-82	06:06		06:55			07:43	09:09-80	07:36		14:30-3	08:22			
	16:41	17	15:07-3	17:33	21	09:09-70	18:23	45	16:31-0	20:15	0	21:04	0		07:42-82	21:43	24	07:45-82	21:02	0	19:57	0		18:48	68	17:18-0	16:49	13	14:42-3	16:21	0		
11	08:30		14:51-3	07:50		08:48-70	06:53		07:30-69	06:43		05:44			07:13-82	05:25		07:23-82	06:08		06:57			07:44	09:09-80	07:38		14:28-3	08:23			
	16:42	18	15:08-3	17:35	22	09:09-70	18:25	40	09:03-80	20:16	0	21:05	0		07:43-82	21:43	31	07:43-82	21:00	0	19:55	0		18:46	69	17:18-0	16:47	17	14:44-3	16:21	0		
12	08:29		14:50-3	07:49		08:48-70	06:51		07:29-69	06:41		05:43			07:13-82	05:26		07:24-82	06:09		06:58			07:46	09:09-80	07:40		14:27-3	08:24			
	16:44	20	15:09-3	17:37	23	09:10-70	18:26	38	09:01-80	20:18	0	21:07	0		07:44	31	20	07:43-82	20:58	0	19:52	0		18:44	68	17:18-0	16:46	19	14:45-3	16:21	0		
13	08:28		14:50-3	07:47		08:48-70	06:48		07:28-69	06:38		05:41			07:13-82	05:27		07:26-82	06:11		07:00			07:48	09:09-80	07:42		14:26-3	08:25			
	16:45	21	15:10-3	17:39	23	09:10-70	18:28	34	08:57-80	20:20	0	21:09	0		07:45	31	21	07:43-82	21:41	17	19:50	0		18:42	68	17:18-0	16:44	21	14:46-3	16:21	0		
14	08:28		14:50-3	07:45		08:48-70	06:46		07:27-69	06:36		05:40			07:13-82	05:28		07:27-82	06:12		07:01			07:49	09:09-80	07:43		14:26-3	08:25			
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15	08:27		14:50-3	07:43		08:48-70	06:44		07:26-69	06:34		05:38			07:13-82	05:29		07:29-82	06:14		07:03			07:51	09:09-80	07:45		14:25-3	08:26			
	16:48	23	15:12-3	17:43	30	16:45-1	18:32	21	07:46-69	20:23	0	21:12	0		07:44-82	21:39	11	07:39-82	20:53	0	19:45	0		18:37	70	17:21-1	16:41	24	14:48-3	16:21	0		
16	08:26		14:50-3	07:41		08:48-70	06:42		07:26-69	06:32		05:37			07:13-82	05:30		07:33-82	06:15		07:04			07:53	09:09-80	07:47		14:25-3	08:27			
	16:50	24	15:13-3	17:44	35	16:48-1	18:33	20	07:45-69	20:25	0	21:13	0		07:45	31	33	07:45-82	21:38	4	19:43	0		18:35	71	17:22-1	16:40	24	14:48-3	16:21	0		
17	08:25		14:50-3	07:39		08:49-70	06:39		07:26-69	06:30		05:35			07:13-82	05:32		07:13-82	06:17		07:06			07:54	09:09-80	07:48		14:25-3	08:28			
	16:51	24	15:13-3	17:46	36	16:49-1	18:35	20	07:45-69	20:26	0	21:15	0		07:45-82	21:37	33	07:45-82	21:37	0	19:41	0		18:33	71	17:23-1	16:39	25	14:49-3	16:21	0		
18	08:24		14:50-3	07:37		08:49-80	06:37		07:26-69	06:28		05:34			07:13-82	05:33		07:13-82	05:33		06:19			07:56	09:10-80	07:50		14:25-3	08:29			
	16:53	25	15:14-3	17:48	37	16:50-1	18:37	19	07:44-69	20:28	0	21:16	0		07:45-82	21:36	0	07:45-82	21:36	0	20:47	0		18:31	68	17:23-1	16:37	25	14:49-3	16:21	0		
19	08:23		14:50-3	07:35		08:46-80	06:35		07:26-69	06:26		05:33			07:13-82	05:34		07:13-82	05:34		06:20			07:58	09:11-80	07:52		14:25-3	08:29			
	16:55	26	15:15-3	17:50	43	16:51-1	18:38	18	07:43-69	20:29	0	21:18	0		07:48	33	33	07:45-82	21:35	0	20:45	0		18:29	65	17:23-1	16:36	26	14:50-3	16:21	0		
20	08:22		14:50-3	07:33		08:43-80	06:32		07:27-69	06:23		05:31			07:12	05:35		07:14-82	05:35		06:22			07:11	09:12-80	07:53		14:25-3	08:30			
	16:56	26	15:15-3	17:52	52	16:51-1	18:40	16	07:42-69	20:31	0	21:19	0		07:48	33	33	07:46-82	21:34	0	20:43	0		19:34	0	08:00	18:27	61	14:50-3	16:22	0		
21	08:21		14:51-3	07:31		08:42-80	06:30		07:28-69	06:21		05:30			07:12	05:37		07:14-82	05:37		06:23			07:12		08:01	09:13-80	07:55		14:25-3	08:30			
	16:58	25	15:15-3	17:53	57	16:51-1	18:42	13	07:40-69	20:33	0	21:20	0		07:48	33	33	07:46-82	21:33	0	20:41	0		19:31	0	18:25	56	17:22-1	16:34	26	14:50-3	16:22	0		
22	08:20		14:51-3	07:29		08:40-80	06:28		07:31-69	06:19		05:29			07:12	05:38		07:14-82	05:38		06:25			07:14	08:15-69	08:03		09:14-80	07:57		14:25-3	08:31			
	17:00	26	15:16-3	17:55	62	16:51-1	18:43	6	07:36-69	20:34	0	21:22	0		07:48	33	33	07:46-82	21:32	0	20:38	0		19:29	10	08:24-69	18:23	49	17:22-1	16:33	26	14:50-3	16:23	0		
23	08:19		14:51-3	07:27		08:39-80	06:26			06:17		05:28			07:13	05:39		07:14-82	05:39		06:27			07:15	08:13-69	08:05		09:16-80	07:58		14:26-3	08:31			
	17:01	26	15:16-3	17:57	65	16:51-1	18:45	0		20:36	0	21:23	0		07:49	33	33	07:46-82	21:30	0	20:36	0		19:27	14	08:26-69	18:21	40	17:21-1	16:32	25	14:50-3	16:23	0		
24	08:18		14:52-3	07:25		08:38-80	06:23			06:15		05:26			07:13	05:41		07:14-82	05:41		06:28			07:17	08:11-69	08:06		09:19-80	08:00		14:26-3	08:32			
	17:03	25	15:16-3	17:59	69	16:51-1	18:47	0		20:38	0	21:24	0		07:49	33	33	07:46-82	21:29	0	20:34	0		19:25	17	08:27-69	18:19	37	17:20-1	16:31	25	14:50-3	16:24	0		
25	08:17		14:52-3	07:23		08:37-80	06:21			06:13		05:25			07:13	05:42		07:15-82	05:42		06:30			07:19	08:10-69	08:08		09:19-70	08:01		14:27-3	08:32			
	17:05	25	15:16-3	18:01	70	16:50-1	18:48	0		20:39	0	21:26	0		07:49	33	33	07:47-82	21:28	0	20:32	0		19:22	18	08:27-69	18:17	34	17:18-1	16:30	24	14:50-3	16:24	0		
26	08:15		14:53-3	07:21		08:36-80	07:19			06:11		05:24			07:14	05:43		07:15-82	05:43		06:31			07:20	08:09-69	08:10		09:18-70	08:03		14:28-3	08:33			
	17:06	24	15:16-3	18:02	71	16:49-1	19:50	0		20:41	0	21:27	0		07:49	33	33	07:47-82	21:26	0	20:30	0		19:20	20	08:28-69	18:15	32	17:16-1	16:29	23	14:50-3	16:25	0		
27	08:14		14:53-3	07:19		08:36-80	07:16			06:09		05:23			07:14	05:45		07:15-82	05:45		06:33			07:22	08:08-69	08:12		09:18-70	08:05		14:28-3	08:33			
	17:08	24	15:16-3	18:04	70	16:47-1	19:51	0		20:43	0	21:28	0		07:49	33	33	07:47-82	21:25	0	20:28	0		19:18	21	08:28-69	18:13	22	09:39-70	16:28	23	14:50-3	16:26	0		
28	08:13		14:54-3	07:17		08:35-80	07:14			06:07		05:22			07:23-82	05:15		07:16-82	05:46		06:35			07:23	08:08-69	08:13		09:18-70	08:06		14:29-3	08:33			
	17:10	22	15:15-3	18:06	69	16:45-1	19:53	0		20:44	0	21:30	6	07:28-82	21:49	32	07:47-82	21:23	0	20:26	0		19:15	20	08:27-69	18:11	22	09:39-70	16:27	22	14:50-3	16:26	0		
29	08:11		14:55-3			07:12				06:06		05:21		07:20-82	05:15		07:16-82	05:48		06:36			07:25	08:08-69	07:15		08:18-70	08:08		14:30-3	08:33			
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30	08:10		14:57-3			07:10				06:04		05:20		07:19-82	05:16		07:16-82	05:49		06:38			07:26	08:08-69	07:17		08:18-70	08:09		14:31-3	08:33			
	17:13	18	15:14-3			19:56	0			20:48	0	21:32	15	07:33-82	21:48	32	07:47-82	21:20	0	20:21	0		19:11	30	09:35-80	17:07	22	08:39-70	16:25	20	14:50-3	16:28	0		
31	08:08		14:58-3			07:07						05:19		07:17-82				06:39									07:19		08:18-70			08:33				
	17:15	16	15:13-3			19:58	0					21:33	19	07:35-82				21:19	0		20:19	0					17:05	22	08:39-70			16:29	0			
Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	560			962			868			0			52			913			370			0			170			1578			578			94		

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Dipl.-Ing. Marcel Boßmeyer
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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-032, (Im Senkel 2, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33	09:56-87	08:07	09:04-65	07:15		07:05			07:52-29	06:02		06:44-79	05:19		05:54-70	05:16		05:53-70	05:52		06:55-79	06:41		07:28			07:20			08:37-65	08:10		09:41-87		
	16:30	49	14:57-27	17:17	25	09:28-65	18:08	0	20:00	19	08:10-29	20:49	80	19:38-4	21:34	70	20:24-2	21:48	76	20:29-2	21:17	66	19:54-4	20:17	0	19:08	0		17:04	48	16:09-92	16:25	40	14:38-27		
2	08:33		09:56-87	08:05		09:04-65	07:13		07:03		07:52-29	06:00		06:44-79	05:18		05:52-70	05:17		05:53-70	05:54		06:54-79	06:42		07:30			07:22			08:36-65	08:12		09:42-87		
	16:31	48	14:57-27	17:19	34	16:29-92	18:09	0	20:01	18	08:09-29	20:51	81	19:39-4	21:35	72	20:24-2	21:48	76	20:29-2	21:16	67	19:54-4	20:15	0	19:06	0		17:02	50	16:09-92	16:24	41	14:39-27		
3	08:33		09:56-87	08:04		09:04-65	07:10		07:01		07:53-29	05:58		06:43-79	05:17		05:51-70	05:18		05:53-70	05:55		06:53-79	06:44		07:31			07:24			08:35-65	08:13		09:42-87		
	16:32	49	14:57-27	17:21	41	16:32-92	18:11	0	20:03	15	08:07-29	20:53	84	19:40-4	21:36	75	20:24-2	21:47	78	20:30-2	21:14	68	19:53-4	20:13	0	19:04	0		17:00	50	16:08-92	16:24	43	14:40-27		
4	08:33		09:57-87	08:02		09:04-65	07:08		06:58		07:55-29	05:56		06:43-79	05:16		05:50-70	05:18		05:54-70	05:57		06:53-79	06:46		07:33			07:26			08:35-65	08:14		09:42-87		
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5	08:32		09:57-87	08:01		09:04-65	07:06		06:56			05:55		06:43-79	05:16		05:50-70	05:18		05:54-70	05:58		06:52-79	06:47		07:35			07:28			08:34-65	08:16		09:42-87		
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Sonne [h]		262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]		834			860			155			596			2182			2208			2173			1404			225			434			767			1495		

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Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

Gesamtbelastung Schattenrezeptor: SR-033, (An der Eiche 7, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33		08:07	15:00-3	07:15	08:32-80	07:05		06:02			05:19			05:16	07:16-82	05:52		06:41			07:28	08:07-69	07:20		08:17-70	08:10		14:37-3
	16:30	0	17:17	18	15:17-3	18:08	69	16:49-1	20:00	0		20:49	0		21:34	0		21:48	22	07:37-82	21:17	0		20:17	0		19:08	50	17:14-0	17:04	20	08:36-70	16:25	14	14:50-3
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31	08:08		14:59-3			07:07									05:19			05:51			06:39						07:19						08:33		
	17:15	20	15:18-3			19:58	0								21:33	0					21:19	0					17:05	21	08:36-70				16:29	0	
Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	504			867			1036			0			0			568			129			0			256			1571			585			43		

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Dipl.-Ing. Marcel Boßmeyer
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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-034, (An der Eiche 11, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33		08:07	15:02-3		07:15	08:33-80	07:05				06:02			05:19			05:16	07:22-82	05:52			06:41			08:07-69	07:20		08:18-70	08:10		14:42-3		
	16:30	0	17:17	20	15:21-3	18:08	69	16:52-1	20:00	0		20:49	0		21:34	0		21:48	7	07:28-82	21:17	0		20:17	0		17:20-0	17:04	19	08:36-70	16:25	10	14:51-3		
2	08:33		08:05		15:03-3	07:13		08:32-80	07:03			06:00			05:18			05:17			05:54			06:42			08:09-69	07:22		08:19-70	08:12		14:44-3		
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	17:15	21	15:21-3			19:58	0						21:33	0					21:19	0		20:19	0					17:05	21	08:37-70			16:29	0		
Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	468			848			1095			0			0			262			7			0			286			1562			579			16		

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Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

Gesamtbelastung Schattenrezeptor: SR-035, (An der Eiche 13, Sundern)

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
1	08:33		08:07		15:03-3	07:15	08:34-80	07:05	06:02		05:19		05:16		05:52		06:41		07:28	08:08-69	07:20		08:18-70	08:10		14:44-3
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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247			
Schatten [min]	455		857		1104		0		0		90		0		0		287		1554		585		8			

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Dipl.-Ing. Marcel Boßmeyer
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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-036, (An der Eiche 2, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33		08:07	15:03-3	07:15	08:33-80	07:05		06:02			05:19			05:16			05:52			06:41			07:28	08:09-69	07:20		08:18-70	08:10							
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2	08:33		08:05		15:04-3	07:13		08:32-80	07:03		06:00			05:18			05:17			05:54			06:42			07:30	08:11-69	07:22		08:19-70	08:12					
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3	08:33		08:04		15:05-3	07:10		08:31-80	07:01		05:58			05:17			05:18			05:55			06:44			07:31	09:09-80	07:24		08:21-70	08:13					
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	16:34	0	17:22	15	15:21-3	18:13	70	16:52-0	20:05	0	20:54	0		21:37	0		21:47	0		21:12	0		20:10	0		19:02	65	17:27-0	16:58	7	08:30-70	16:23	0			
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	16:35	0	17:24	9	15:18-3	18:15	71	16:52-0	20:06	0	20:56	0		21:38	0		21:46	0		21:11	0		20:08	0		18:59	68	17:28-0	16:57	3	14:45-3	16:23	0			
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	16:58	24	15:22-3	17:53	35	16:56-1	18:42	20	07:40-69	20:33	0	21:20	0		21:48	0		21:33	0		20:41	0		19:31	16	08:24-69	18:25	33	17:26-1	16:34	24	14:57-3	16:22	0			
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	17:00	25	15:23-3	17:55	40	16:57-1	18:43	18	07:39-69	20:34	0	21:22	0		21:48	0		21:32	0		20:38	0		19:29	19	08:25-69	18:23	33	17:25-1	16:33	23	14:57-3	16:23	0			
23	08:19		14:59-3	07:27		08:42-80	06:26		07:23-69	06:17		05:28			05:13			05:39			06:27			07:15			08:06	09:18-70	07:58		14:36-3	08:31					
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Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	429			810			1183			0			0			0			0			0			360			1528			571			0		

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Gesamtbelastung Schattenrezeptor: SR-037, (Zum Backofen 2, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33		08:07	15:04-3	07:15	08:36-80	07:05		06:02			05:19			05:16	07:20-82	05:52		06:41			07:28	08:08-69	07:20		08:19-70	08:10		14:40-3
	16:30	0	17:17	15:19-3	18:08	69	16:49-0	20:00	0	20:49	0		21:34	0		07:38-82	21:17	0	20:17	0		19:08	42	09:44-80	17:04	22	08:40-70	16:25	14	14:53-3
2	08:33		08:05	15:05-3	07:13	08:36-80	07:03		06:00			05:18			05:17	07:21-82	05:54		06:42			07:30	08:09-69	07:22		08:20-70	08:12		14:42-3
	16:31	0	17:19	15:18-3	18:09	70	16:49-0	20:01	0	20:51	0		21:35	0		21:48	17	07:37-82	21:16	0		19:06	50	17:16-0	17:02	21	08:40-70	16:24	11	14:52-3
3	08:33		08:04	15:08-3	07:10	08:36-80	07:01		05:58			05:17			05:18	07:21-82	05:55		06:44			07:31	08:10-69	07:24		08:21-70	08:13		14:43-3
	16:32	0	17:21	15:15-3	18:11	69	16:48-0	20:03	0	20:53	0		21:36	0		21:47	17	07:37-82	21:14	0		19:04	58	17:19-0	17:00	19	08:39-70	16:24	9	14:51-3
4	08:33		08:02		07:08	08:36-80	06:58		05:56			05:16			05:18	07:23-82	05:57		06:46			07:33	08:14-69	07:26		08:22-70	08:14		14:46-3
	16:34	0	17:22	0	18:13	69	16:48-0	20:05	0	20:54	0		21:37	0		21:47	14	07:36-82	21:12	0		19:02	56	17:21-0	16:58	17	08:38-70	16:23	4	14:49-3
5	08:32		08:01	08:57-70	07:06	08:36-80	06:56		05:55			05:16			05:19	07:24-82	05:58		06:47			07:35	09:15-80	07:28		08:24-70	08:16		
	16:35	0	17:24	8	09:04-70	18:15	66	16:47-0	20:06	0	20:56	0		21:38	0		21:46	12	07:35-82	21:11	0		18:59	57	17:22-0	16:57	13	08:36-70	16:23	0	
6	08:32		07:59	08:54-70	07:04	08:36-80	06:54		05:53			05:15			05:15	07:22-82	05:59		06:49			07:36	09:14-80	07:29		08:26-70	08:17		
	16:36	0	17:26	13	09:06-70	18:16	65	16:47-0	20:08	0	20:57	0		21:39	5	07:26-82	21:46	9	07:34-82	21:09	0		18:57	61	17:23-0	16:55	9	08:34-70	16:22	0	
7	08:32		07:57	08:53-70	07:02	08:36-80	06:52		05:51			05:15			07:19-82	05:21		07:29-82	06:01			07:38	09:13-80	07:31		08:18			
	16:37	0	17:28	16	09:08-70	18:18	62	16:46-0	20:10	0	20:59	0		21:40	10	07:28-82	21:45	3	07:31-82	21:07	0		18:55	64	17:23-0	16:53	0		16:22	0	
8	08:31		15:02-3	07:56	06:59	08:36-80	06:49		05:49			05:14			07:18-82	05:22			06:03			07:39	09:12-80	07:33		14:37-3	08:19		
	16:38	5	15:06-3	17:30	18:20	58	16:44-0	20:11	0	21:01	0		21:41	13	07:30-82	21:45	0		21:06	0		18:53	67	17:24-0	16:52	10	14:46-3	16:21	0	
9	08:31		15:00-3	07:54	06:57	08:37-80	06:47		05:48			05:14			07:17-82	05:23			06:04			07:41	09:11-80	07:35		14:35-3	08:20		
	16:40	10	15:09-3	17:32	18:21	54	16:43-0	20:13	0	21:02	0		21:42	15	07:31-82	21:44	0		21:04	0		18:50	69	17:24-0	16:50	15	14:49-3	16:21	0	
10	08:30		15:00-3	07:52	06:55	07:34-69	06:45		05:46			05:13			07:17-82	05:24			06:06			07:43	09:11-80	07:36		14:33-3	08:22		
	16:41	12	15:11-3	17:33	18:23	53	16:40-0	20:15	0	21:04	0		21:43	16	07:32-82	21:43	0		21:02	0		18:48	70	17:24-0	16:49	18	14:50-3	16:21	0	
11	08:30		14:59-3	07:50	06:53	07:31-69	06:43		05:44			05:13			07:16-82	05:25			06:08			07:44	09:11-80	07:38		14:32-3	08:23		
	16:42	14	15:12-3	17:35	18:25	50	16:37-0	20:16	0	21:05	0		21:43	18	07:33-82	21:43	0		21:00	0		18:46	69	17:23-0	16:47	20	14:51-3	16:21	0	
12	08:29		14:58-3	07:49	06:51	07:29-69	06:41		05:43			05:13			07:16-82	05:26			06:09			07:46	09:10-80	07:40		14:32-3	08:24		
	16:44	16	15:13-3	17:37	18:26	42	09:05-80	20:18	0	21:07	0		21:44	19	07:34-82	21:42	0		20:58	0		18:44	70	17:23-0	16:46	21	14:52-3	16:21	0	
13	08:28		14:58-3	07:47	06:48	07:27-69	06:38		05:41			05:12			07:15-82	05:27			06:11			07:48	09:10-80	07:42		14:31-3	08:25		
	16:45	18	15:15-3	17:39	18:28	41	09:03-80	20:20	0	21:09	0		21:45	21	07:35-82	21:41	0		20:56	0		18:42	68	17:22-0	16:44	23	14:53-3	16:21	0	
14	08:28		14:57-3	07:45	06:46	07:26-69	06:36		05:40			05:12			07:15-82	05:28			06:12			07:49	09:10-80	07:43		14:31-3	08:25		
	16:47	20	15:16-3	17:41	18:30	36	08:59-80	20:21	0	21:10	0		21:45	21	07:35-82	21:40	0		20:54	0		18:40	68	17:22-0	16:43	24	14:54-3	16:21	0	
15	08:27		14:57-3	07:43	06:44	07:26-69	06:34		05:38			05:12			07:15-82	05:29			06:14			07:03		07:51	09:11-80	07:45		14:30-3	08:26		
	16:48	21	15:17-3	17:43	23	09:11-70	18:32	25	08:53-80	20:23	0	21:12	0		07:36-82	21:39	0		20:53	0		19:45	0	18:37	65	17:21-0	16:41	25	14:54-3	16:21	0	
16	08:26		14:57-3	07:41	06:42	07:25-69	06:32		05:37			05:12			07:15-82	05:30			06:15			07:04		07:53	09:11-80	07:47		14:30-3	08:27		
	16:50	22	15:18-3	17:44	22	09:11-70	18:33	21	07:45-69	20:25	0	21:13	0		07:36-82	21:38	0		20:51	0		19:43	0	18:35	63	17:20-0	16:40	26	14:55-3	16:21	0	
17	08:25		14:57-3	07:39	06:39	07:25-69	06:30		05:35			05:12			07:15-82	05:32			06:17			07:06		07:54	09:11-80	07:48		14:30-3	08:28		
	16:51	22	15:18-3	17:46	21	09:10-70	18:35	21	07:45-69	20:26	0	21:15	0		07:37-82	21:37	0		20:49	0		19:41	0	18:33	60	17:19-0	16:39	26	14:55-3	16:21	0	
18	08:24		14:57-3	07:37	06:37	07:25-69	06:28		05:34			05:12			07:15-82	05:33			06:19			07:07		07:56	09:12-80	07:50		14:30-3	08:29		
	16:53	23	15:19-3	17:48	19	09:09-70	18:37	20	07:44-69	20:28	0	21:16	0		07:37-82	21:36	0		20:47	0		19:38	0	18:31	55	17:17-0	16:37	26	14:55-3	16:21	0	
19	08:23		14:57-3	07:35	06:35	07:25-69	06:26		05:33			05:12			07:15-82	05:34			06:20			07:09		07:58	09:13-80	07:52		14:31-3	08:29		
	16:55	24	15:20-3	17:50	21	09:08-70	18:38	19	07:43-69	20:29	0	21:18	0		07:37-82	21:35	0		20:45	0		19:36	0	18:29	50	17:15-0	16:36	25	14:55-3	16:21	0	
20	08:22		14:57-3	07:33	06:32	07:25-69	06:23		05:31			05:12			07:15-82	05:35			06:22			07:11		08:00		09:14-80	07:53		14:31-3	08:30		
	16:56	24	15:20-3	17:52	24	09:09-80	18:40	18	07:42-69	20:31	0	21:19	0		07:38-82	21:34	0		20:43	0		19:34	0	18:27	41	17:12-0	16:35	25	14:55-3	16:22	0	
21	08:21		14:57-3	07:31	06:30	07:26-69	06:21		05:30			05:12			07:15-82	05:37			06:23			07:12	08:16-69	08:01		09:15-80	07:55		14:31-3	08:30		
	16:58	25	15:21-3	17:53	37	16:40-0	18:42	16	07:41-69	20:33	0	21:20	0		07:38-82	21:33	0		20:41	0		19:31	8	08:23-69	18:25	28	09:42-80	16:34	25	14:55-3	16:22	0	
22	08:20		14:57-3	07:29	06:28	07:28-69	06:19		05:29			05:12			07:16-82	05:38			06:25			07:14	08:13-69	08:03		09:16-80	07:57		14:32-3	08:31		
	17:00	25	15:21-3	17:55	47	16:43-0	18:43	11	07:38-69	20:34	0	21:22	0		07:38-82	21:32	0		20:38	0		19:29	13	08:25-69	18:23	25	09:40-80	16:33	25	14:56-3	16:23	0	
23	08:19		14:57-3	07:27	06:26	07:32-69	06:17		05:28			05:13			07:16-82	05:39			06:27			07:15	08:11-69	08:05		09:19-80	07:58		14:32-3	08:31		
	17:01	26	15:22-3	17:57	53	16:45-0	18:45	3	07:34-69	20:36	0	21:23	0		07:38-82	21:30	0		20:36	0		19:27	16	08:26-69	18:21	20	09:38-70	16:32	24	14:55-3	16:23	0	
24	08:18		14:57-3	07:25	06:23	07:40-80	06:13		05:26			05:13			07:16-82	05:41			06:28			07:17	08:10-69	08:06		09:21-70	08:00		14:33-3	08:32		
	17:03	26	15:22-3	17:59	57	16:46-0	18:47	0	20:38	0		21:24	0		07:39-82	21:29	0		20:34	0		19:25	18	08:27-69	18:19	19	09:39-70	16:31	23	14:55-3	16:24	0	
25	08:17		14:58-3	07:23	06:21	08:39-80	06:13		05:25			05:13			07:16-82	05:42			06:30			07:19	08:09-69	08:08		09:20-70	08:01		14:34-3	08:32		
	17:05	25	15:22-3	18:01	60	16:47-0	18:48	0	20:39	0		21:26	0		07:39-82	21:28	0		20:32	0		19:22	20	08:28-69	18:17	21	09:40-70	16:30	22	14:55-3	16:24	0	
26	08:15		14:58-3	07:21	06:19	08:38-80	07:19		06:11			05:24			07:17-82	05:43			06:31			07:20	08:08-69	08:10		09:20-70	08:03		14:35-3	08:33		
	17:06	25	15:22-3	18:02	64	16:48-0	19:50	0	20:41	0		21:27	0		07:39-82	21:26	0		20:30	0		19:20	21	08:28-69	18:15	22	09:41-70	16:29	21	14:55-3	16:25	0	
27	08:14		14:59-3	07:19	06:17	08:37-80	07:16		06:09			05:23			07:17-82	05:45			06:33			07:22	08:07-69	08:12		09:19-70	08:05		14:35-3	08:33		
	17:08	24	15:22-3	18:04	66	16:48-0	19:51	0	20:43	0		21:28	0		07:39-82	21:25	0		20:28	0		19:18	22	08:28-69	18:13	23	09:41-70	16:28	21	14:55-3	16:26	0	
28	08:13		14:59-3	07:17	06:15	08:37-80	07:14		06:07			05:22			07:18-82	05:46			06:35			07:23	08:07-69	08:13		09:19-70	08:06		14:36-3	08:33		
	17:10	24	15:22-3	18:06	68	16:49-0	19:53	0	20:44	0		21:30	0		07:39-82	21:23	0		20:26	0		19:15	21	08:27-69	18:11	23	09:41-70	16:27	19	14:54-3	16:26	0	
29	08:11		15:00-3		07:12		06:06		05:21			05:15			07:18-82	05:48			06:36			07:25	08:07-69	07:15		08:19-70	08:08		14:38-3	08:33		
	17:12	23	15:22-3		19:55	0	20:46	0	21:31	0		21:48	21		07:38-82	21:22	0		20:24	0		19:13	32	09:38-80	17:09	23	08:41-70	16:26	17	14:54-3	16:27	0	
30	08:10		15:01-3		07:10		06:04		05:20			05:16			07:19-82	05:49			06:38			07:26	08:07-69	07:17		08:19-70	08:09		14:39-3	08:33		
	17:13	21	15:21-3		19:56	0	20:48	0	21:32	0		21:48	20		07:38-82	21:20	0		20:21	0		19:11	39	09:42-80	17:07	23	08:41-70	16:25	16	14:54-3	16:28	0	
31	08:08		15:02-3		07:07				05:19							05:51			06:39						07:19		08:19-70				08:33		
	17:15	19	15:20-3		19:58	0			21:33	0						21:19	0		20:19	0					17:05	23	08:41-70				16:29	0	
Sonne [h]	262			279		368			415			495			452			380			332			268			247								
Schatten [min]	494			809		958			0			502			91			210			1453			598			38								

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Gesamtbelastung Schattenrezeptor: SR-038, (Zum Backofen 9, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33		08:07	15:05-3	07:15	08:38-80	07:05		06:02			05:19			05:16			07:20-82	05:52		06:41			07:28	08:08-69	07:20		08:20-70	08:10		14:40-3
	16:30	0	17:17	15	15:19-3	18:08	69	16:49-0	20:00	0		20:49	0		21:34	0		21:48	21	07:40-82	21:17	0		20:17	0		19:08	38	09:43-80	17:04	23	08:42-70	16:25	15	14:54-3
2	08:33		08:05		15:07-3	07:13		08:38-80	07:03			06:00			05:18			05:17		07:20-82	05:54			06:42			07:30	40	08:09-69	07:22		08:21-70	08:12		14:41-3
	16:31	0	17:19	12	15:18-3	18:09	69	16:49-0	20:01	0		20:51	0		21:48	21		07:40-82	21:16	0		20:15	0		19:06	40	09:45-80	17:02	21	08:41-70	16:24	13	14:53-3
3	08:33		08:04		15:11-3	07:10		08:38-80	07:01			05:58			05:17			05:18		07:21-82	05:55			06:44			07:31		08:10-69	07:24		08:21-70	08:13		14:43-3
	16:32	0	17:21	4	15:14-3	18:11	68	16:48-0	20:03	0		20:53	0		21:36	0		21:47	19	07:39-82	21:14	0		20:13	0		19:04	54	17:18-0	17:00	20	08:40-70	16:24	11	14:53-3
4	08:33		08:02		08:59-70	07:08		08:38-80	06:58			05:56			05:16			05:18		07:22-82	05:57			06:46			07:33		08:12-69	07:26		08:22-70	08:14		14:45-3
	16:34	0	17:22	6	09:04-70	18:13	67	16:48-0	20:05	0		20:54	0		21:37	0		21:47	18	07:39-82	21:12	0		20:10	0		19:02	57	17:20-0	16:58	18	08:39-70	16:23	7	14:51-3
5	08:32		08:01		08:56-70	07:06		08:38-80	06:56			05:55			05:16			07:22-82	05:58					06:47			07:35		09:17-80	07:28		08:23-70	08:16		
	16:35	0	17:24	12	09:07-70	18:15	65	16:47-0	20:06	0		20:56	0		21:38	6		07:27-82	21:46	16	07:38-82	21:11	0		20:08	0		18:59	54	17:21-0	16:57	16	08:38-70	16:23	0	
6	08:32		07:59		08:54-70	07:04		08:38-80	06:54			05:53			05:15			07:20-82	05:20		07:24-82	06:00			06:49			07:36		09:16-80	07:29		08:25-70	08:17		
	16:36	0	17:26	16	09:09-70	18:16	63	16:46-0	20:08	0		20:57	0		21:39	11		07:30-82	21:46	14	07:37-82	21:09	0		20:06	0		18:57	58	17:22-0	16:55	13	08:37-70	16:22	0	
7	08:32		07:57		08:53-70	07:02		08:38-80	06:52			05:51			05:15			07:18-82	05:21		07:26-82	06:01			06:50			07:38		09:15-80	07:31		08:28-70	08:18		
	16:37	2	15:05-3	17:28	18	09:10-70	18:18	60	16:45-0	20:10	0	20:59	0		21:40	14		07:31-82	21:45	11	07:36-82	21:07	0		20:04	0		18:55	63	17:23-0	16:53	7	08:34-70	16:22	0	
8	08:31		15:01-3	07:56	08:52-70	06:59		08:39-80	06:49			05:49			05:14			07:17-82	05:22		07:29-82	06:03			06:52			07:39		09:14-80	07:33		14:39-3	08:19		
	16:38	8	15:08-3	17:30	20	09:11-70	18:20	55	16:44-0	20:11	0	21:01	0		21:41	17		07:33-82	21:45	5	07:33-82	21:06	0		20:01	0		18:53	65	17:23-0	16:52	8	14:46-3	16:21	0	
9	08:31		15:00-3	07:54	08:51-70	06:57		08:39-80	06:47			05:48			05:14			07:17-82	05:23			06:04			06:53			07:41		09:13-80	07:35		14:36-3	08:20		
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31	08:08		15:03-3			07:07						05:19							05:51			06:39						07:19		08:20-70				08:33		
	17:15	18	15:20-3			19:58	0					21:33	0						21:19	0		20:19	0					17:05	23	08:42-70				16:29	0	
Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	504			852			903			0			0			563			125			0			177			1459			612			46		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-039, (Zum Backofen 11, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33		08:07	15:06-3	07:15	08:38-80	07:05		06:02			05:19			05:16		07:21-82	05:52		06:41			07:28	08:08-69	07:20		08:20-70	08:10		14:42-3
	16:30	0	17:17	15:21-3	16:08	70	16:50-0	20:00	0	20:49	0		21:34	0		21:48	16	07:36-82	21:17	0	20:17	0		19:08	39	09:44-80	17:04	23	08:42-70	16:25	14	14:55-3
2	08:33		08:05	15:07-3	07:13	08:38-80	07:03		06:00			05:18			05:17		07:22-82	05:54		06:42			07:30	08:09-69	07:22		08:21-70	08:12		14:44-3
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Sonne [h]		262			279			368			415			483			495			499			452			380			332			268			247	
Schatten [min]		491			861			935			0			0			422			60			0			190			1467			611			36	

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-040, (Meinkenbrachter Straße 3, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	1021			823			123			684			2526			2247			2420			1390			414			517			790			1655		

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engineering@noxt.de · 20. August 2025

noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-041, (Am Alten Brunnen 16, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	864			696			221			1154			2149			1463			1840			1853			475			332			770			1470		

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engineering@noxt.de · 20. August 2025

noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-042, (Am Alten Brunnen 18, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	941			725			170			975			2367			1560			1976			1682			464			387			783			1571		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-043, (Zum Backofen 15, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33		08:07	15:09-3	07:15	08:39-80	07:05		06:02			05:19			05:16			05:52			06:41			07:28	08:08-69	07:20		08:21-70	08:10	
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	17:01	24	15:28-3	17:57	48	16:48-0	18:45	10	07:37-69	20:36	0		21:23	0		21:49	0		21:30	0		20:36	0		19:27	18	08:27-69	18:21	23	09:43-80	16:32	21	15:01-3	16:23	0		
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	17:03	25	15:29-3	17:59	54	16:50-0	18:47	0		20:38	0		21:24	0		21:49	0		21:29	0		20:34	0		19:25	20	08:28-69	18:19	20	09:42-70	16:31	21	15:01-3	16:24	0		
25	08:17		15:05-3	07:23		08:42-80	06:21			06:13			05:25			05:13			05:42			06:30			07:19		08:08-69	08:08		09:23-70	08:01		14:42-3	08:32			
	17:05	25	15:29-3	18:01	59	16:52-0	18:48	0		20:39	0		21:26	0		21:49	0		21:28	0		20:32	0		19:22	21	08:28-69	18:17	20	09:42-70	16:30	20	15:01-3	16:24	0		
26	08:15		15:05-3	07:21		08:41-80	07:19			06:11			05:24			05:14			05:43			06:31			07:20		08:07-69	08:10		09:22-70	08:03		14:43-3	08:33			
	17:06	25	15:29-3	18:02	64	16:53-0	19:50	0		20:41	0		21:27	0		21:49	0		21:26	0		20:30	0		19:20	22	08:28-69	18:15	22	09:43-70	16:29	18	15:00-3	16:25	0		
27	08:14		15:05-3	07:19		08:40-80	07:16			06:09			05:23			05:14			05:45			06:33			07:22		08:07-69	08:12		09:21-70	08:05		14:45-3	08:33			
	17:08	26	15:30-3	18:04	67	16:54-0	19:51	0		20:43	0		21:28	0		21:49	0		21:25	0		20:28	0		19:18	22	08:28-69	18:13	23	09:43-70	16:28	16	15:00-3	16:26	0		
28	08:13		15:06-3	07:17		08:40-80	07:14			06:07			05:22			05:15			05:46			06:35			07:23		08:07-69	08:13		09:21-70	08:06		14:46-3	08:33			
	17:10	25	15:30-3	18:06	68	16:54-0	19:53	0		20:44	0		21:30	0		21:49	0		21:23	0		20:26	0		19:15	30	09:41-80	18:11	24	09:44-70	16:27	14	14:59-3	16:26	0		
29	08:11		15:06-3				07:12			06:06			05:21			05:15			05:48			06:36			07:25		08:07-69	07:15		08:21-70	08:08		14:48-3	08:33			
	17:12	24	15:29-3				19:55	0		20:46	0		21:31	0		21:48	0		21:22	0		20:24	0		19:13	38	09:45-80	17:09	24	08:44-70	16:26	11	14:58-3	16:27	0		
30	08:10		15:07-3				07:10			06:04			05:20			05:16			05:49			06:38			07:26		08:07-69	07:17		08:21-70	08:09		14:50-3	08:33			
	17:13	23	15:29-3				19:56	0		20:48	0		21:32	0		21:48	0		21:20	0		20:21	0		19:11	43	09:48-80	17:07	24	08:44-70	16:25	8	14:57-3	16:28	0		
31	08:08		15:08-3				07:07						05:19			05:51			06:39			07:19						07:19			08:21-70			08:33			
	17:15	22	15:29-3				19:58	0					21:33	0		21:19	0		20:19	0								17:05	23	08:43-70				16:29	0		
Sonne [h]	262			279			368			415			483			495			499			452			380			332			268						
Schatten [min]	424			838			1048			0			0			0			0			0			245			1488			619			0			247

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Gesamtbelastung Schattenrezeptor: SR-044, (Zum Backofen 4, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33			08:07			07:15		08:37-80	07:05			06:02			05:19			05:16			05:52			06:41			07:28		08:08-69	07:20		08:20-70	08:10		
	16:30	0		17:17	0		18:08	65	16:56-0	20:00	0		20:49	0		21:34	0		21:48	0		21:17	0		20:17	0		19:08	68	17:31-0	17:04	21	08:40-70	16:25	0	
2	08:33			08:05			07:13		08:36-80	07:03			06:00			05:18			05:17			05:54			06:42			07:30		08:12-69	07:22		08:21-70	08:12		
	16:31	0		17:19	0		18:09	69	16:57-0	20:01	0		20:51	0		21:35	0		21:48	0		21:16	0		20:15	0		19:06	65	17:32-0	17:02	19	08:39-70	16:24	0	
3	08:33			08:04			07:10		08:36-80	07:01			05:58			05:17			05:18			05:55			06:44			07:31		09:14-80	07:24		08:22-70	08:13		
	16:32	0		17:21	0		18:11	70	16:57-0	20:03	0		20:53	0		21:36	0		21:47	0		21:14	0		20:13	0		19:04	64	17:33-0	17:00	17	08:38-70	16:24	0	
4	08:33			08:02			07:08		08:35-80	06:58			05:56			05:16			05:18			05:57			06:46			07:33		09:13-80	07:26		08:24-70	08:14		
	16:34	0		17:22	0		18:13	71	16:57-0	20:05	0		20:54	0		21:37	0		21:47	0		21:12	0		20:10	0		19:02	67	17:33-0	16:58	14	08:37-70	16:23	0	
5	08:32			08:01			07:06		08:35-80	06:56			05:55			05:16			05:19			05:58			06:47			07:35		09:12-80	07:28		08:26-70	08:16		
	16:35	0		17:24	0		18:15	72	16:57-0	20:06	0		20:56	0		21:38	0		21:46	0		21:11	0		20:08	0		18:59	69	17:33-0	16:57	9	08:34-70	16:23	0	
6	08:32			07:59			08:57-70	07:04		06:54			05:53			05:15			05:20			06:00			06:49			07:36		09:12-80	07:29			08:17		
	16:36	0		17:26	8		09:04-70	18:16	16:57-0	20:08	0		20:57	0		21:39	0		21:46	0		21:09	0		20:06	0		18:57	70	17:33-0	16:55	0		16:22	0	
7	08:32			07:57			08:55-70	07:02		06:52			05:51			05:15			05:21			06:01			06:50			07:38		09:11-80	07:31			08:18		
	16:37	0		17:28	13		09:07-70	18:18	16:56-0	20:10	0		20:59	0		21:40	0		21:45	0		21:07	0		20:04	0		18:55	71	17:33-0	16:53	0		16:22	0	
8	08:31			07:56			08:53-70	06:59		06:49			05:49			05:14			05:22			06:03			06:52			07:39		09:11-80	07:33			08:19		
	16:38	0		17:30	17		09:09-70	18:20	16:56-0	20:11	0		21:01	0		21:41	0		21:45	0		21:06	0		20:01	0		18:53	72	17:33-0	16:52	0		16:21	0	
9	08:31			07:54			08:52-70	06:57		06:47			05:48			05:14			05:23			06:04			06:53			07:41		09:11-80	07:35			08:20		
	16:40	0		17:32	19		09:10-70	18:21	16:55-0	20:13	0		21:02	0		21:42	0		21:44	0		21:04	0		19:59	0		18:50	71	17:33-0	16:50	0		16:21	0	
10	08:30			07:52			08:51-70	06:55		06:45			05:46			05:13			05:24			06:06			06:55			07:43		09:11-80	07:36			08:22		
	16:41	0		17:33	21		09:11-70	18:23	16:54-0	20:15	0		21:04	0		21:43	0		21:43	0		21:02	0		19:57	0		18:48	70	17:32-0	16:49	0		16:21	0	
11	08:30			07:50			08:50-70	06:53		06:43			05:44			05:13			05:25			06:08			06:57			07:44		09:11-80	07:38			08:23		
	16:42	0		17:35	23		09:12-70	18:25	16:53-0	20:16	0		21:05	0		21:43	0		21:43	0		21:00	0		19:55	0		18:46	69	17:31-0	16:47	0		16:21	0	
12	08:29			07:49			08:50-70	06:51		06:41			05:43			05:13			05:26			06:09			06:58			07:46		09:11-80	07:40			08:24		
	16:44	0		17:37	23		09:12-70	18:26	16:51-0	20:18	0		21:07	0		21:44	0		21:42	0		20:58	0		19:52	0		18:44	66	17:30-0	16:46	0		16:21	0	
13	08:28			07:47			08:49-70	06:48		06:38			05:41			05:12			05:27			06:11			07:00			07:48		09:11-80	07:42			08:25		
	16:45	0		17:39	24		09:12-70	18:28	16:49-0	20:20	0		21:09	0		21:45	0		21:41	0		20:56	0		19:50	0		18:42	63	17:29-0	16:44	0		16:21	0	
14	08:28			07:45			08:49-70	06:46		06:36			05:40			05:12			05:28			06:12			07:01			07:49		09:11-80	07:43			08:25		
	16:47	0		17:41	24		09:12-70	18:30	16:46-0	20:21	0		21:10	0		21:45	0		21:40	0		20:54	0		19:48	0		18:40	60	17:28-0	16:43	0		16:21	0	
15	08:27			07:43			08:49-70	06:44		06:34			05:38			05:12			05:29			06:14			07:03			07:51		09:12-80	07:45			08:26		
	16:48	0		17:43	24		09:12-70	18:32	16:45-0	20:23	0		21:12	0		21:46	0		21:39	0		20:53	0		19:45	0		18:37	55	17:26-0	16:41	0		16:21	0	
16	08:26			07:41			08:49-70	06:42		06:32			05:37			05:12			05:30			06:15			07:04			07:53		09:13-80	07:47			08:27		
	16:50	0		17:44	24		09:12-70	18:33	16:45-0	20:25	0		21:13	0		21:46	0		21:38	0		20:51	0		19:43	0		18:35	48	17:23-0	16:40	0		16:21	0	
17	08:25			07:39			08:50-70	06:39		06:30			05:35			05:12			05:32			06:17			07:06			07:54		09:14-80	07:48			08:28		
	16:51	0		17:46	23		09:12-70	18:35	16:44	09:02-80	20:26	0	21:15	0		21:47	0		21:37	0		20:49	0		19:41	0		18:33	36	17:18-0	16:39	0		16:21	0	
18	08:24			07:37			08:50-70	06:37		07:22-69	06:28	0	05:34			05:12			05:33			06:19			07:07			07:56		09:15-80	07:50			08:29		
	16:53	0		17:48	22		09:11-70	18:37	39	08:59-80	20:28	0	21:16	0		21:47	0		21:36	0		20:47	0		19:38	0		18:31	30	09:44-80	16:37	0		16:21	0	
19	08:23			07:35			08:51-70	06:35		07:22-69	06:26	0	05:33			05:12			05:34			06:20			07:09		08:13-69	07:58		09:16-80	07:52			08:29		
	16:55	0		17:50	20		09:10-70	18:38	25	08:52-80	20:29	0	21:18	0		21:48	0		21:35	0		20:45	0		19:36	10	08:22-69	18:29	28	09:43-80	16:36	0		16:21	0	
20	08:22			07:33			08:52-70	06:32		07:22-69	06:23	0	05:31			05:12			05:35			06:22			07:11	14	08:11-69	08:00		09:18-80	07:53			08:30		
	16:56	0		17:52	18		09:09-70	18:40	22	07:42-69	20:31	0	21:19	0		21:48	0		21:34	0		20:43	0		19:34		08:24-69	18:27	23	09:40-80	16:35	0		16:22	0	
21	08:21			07:31			08:50-80	06:30		07:22-69	06:21		05:30			05:12			05:37			06:23			07:12		08:09-69	08:01		09:21-80	07:55			08:30		
	16:58	0		17:53	18		09:07-70	18:42	20	07:41-69	20:33	0	21:20	0		21:48	0		21:33	0		20:41	0		19:31	17	08:25-69	18:25	18	09:38-70	16:34	0		16:22	0	
22	08:20			07:29			08:47-80	06:28		07:22-69	06:19		05:29			05:12			05:38			06:25			07:14		08:08-69	08:03		09:22-70	07:57			08:31		
	17:00	0		17:55	23		09:09-80	18:43	19	07:40-69	20:34	0	21:22	0		21:48	0		21:32	0		20:38	0		19:29	19	08:26-69	18:23	19	09:40-70	16:33	0		16:23	0	
23	08:19			07:27			08:45-80	06:26		07:23-69	06:17		05:28			05:13			05:39			06:27			07:15		08:07-69	08:05		09:21-70	07:58			08:31		
	17:01	0		17:57	27		09:11-80	18:45	16	07:38-69	20:36	0	21:23	0		21:49	0		21:30	0		20:36	0		19:27	20	08:26-69	18:21	21	09:41-70	16:32	0		16:23	0	
24	08:18			07:25			08:43-80	06:23		07:24-69	06:15		05:26			05:13			05:41			06:28			07:17		08:06-69	08:06		09:20-70	08:00			08:32		
	17:03	0		17:59	31		09:13-80	18:47	13	07:36-69	20:38	0	21:24	0		21:49	0		21:29	0		20:34	0		19:25	21	08:26-69	18:19	22	09:41-70	16:31	0		16:24	0	
25	08:17			07:23			08:41-80	06:21		07:27-69	06:13		05:25			05:13			05:42			06:30			07:19		08:05-69	08:08		09:20-70	08:01			08:32		
	17:05	0		18:01	46		16:50-0	18:48	7	07:33-69	20:39	0	21:26	0		21:49	0		21:28	0		20:32	0		19:22	34	09:40-80	18:17	23	09:42-70	16:30	0		16:24	0	
26	08:15			07:21			08:40-80	07:19		06:11			05:24			05:14			05:43			06:31			07:20		08:05-69	08:10		09:19-70	08:03			08:33		
	17:06	0		18:02	53		16:52-0	19:50	0	20:41	0		21:27	0		21:49	0		21:26	0		20:30	0		19:20	42	09:44-80	18:15	24	09:42-70	16:29	0		16:25	0	
27	08:14			07:19			08:39-80	07:16		06:09			05:23			05:14			05:45			06:33			07:22		08:05-69	08:12		09:19-70	08:05			08:33		
	17:08	0		18:04	57		16:54-0	19:51	0	20:43	0		21:28	0		21:49	0		21:25	0		20:28	0		19:18	46	09:46-80	18:13	24	09:42-70	16:28	0		16:26	0	
28	08:13			07:17			08:38-80	07:14		06:07			05:22			05:15			05:46			06:35			07:23		08:05-69	08:13		09:19-70	08:06			08:33		
	17:10	0		18:06	62		16:55-0	19:53	0	20:44	0		21:30	0		21:49	0		21:23	0		20:26	0		19:15	49	09:48-80	18:11	24	09:42-70	16:27	0		16:26	0	
29	08:11						07:12			06:06			05:21			05:15			05:48			06:36			07:25		08:06-69	07:15		08:19-70	08:08			08:33		
	17:12	0					19:55	0		20:46	0		21:31	0		21:48	0		21:22	0		20:24	0		19:13	60	17:27-0	17:09	24	08:42-70	16:26	0		16:27	0	
30	08:10						07:10			06:04			05:20			05:16			05:49			06:38			07:26		08:07-69	07:17		08:19-70	08:09			08:33		
	17:13	0					19:56	0		20:48	0		21:32	0		21:48	0		21:20	0		20:21	0		19:11	66	17:30-0	17:07	24	08:42-70	16:25	0		16:28	0	
31	08:08						07:07			19:58	0		05:19						05:51			06:39						07:19		08:20-70				08:33		
	17:15	0					19:58	0					21:33	0					21:19	0		20:19	0					17:05	22	08:41-70				16:29	0	
Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	0			620			1248			0			0			0			0			0			398			1410			80			0		

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Gesamtbelastung Schattenrezeptor: SR-045, (Am Alten Brunnen 14, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
1	08:33	10:07	08:07	09:16	-65	07:15			07:05			07:40	-18	06:02	06:46	-79	05:19	06:11	-78	05:16	05:52	-70	05:52	06:56	-79	06:41	07:38	-18	07:28			07:20			15:46	-92	08:10			09:56	-87
	16:30	15:06	-27	17:17	25	09:40	-65	18:08	0	20:00	33	08:13	-29	20:49	19:37	-4	21:34	20:13	-2	21:48	20:11	-2	21:17	20:21	-2	20:17	13	07:50	-18	19:08	0	17:04	28	16:13	-92	16:25	34	14:48	-27
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Gesamtbelastung Schattenrezeptor: SR-046, (Meinkenbrachter Straße 3a, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]		1065			856			496			754			2568			1442			2209			1490			565			791			799			1692	

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Gesamtbelastung Schattenrezeptor: SR-047, (Am Alten Brunnen 20, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	998			802			503			1016			2269			1164			1713			1780			570			746			783			1604		

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Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-048, (Am Alten Brunnen 12, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	929			794			522			1189			2032			1221			1500			1942			563			720			774			1458		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-049, (Meinkenbrachter Straße 5, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	1127			1019			522			769			2589			1256			2092			1512			571			1007			823			1731		

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engineering@noxt.de · 20. August 2025

noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-050, (Meinkenbrachter Straße 5a, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1088			1006			511			875			2433			1088			1864			1659			570			984			814			1688		

noxt! engineering GmbH
Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

Gesamtbelastung Schattenrezeptor: SR-051, (Am Alten Brunnen 10, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	950			990			523			1234			1956			1442			1354			2003			562			949			779			1443		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-052, (Meinkenbrachter Straße 7, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1108			999			517			938			2355			856			1700			1737			577			995			818			1685		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-053, (Brinkweg 2, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	1271			984			570			648			2675			1389			2458			1266			572			1036			906			1810		

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engineering@noxt.de · 20. August 2025

noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-054, (Am Alten Brunnen 8, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Sonne [h]	262			279			368			415			495			483			499			452			380			332			268			247		
Schatten [min]	975			969			535			1276			1578			1888			1303			2057			572			961			786			1421		

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engineering@noxt.de · 20. August 2025

noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-055, (Meinkenbrachter Straße 10, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1439			955			681			543			2548			2452			2862			888			547			1080			1103			1839		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-056, (Meinkenbrachter Straße 7a, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	1121			995			517			947			2338			810			1619			1762			582			1000			823			1692		

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Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

Gesamtbelastung Schattenrezeptor: SR-057, (Am Alten Brunnen 6, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	995			963			546			1307			1798			1708			1291			2101			577			971			794			1410		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-058, (Meinkenbrachter Straße 9, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1243			982			527			806			2520			888			1971			1526			585			1014			882			1776		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-059, (Meinkenbrachter Straße 12, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1287			980			556			739			2614			1078			2190			1397			582			1024			921			1803		

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Gesamtbelastung Schattenrezeptor: SR-060, (Am Alten Brunnen 2, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Gesamtbelastung Schattenrezeptor: SR-061, (Am Alten Brunnen 2a, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1094			936			528			1186			1955			1440			1316			2036			601			1007			819			1443		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-062, (Brinkweg 4, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1505			958			668			585			2710			1614			2764			994			564			1043			1195			1849		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-063, (Am Alten Brunnen 2b, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1112			955			523			1149			2032			1370			1342			2001			596			1022			819			1468		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-064, (Meinkenbrachter Straße 14, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	1452			992			598			683			2678			1334			2378			1238			581			1015			1143			1838		

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Gesamtbelastung Schattenrezeptor: SR-065, (Brinkweg 6, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1528			950			663			595			2734			1474			2731			1003			569			1031			1217			1839		

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Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

Gesamtbelastung Schattenrezeptor: SR-066, (Brinkweg 6a, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1545			958			661			614			2733			1386			2656			1031			575			1027			1246			1832		

noxt! engineering GmbH
Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

Gesamtbelastung Schattenrezeptor: SR-067, (Meinkenbrachter Straße 11, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	1464			1001			562			777			2553			1054			2102			1407			593			1018			1149			1812		

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engineering@noxt.de · 20. August 2025

noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-068, (Brinkweg 8, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1603			908			742			588			2562			1938			2982			881			534			1068			1303			1810		

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Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

Gesamtbelastung Schattenrezeptor: SR-069, (Am Alten Brunnen 5, Sundern)

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Schatten [min]	1187			944			528			1076			2147			1378			1466			1917			604			1046			858			1465		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-070, (Meinkenbrachter Straße 13, Sundern)

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Schatten [min]	1608			943			645			701			2627			1095			2466			1129			592			1002			1313			1805		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-071, (August-Essleben-Straße 2, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1676			885			891			657			2096			2624			2940			781			505			1083			1507			1618		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-072, (Meinkenbrachter Straße 18, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Sonne [h]		262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]		1712			898			792			679			2338			2196			2838			902			530			1044			1473			1576		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-073, (August-Essleben-Straße 4a, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1654			904			975			657			1821			2882			2777			732			508			1102			1571			1630		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-074, (August-Essleben-Straße 4b, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1651			915			1014			650			1690			3025			2699			705			500			1125			1592			1610		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-075, (Meinkenbrachter Straße 15, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1728			901			773			717			2283			1996			2701			958			543			1027			1509			1562		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-076, (August-Essleben-Straße 6, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1651			929			1033			652			1645			2875			2567			737			507			1124			1637			1573		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-077, (August-Essleben-Straße 8, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1652			942			1064			649			1567			2765			2394			757			511			1119			1647			1492		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-078, (Meinkenbrachter Straße 22, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1685			903			969			682			1810			2420			2533			799			513			1092			1636			1592		

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Gesamtbelastung Schattenrezeptor: SR-079, (Meinkenbrachter Straße 17, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1715			897			837			751			2045			2119			2579			907			530			1047			1607			1598		

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engineering@noxt.de · 20. August 2025

Gesamtbelastung Schattenrezeptor: SR-080, (Meinkenbrachter Straße 19, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]		1717			911			915			736			2174			2146			2745			898			524			1046			1691			1571		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-081, (Meinkenbrachter Straße 24, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	2007			951			1050			671			1942			2393			2624			850			510			1106			1879			1894		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-082, (Zum Bauerhahn 1, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1410			911			834			872			1641			2350			2082			1017			538			1013			1572			1130		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-083, (Zur Rohmke 2, Sundern)

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-084, (Zum Bauerhahn 2, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	2044			953			1040			709			1519			1780			949			515			1086			1943			1948				

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engineering@noxt.de · 20. August 2025

noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-085, (Zur Rohmke 4, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1937			1143			1251			647			1853			1527			904			708			1163			1915			1984					

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-086, (Zur Rohmke 6, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1922			1284			1242			646			1109			1625			1321			865			818			1184			1898			2003		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-087, (Zum Bauerhahn 20, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]		1812			892			605			1014			2034			2799			2509			1305			655			1082			1467			944	

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-088, (Meinkenbrachter Straße 26, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]		2011			1074			1263			661			1240			1451			1383			1019			663			1127			1985			2054		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-089, (Zum Bauerhahn 8, Sundern)

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Sonne [h]	262			279			368			415			495			483			499			452			380			332			268			247		
Schatten [min]	1600			902			855			1004			2836			1637			2275			1143			731			1034			1612			1069		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-090, (Zum Bauerhahn 18, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	1864			877			756			1038			2100			2824			2603			1310			768			1154			1433			1142		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-091, (Zum Bauerhahn 6, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]		1494			916			974			943			1419			2560			1992			1067			690			1003			1666			1189	

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Gesamtbelastung Schattenrezeptor: SR-092, (Zur Rohmke 3, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	1946			1298			1262			657			1161			1344			1254			933			807			1191			1934			2085		

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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-093, (Zur Rohmke 8, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1994			1517			1202			590			1205			882			1136			690			1245			1321			1840			1696		

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Gesamtbelastung Schattenrezeptor: SR-094, (Zum Bauerhahn 16, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1894			863			761			1294			2174			2849			2704			1571			777			1184			1408			1276		

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Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

Gesamtbelastung Schattenrezeptor: SR-095, (Zur Rohmke 8a, Sundern)

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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noxt! engineering

Gesamtbelastung Schattenrezeptor: SR-096, (Meinkenbrachter Straße 31, Sundern)

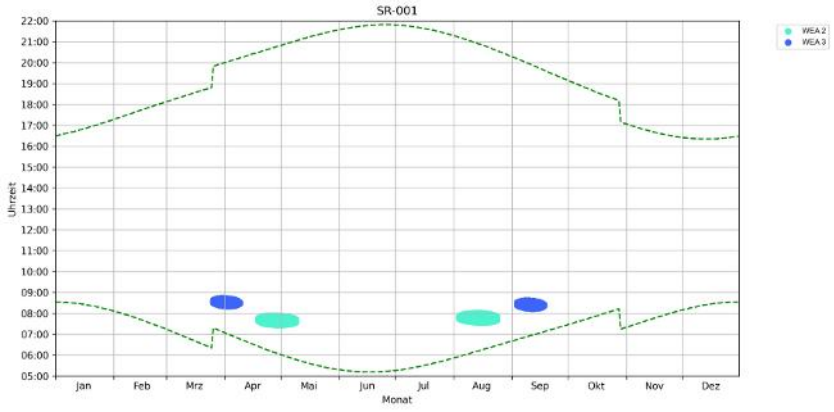
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	17:15	78	16:34-27				19:58	37	08:50-31				21:33	16	20:44-3				21:19	75	20:11-4	20:19	22	07:48-30				17:05	51	16:08-27				16:29	76	15:27-24	
Sonne [h]	262			279			368			415			495			483			499			452			380			332			268			247		
Schatten [min]	2460			1178			1389			907			1059			1702			1145			1550			911			1160			2286			2445		

noxt! engineering GmbH
Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

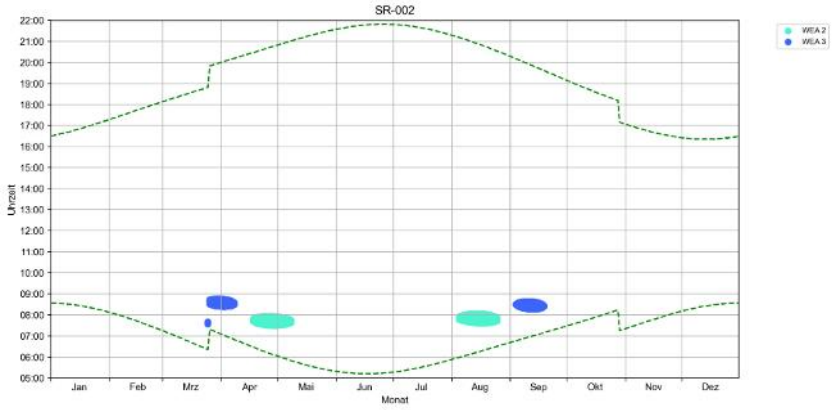
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B Grafischer Kalender der Gesamtbelastung pro SR

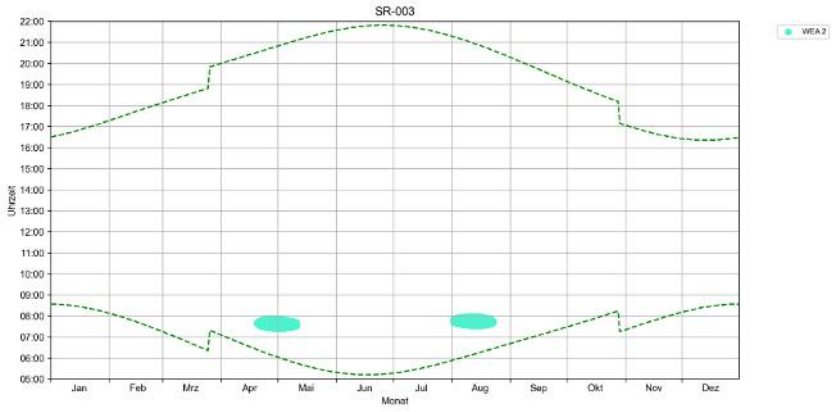
Nachfolgend ist der grafische Kalender der 96 untersuchten Schattenrezeptoren mit den Schattenzeiten je Schattenrezeptor über das gesamte Jahr dargestellt.



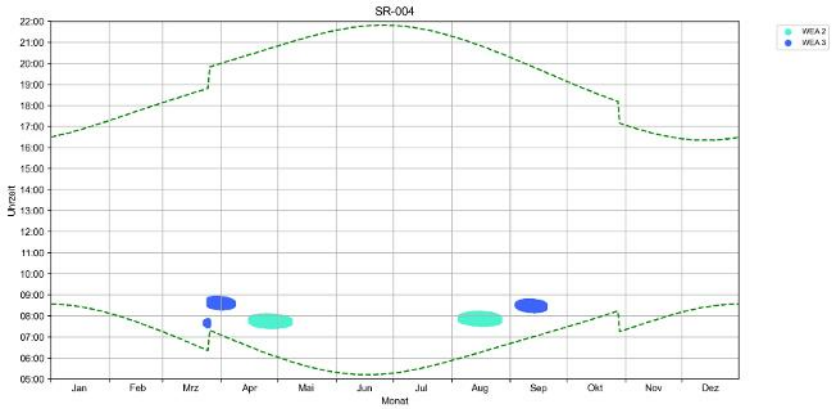
Grafischer Schattenkalender für SR-001



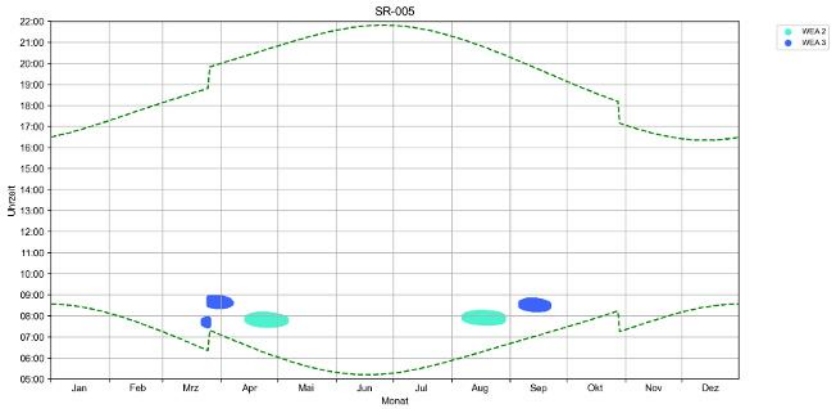
Grafischer Schattenkalender für SR-002



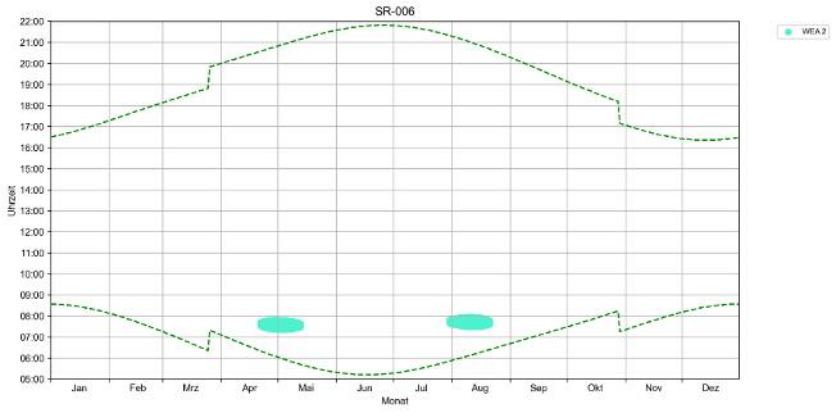
Grafischer Schattenkalender für SR-003



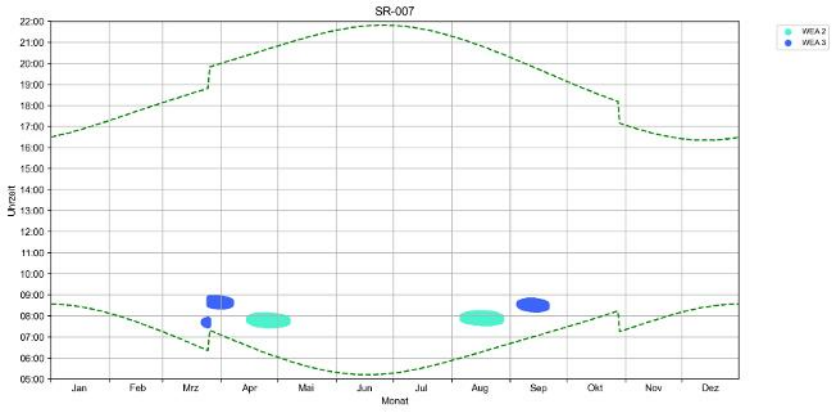
Grafischer Schattenkalender für SR-004



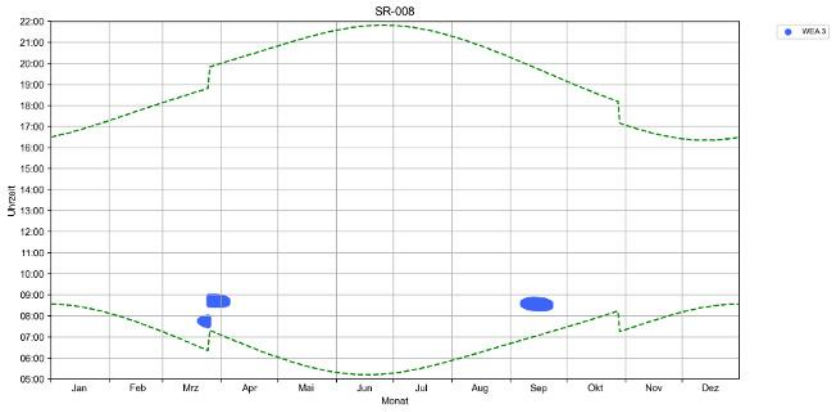
Grafischer Schattenkalender für SR-005



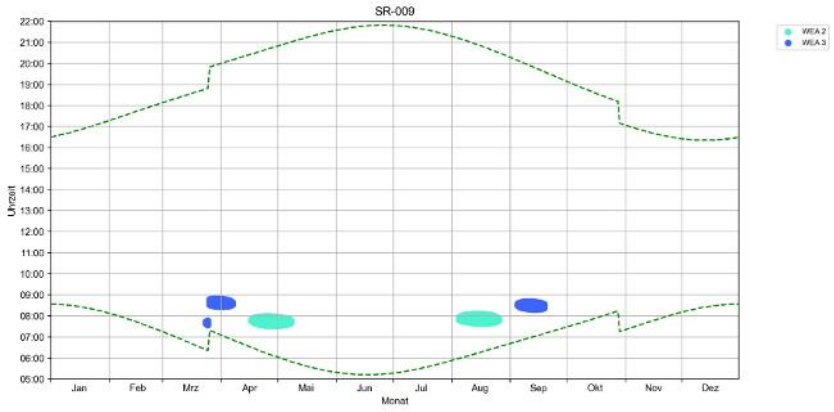
Grafischer Schattenkalender für SR-006



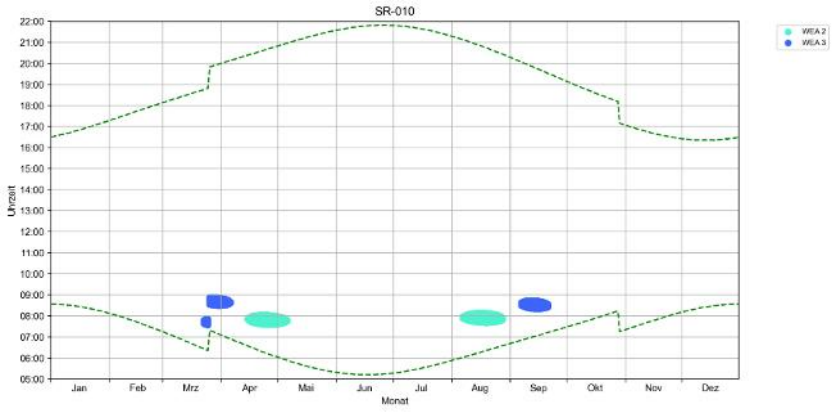
Grafischer Schattenkalender für SR-007



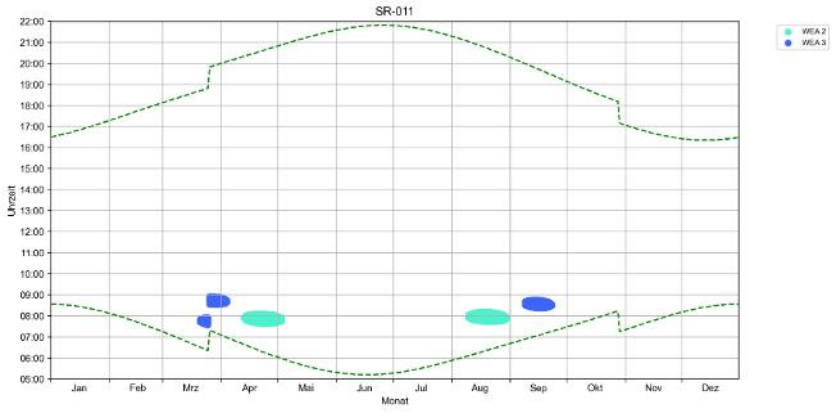
Grafischer Schattenkalender für SR-008



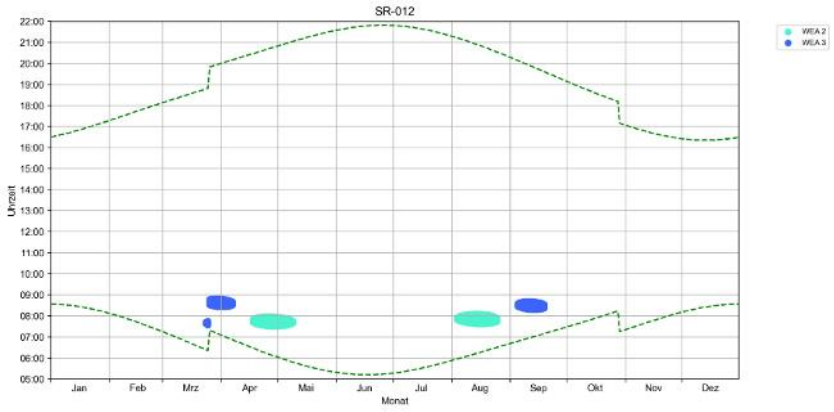
Grafischer Schattenkalender für SR-009



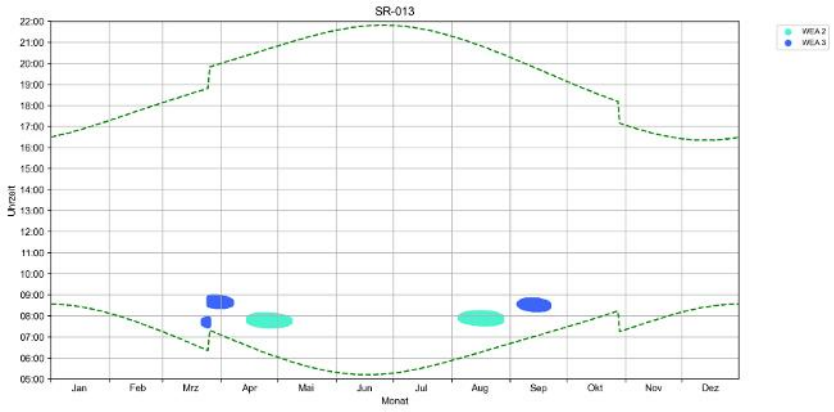
Grafischer Schattenkalender für SR-010



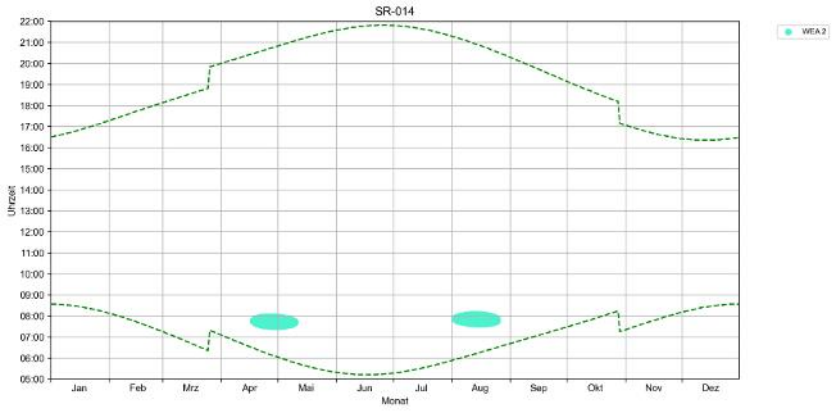
Grafischer Schattenkalender für SR-011



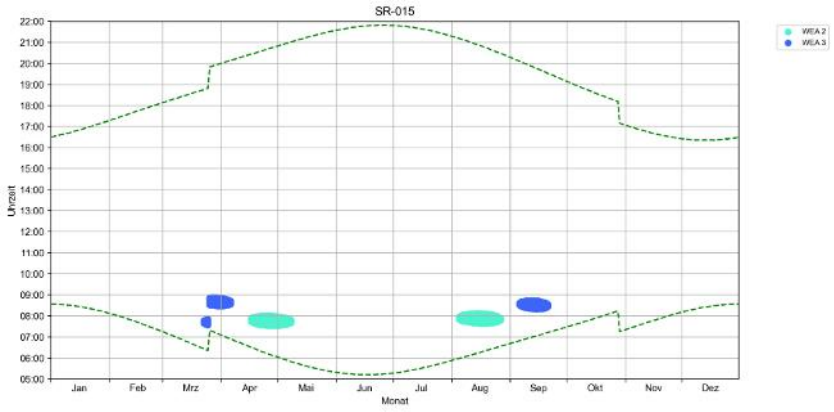
Grafischer Schattenkalender für SR-012



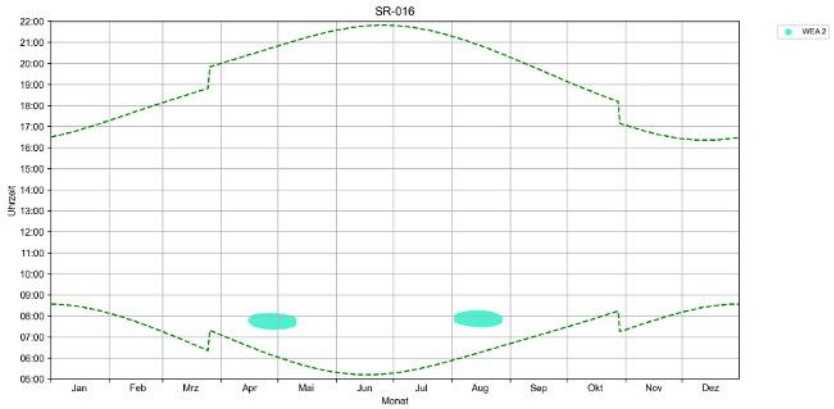
Grafischer Schattenkalender für SR-013



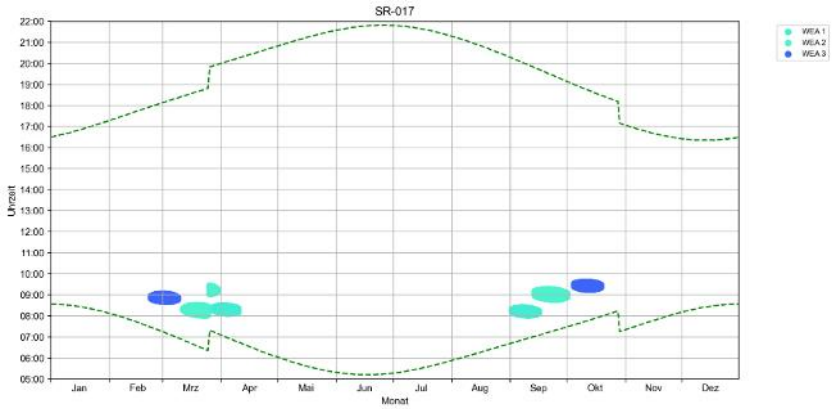
Grafischer Schattenkalender für SR-014



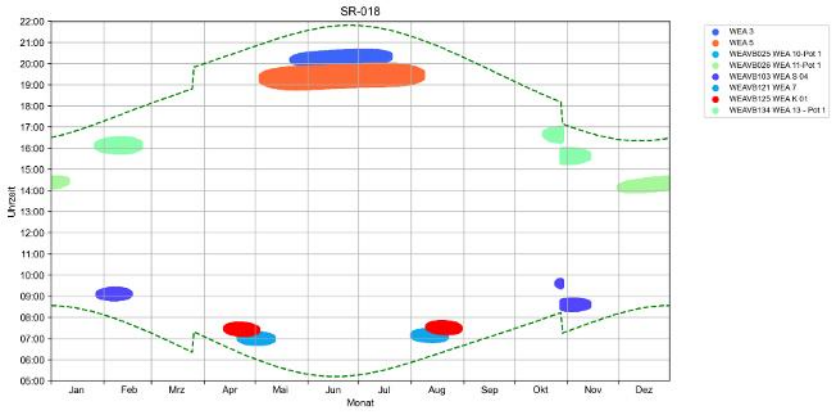
Grafischer Schattenkalender für SR-015



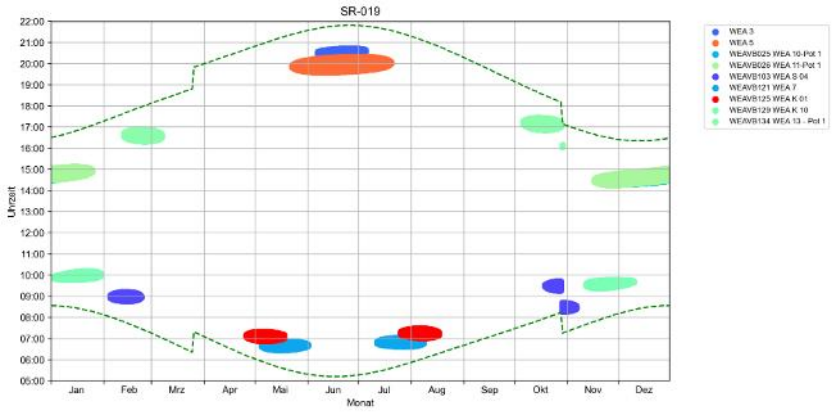
Grafischer Schattenkalender für SR-016



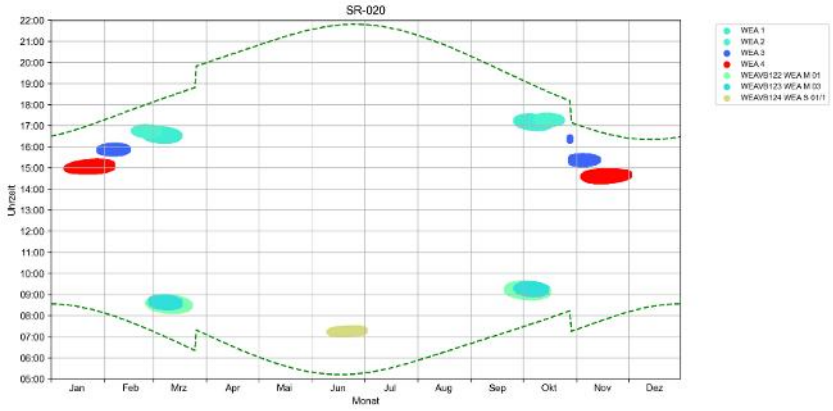
Grafischer Schattenkalender für SR-017



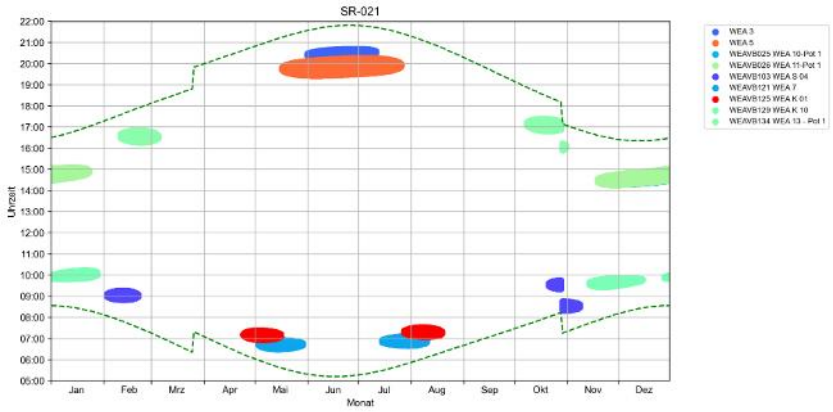
Grafischer Schattenkalender für SR-018



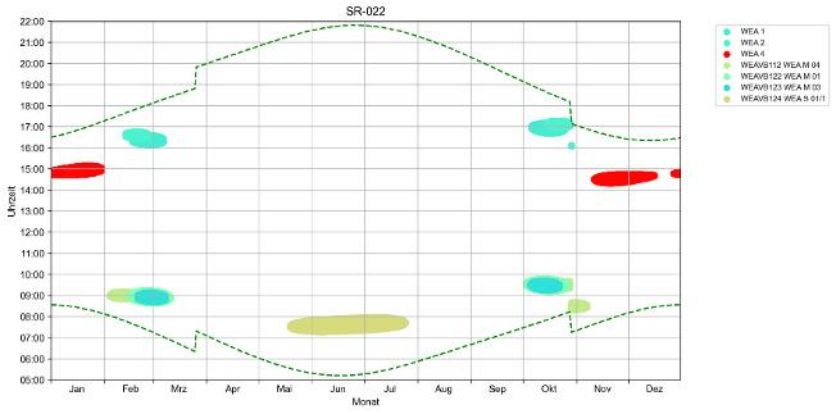
Grafischer Schattenkalender für SR-019



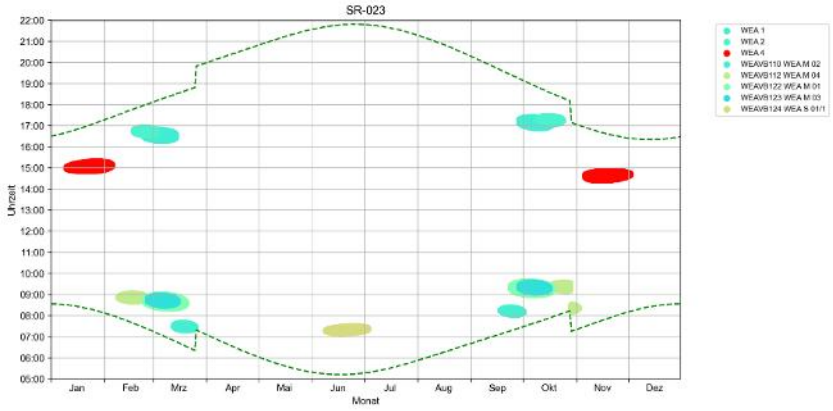
Grafischer Schattenkalender für SR-020



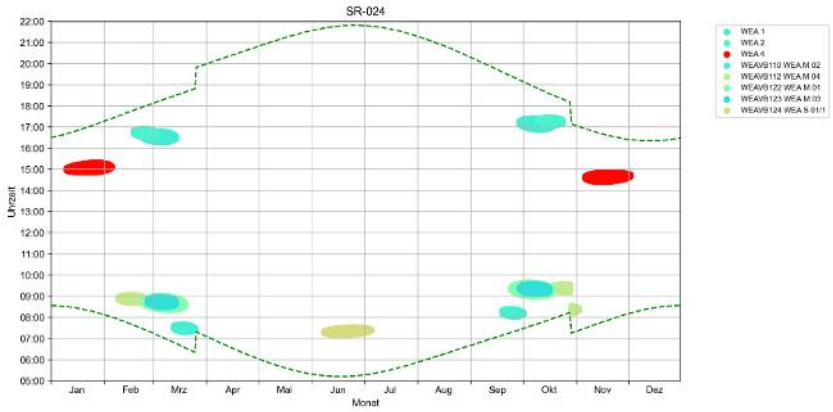
Grafischer Schattenkalender für SR-021



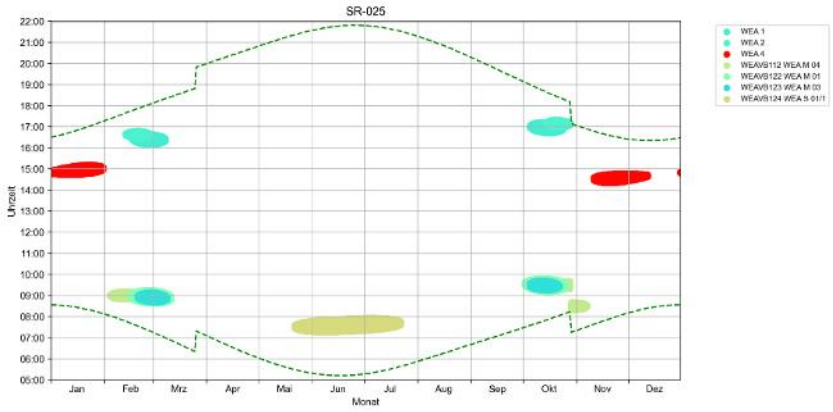
Grafischer Schattenkalender für SR-022



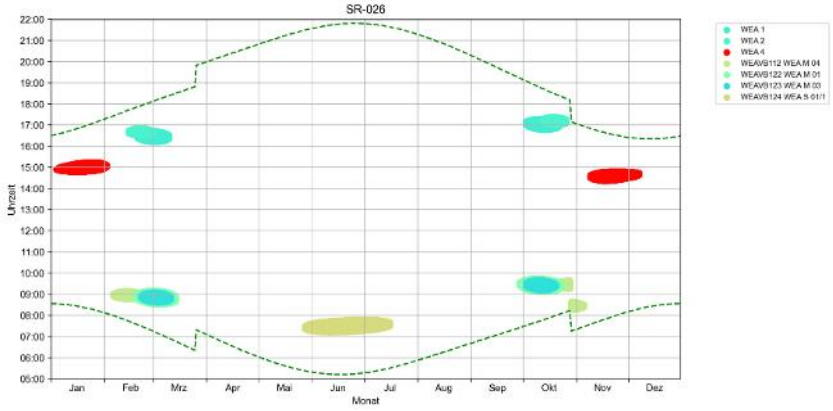
Grafischer Schattenkalender für SR-023



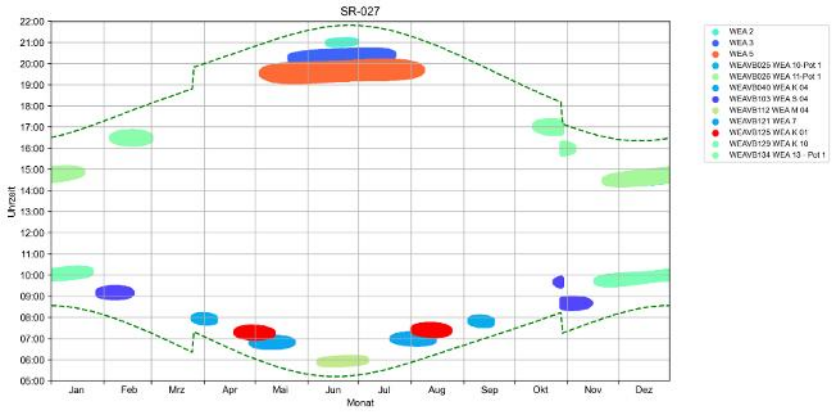
Grafischer Schattenkalender für SR-024



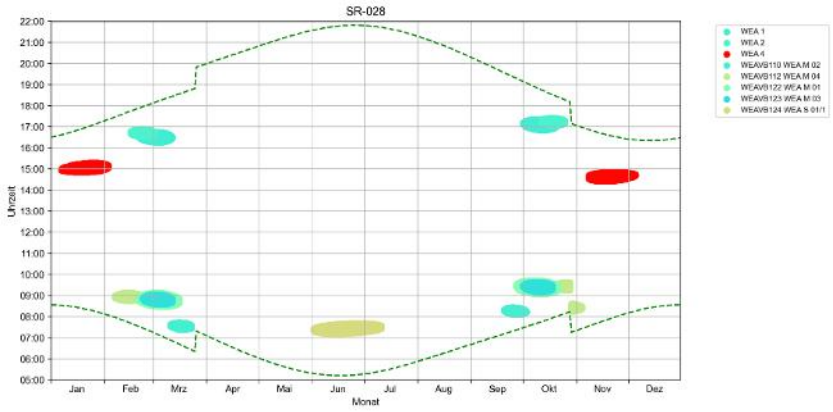
Grafischer Schattenkalender für SR-025



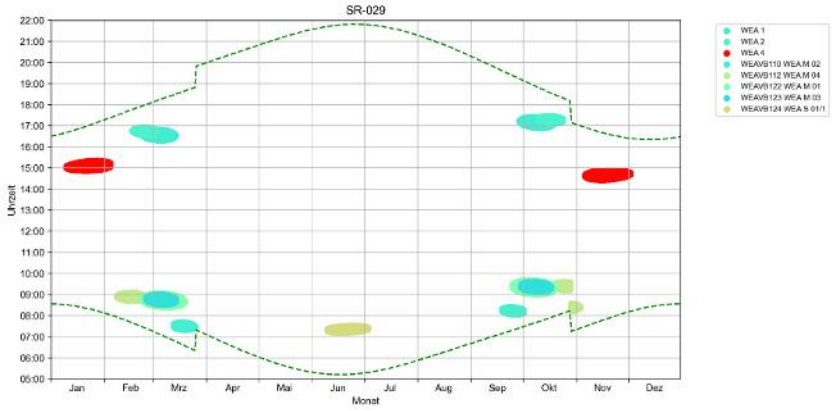
Grafischer Schattenkalender für SR-026



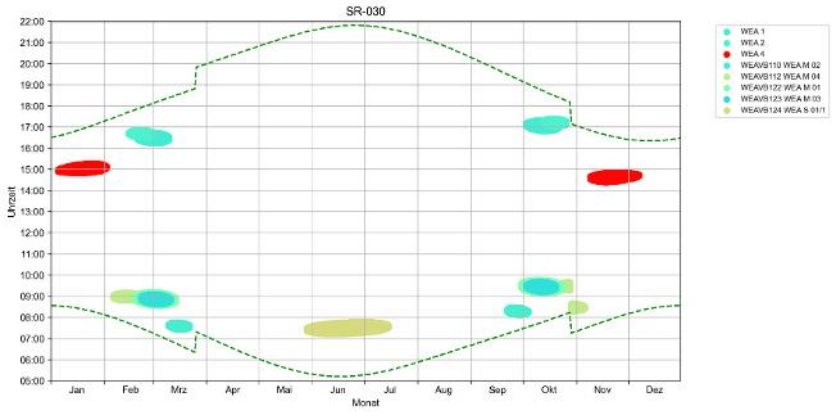
Grafischer Schattenkalender für SR-027



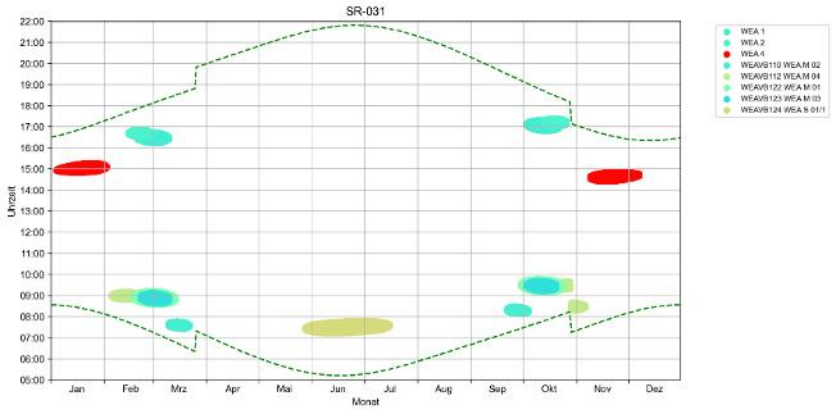
Grafischer Schattenkalender für SR-028



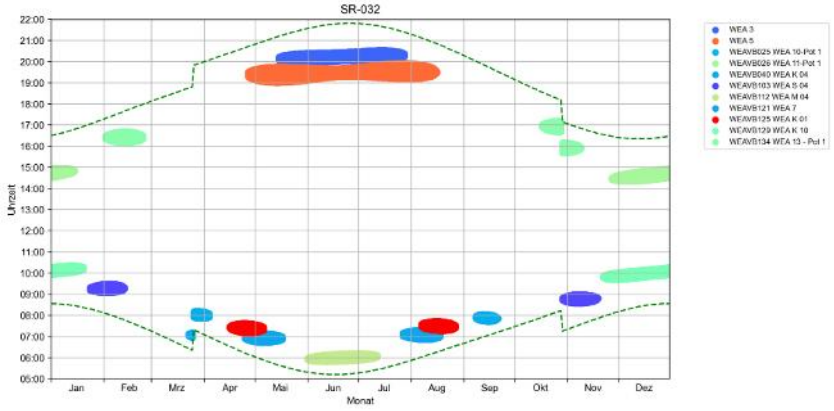
Grafischer Schattenkalender für SR-029



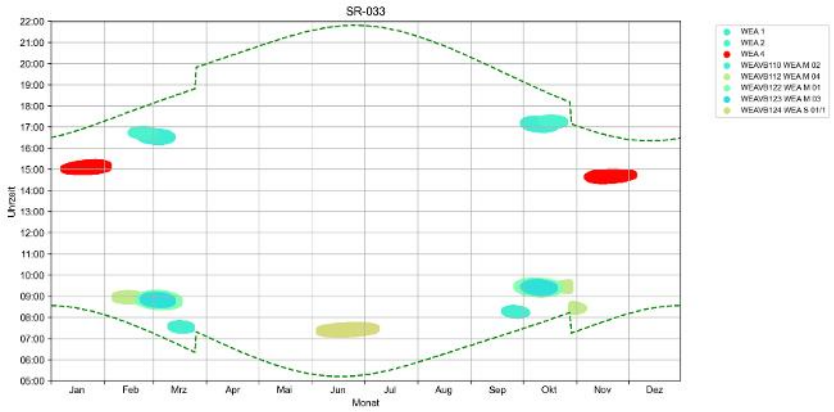
Grafischer Schattenkalender für SR-030



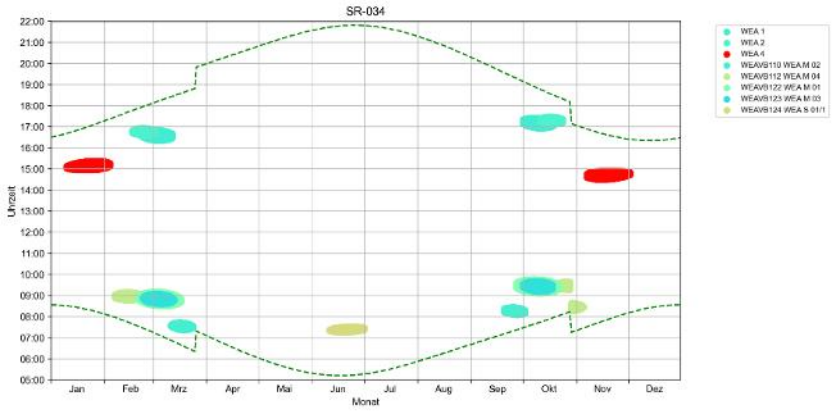
Grafischer Schattenkalender für SR-031



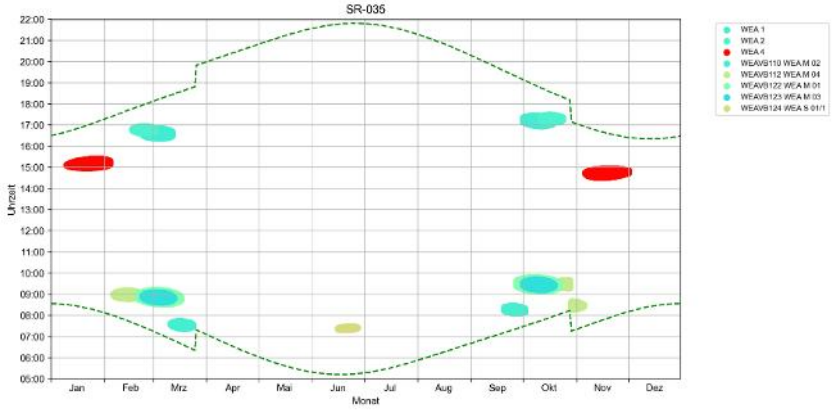
Grafischer Schattenkalender für SR-032



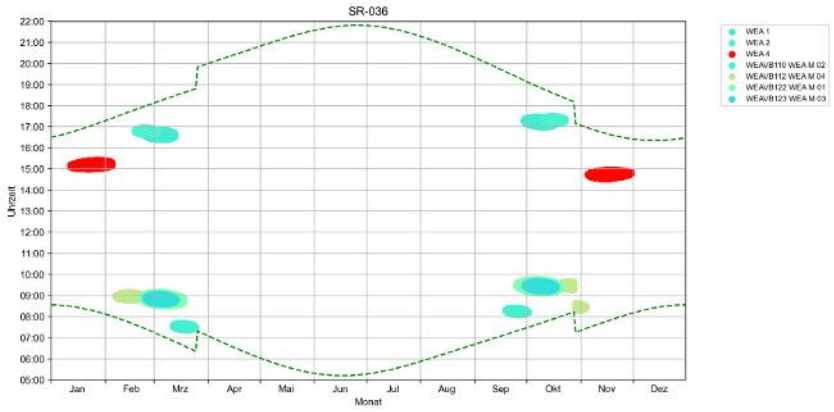
Grafischer Schattenkalender für SR-033



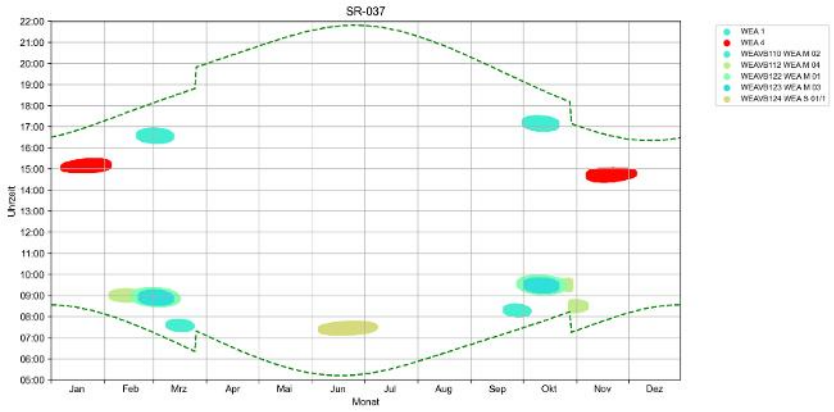
Grafischer Schattenkalender für SR-034



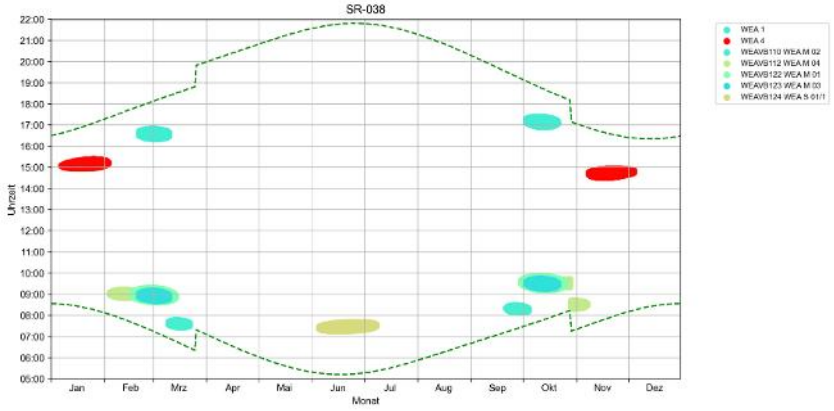
Grafischer Schattenkalender für SR-035



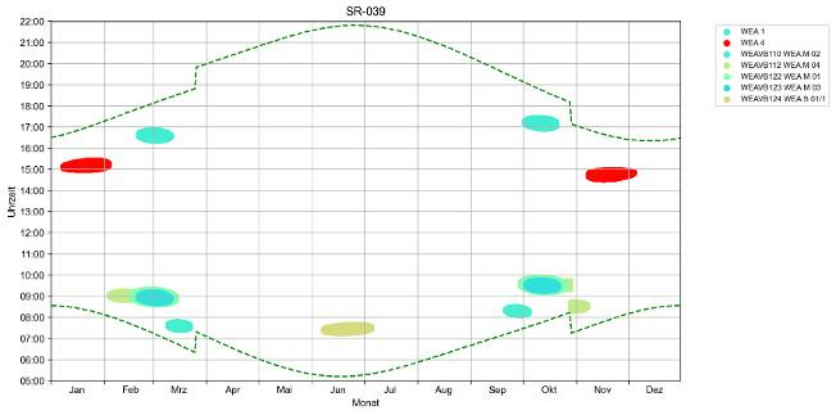
Grafischer Schattenkalender für SR-036



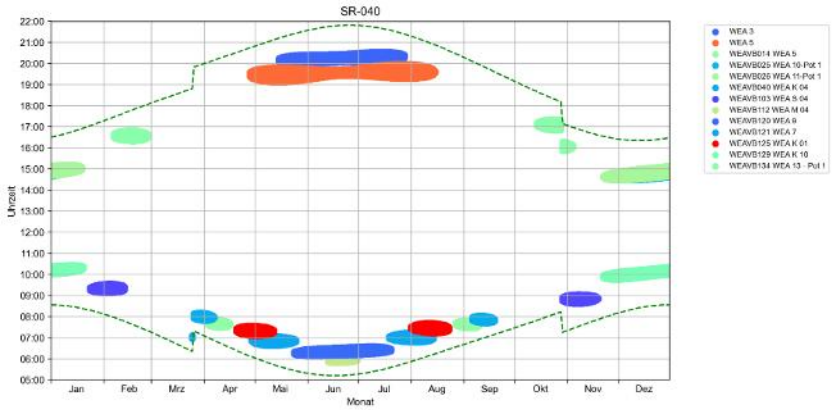
Grafischer Schattenkalender für SR-038



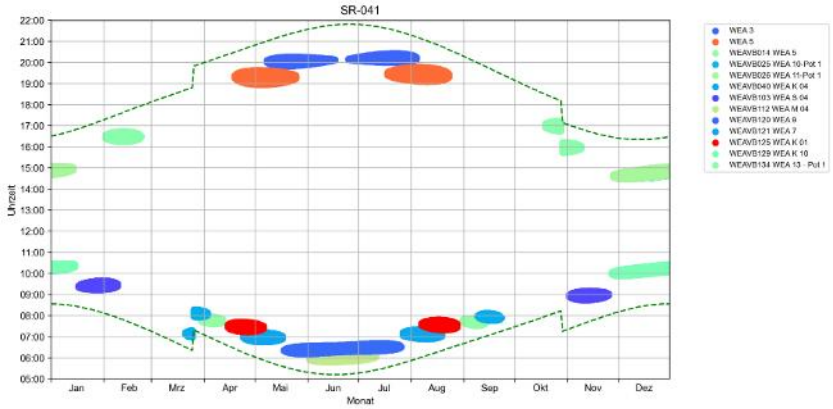
Grafischer Schattenkalender für SR-038



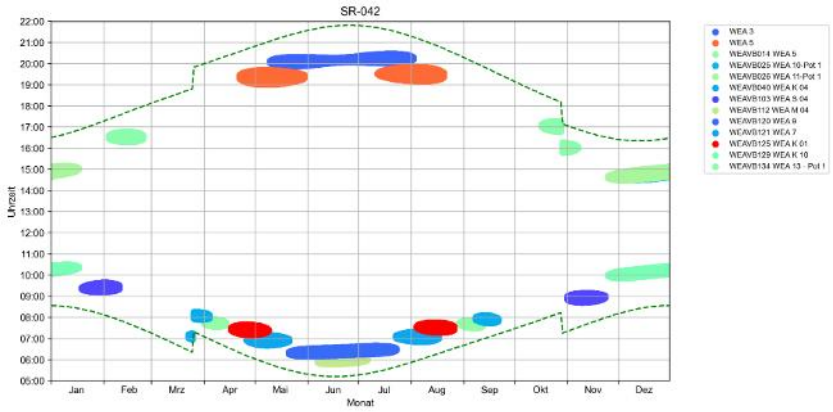
Grafischer Schattenkalender für SR-039



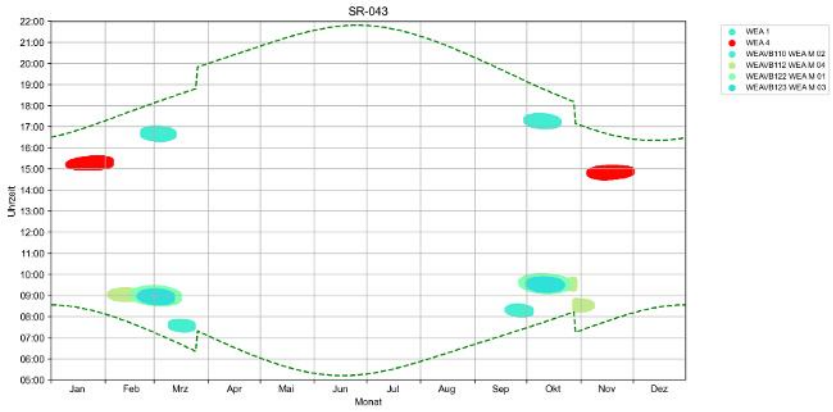
Grafischer Schattenkalender für SR-040



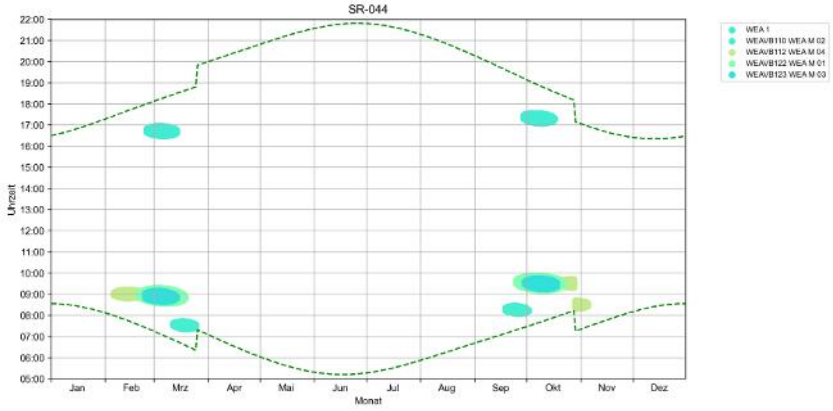
Grafischer Schattenkalender für SR-041



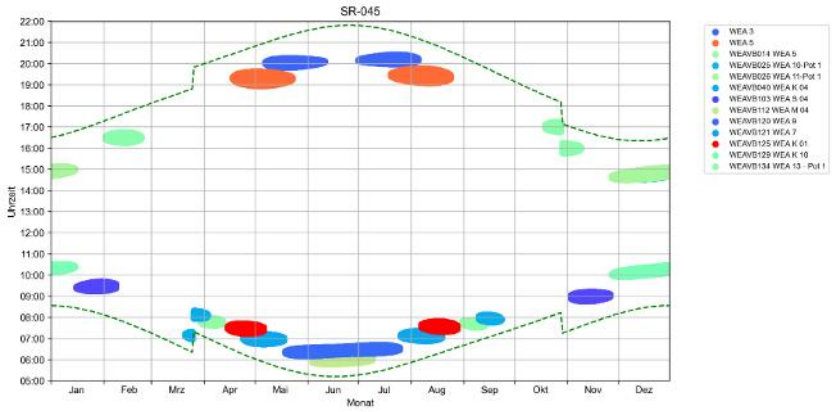
Grafischer Schattenkalender für SR-042



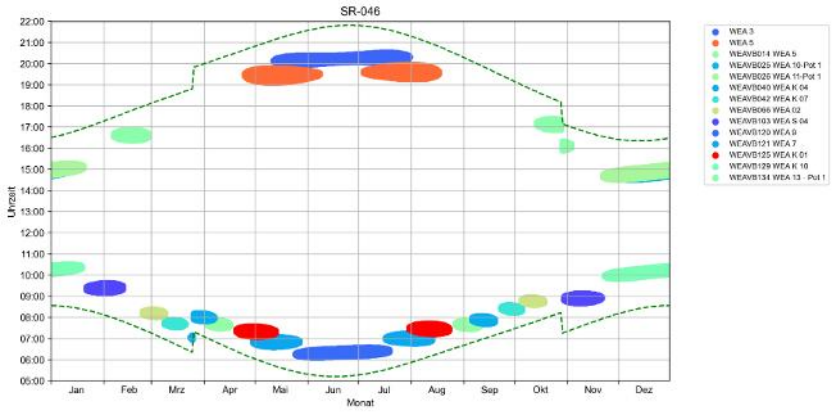
Grafischer Schattenkalender für SR-043



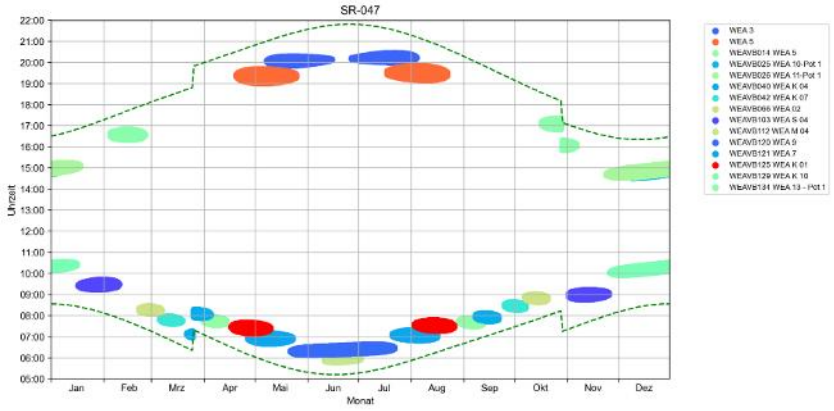
Grafischer Schattenkalender für SR-044



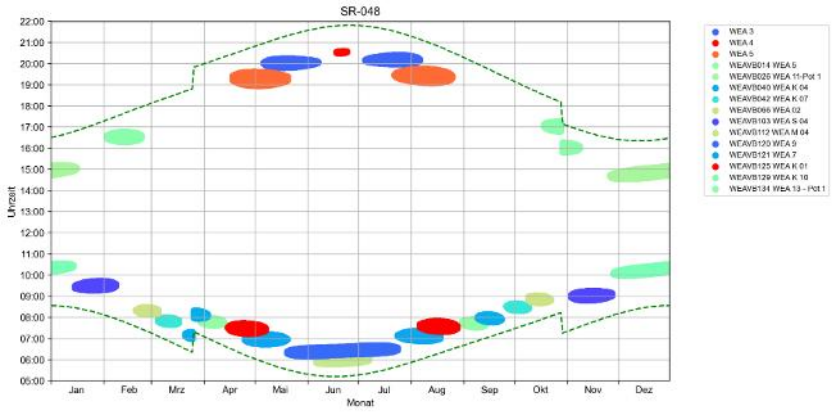
Grafischer Schattenkalender für SR-045



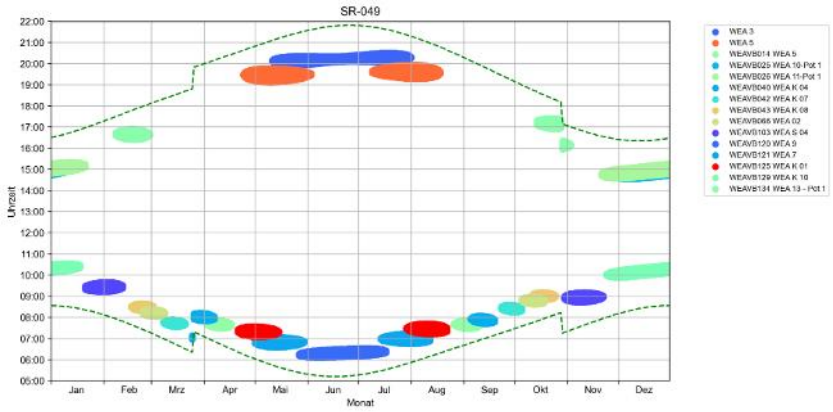
Grafischer Schattenkalender für SR-046



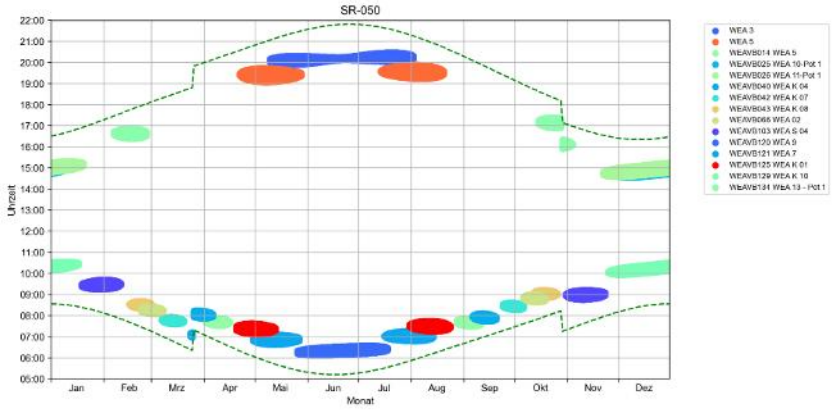
Grafischer Schattenkalender für SR-047



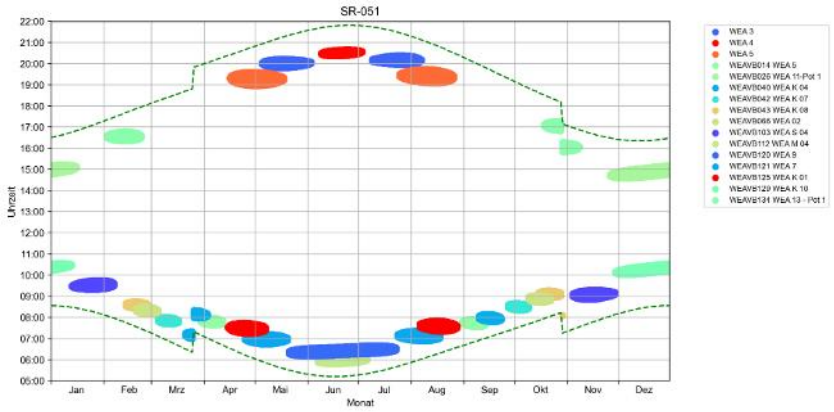
Grafischer Schattenkalender für SR-048



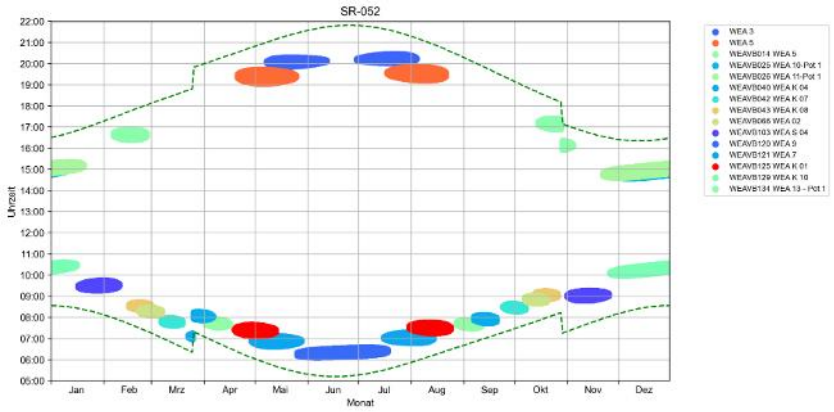
Grafischer Schattenkalender für SR-049



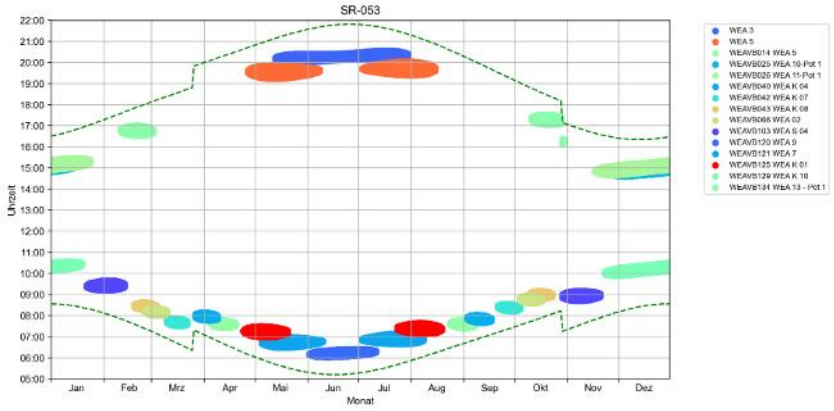
Grafischer Schattenkalender für SR-050



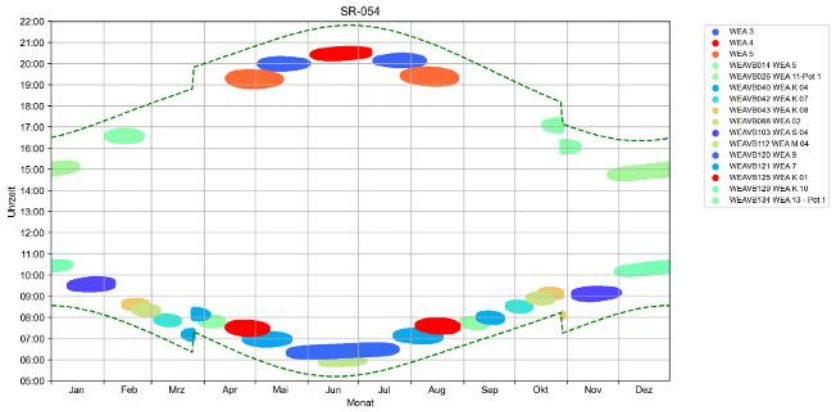
Grafischer Schattenkalender für SR-051



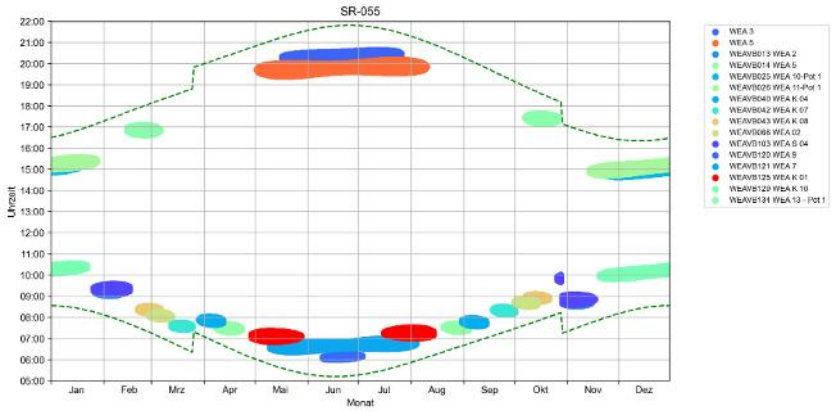
Grafischer Schattenkalender für SR-052



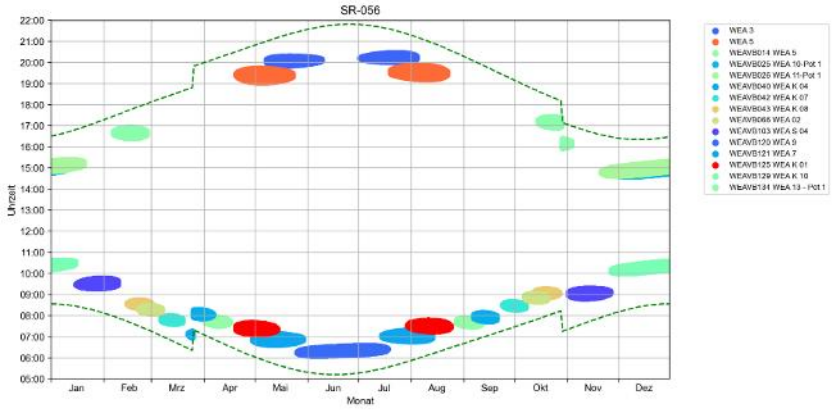
Grafischer Schattenkalender für SR-053



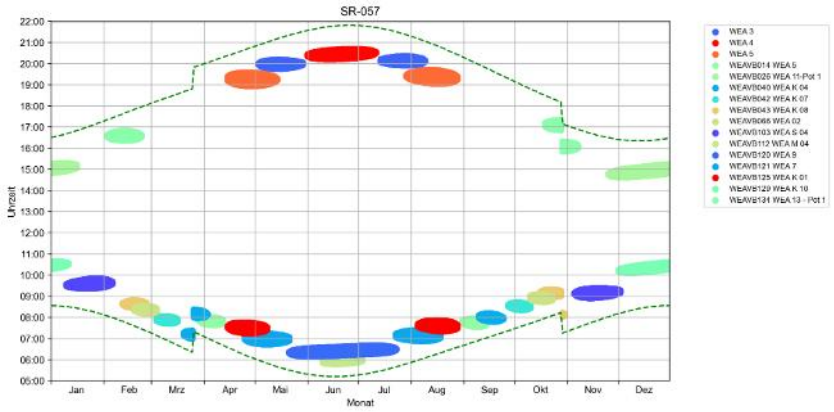
Grafischer Schattenkalender für SR-054



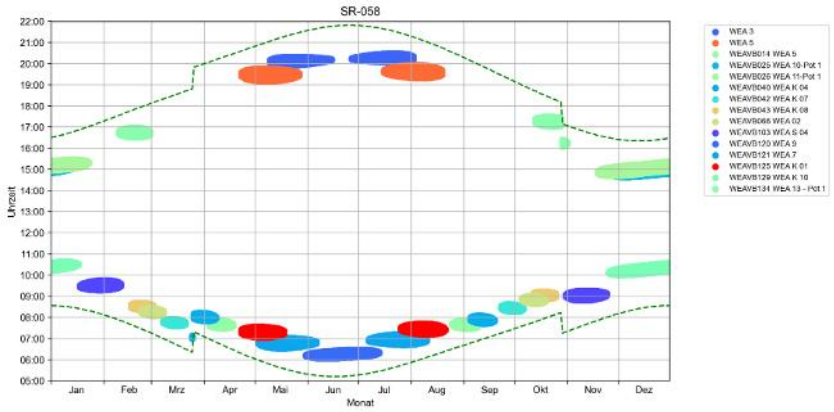
Grafischer Schattenkalender für SR-055



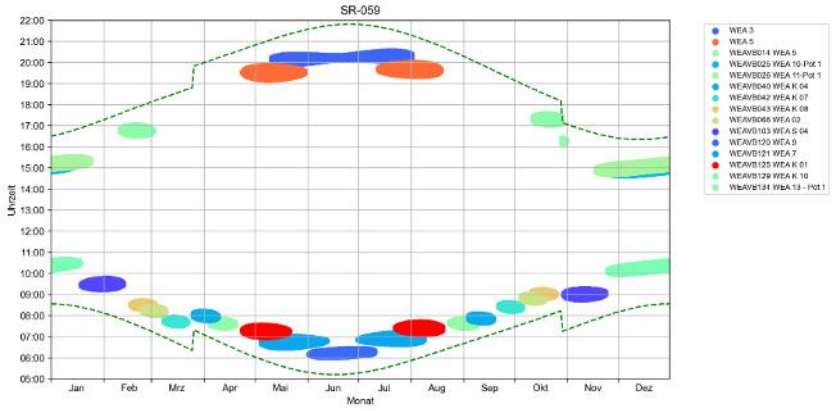
Grafischer Schattenkalender für SR-056



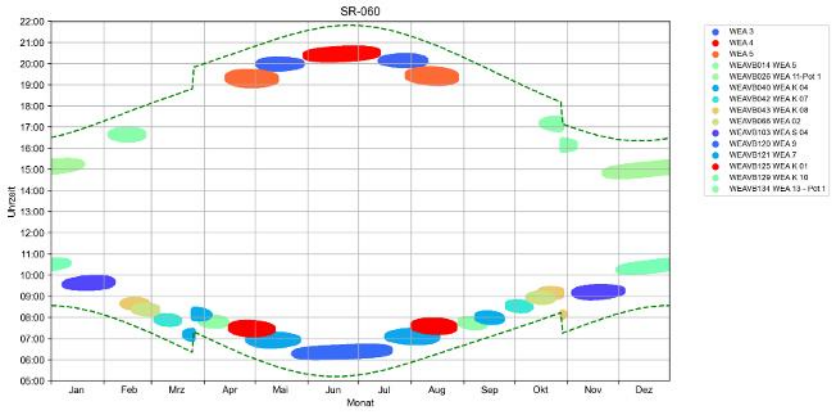
Grafischer Schattenkalender für SR-057



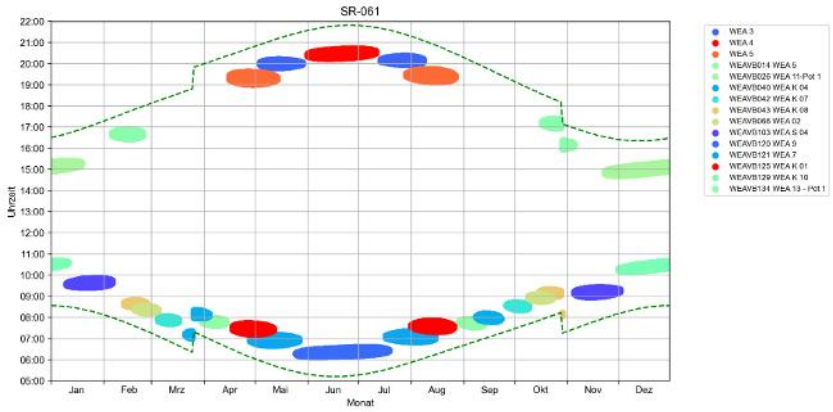
Grafischer Schattenkalender für SR-058



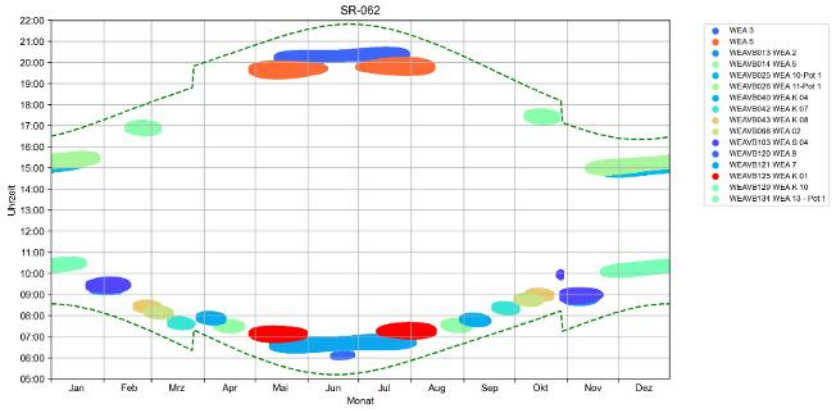
Grafischer Schattenkalender für SR-059



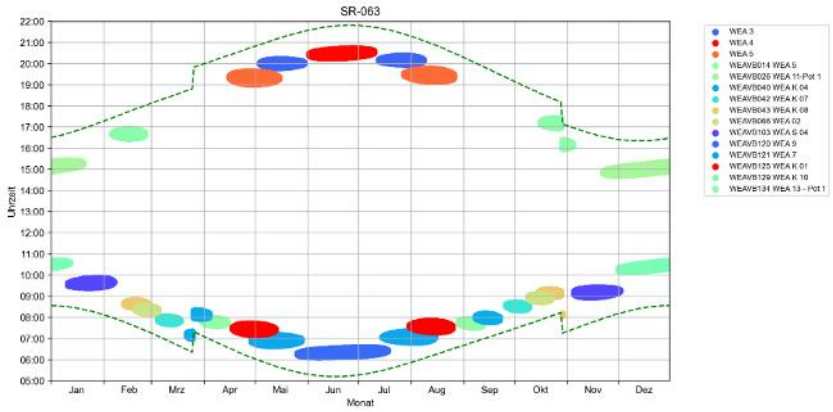
Grafischer Schattenkalender für SR-060



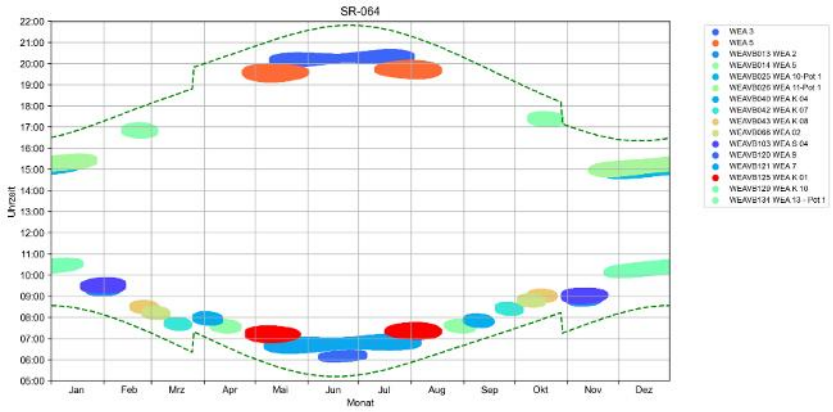
Grafischer Schattenkalender für SR-061



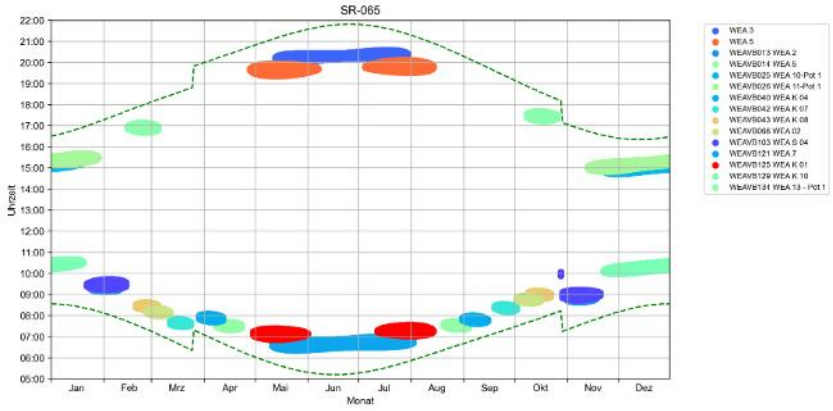
Grafischer Schattenkalender für SR-062



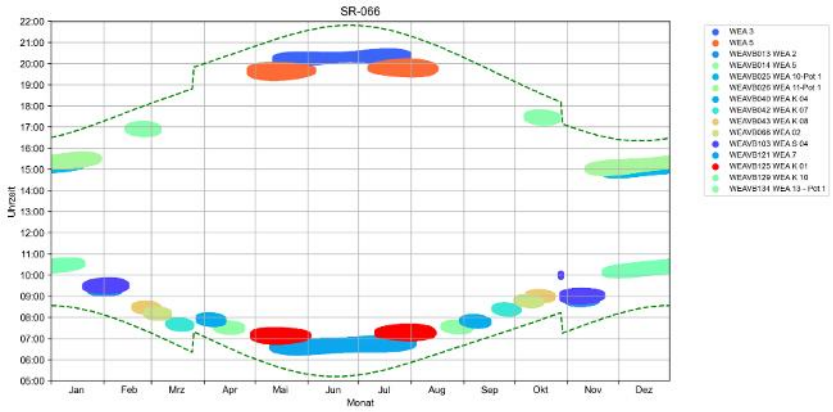
Grafischer Schattenkalender für SR-063



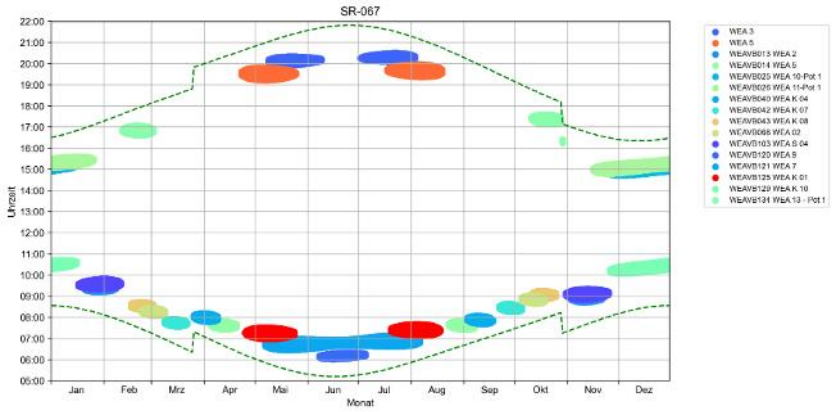
Grafischer Schattenkalender für SR-064



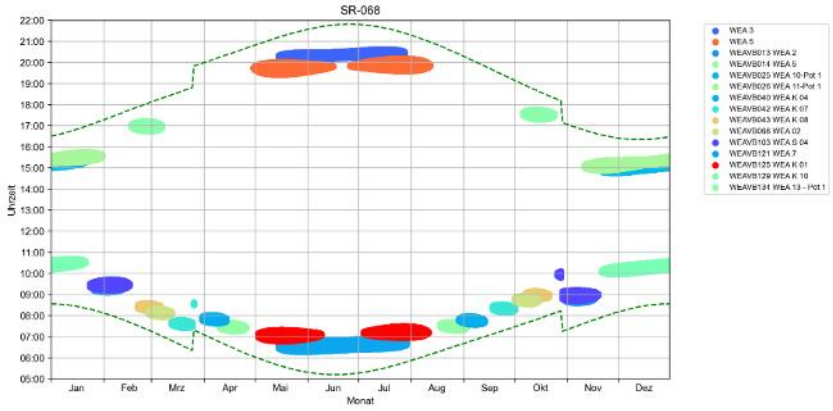
Grafischer Schattenkalender für SR-065



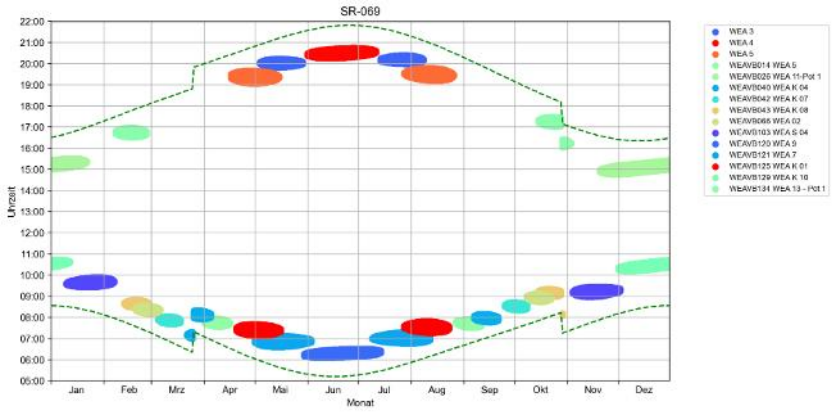
Grafischer Schattenkalender für SR-066



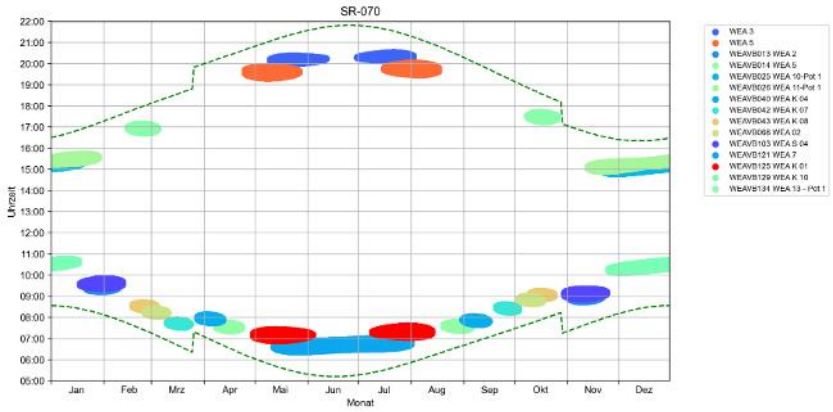
Grafischer Schattenkalender für SR-067



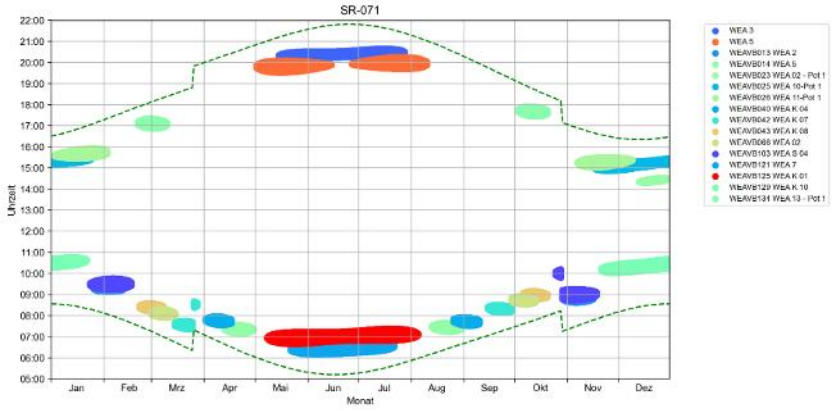
Grafischer Schattenkalender für SR-068



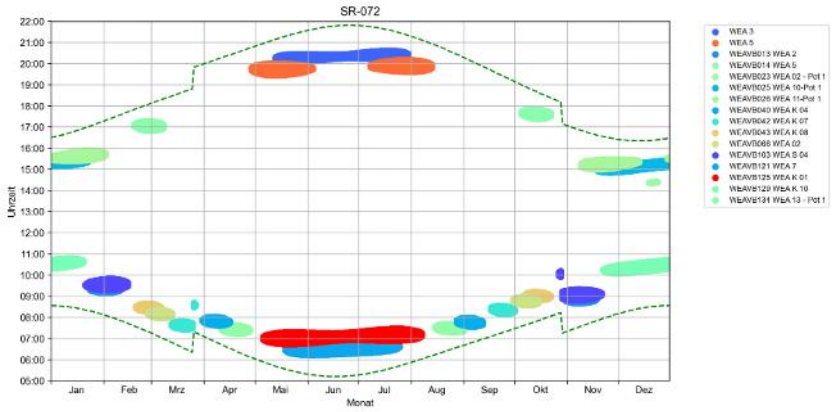
Grafischer Schattenkalender für SR-069



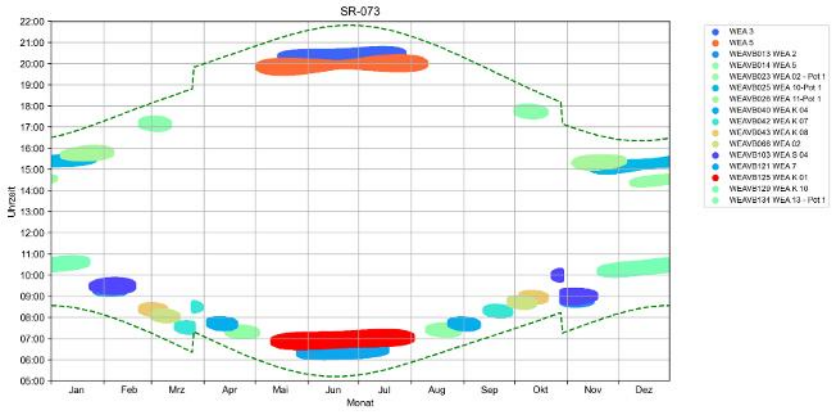
Grafischer Schattenkalender für SR-070



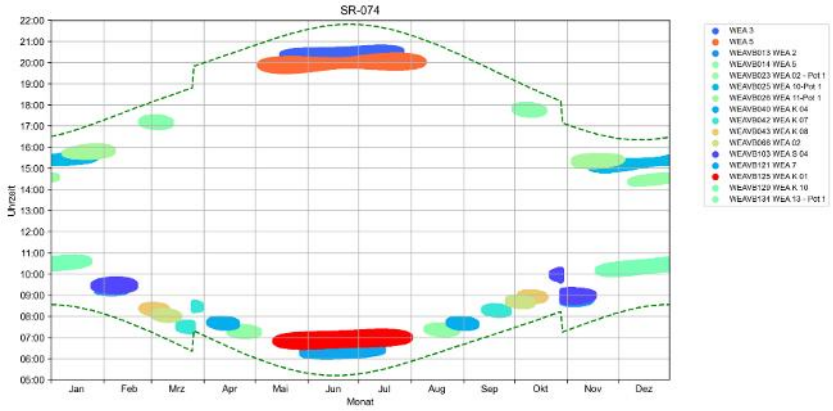
Grafischer Schattenkalender für SR-071



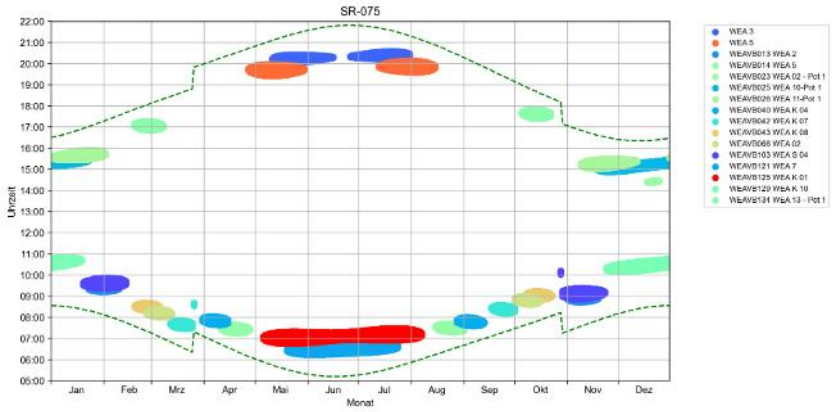
Grafischer Schattenkalender für SR-072



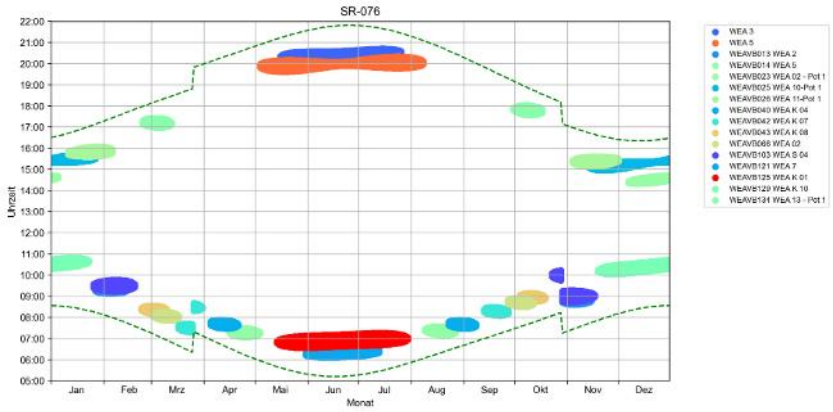
Grafischer Schattenkalender für SR-073



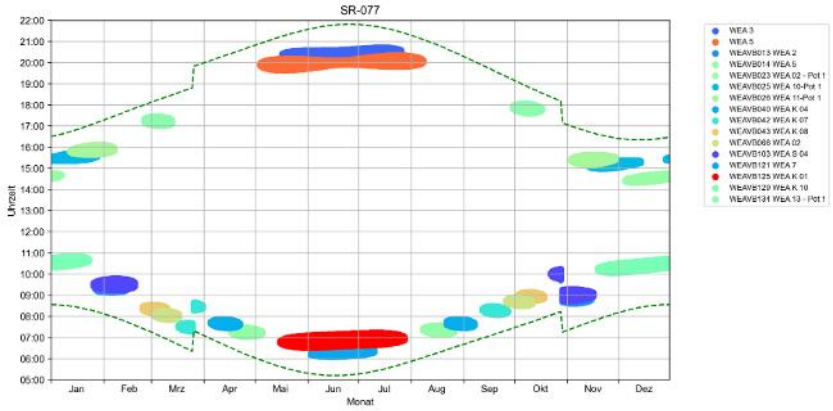
Grafischer Schattenkalender für SR-074



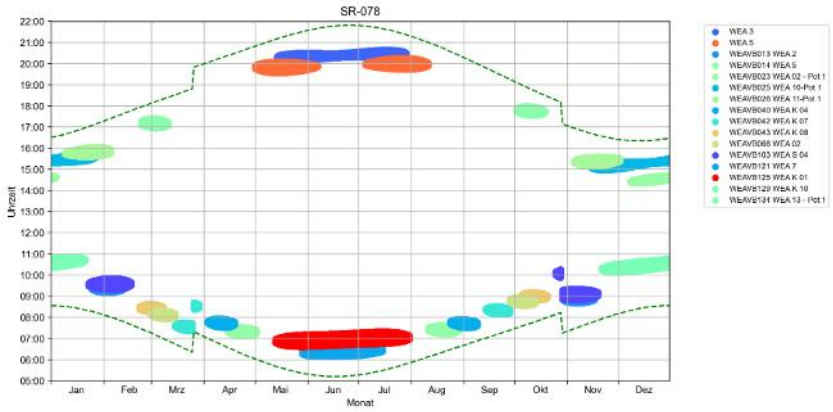
Grafischer Schattenkalender für SR-075



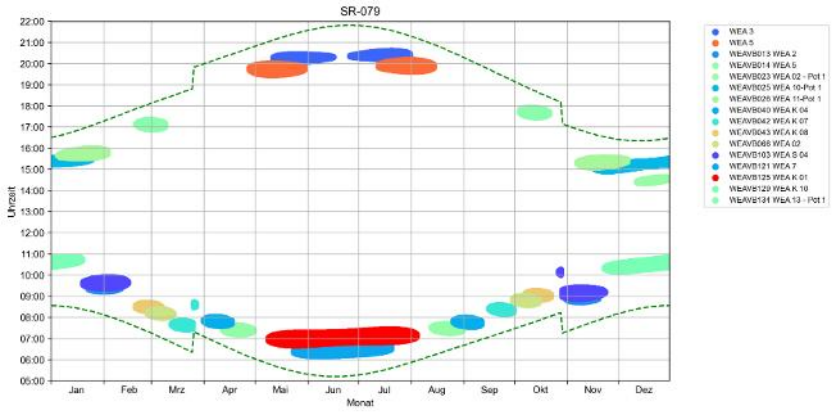
Grafischer Schattenkalender für SR-076



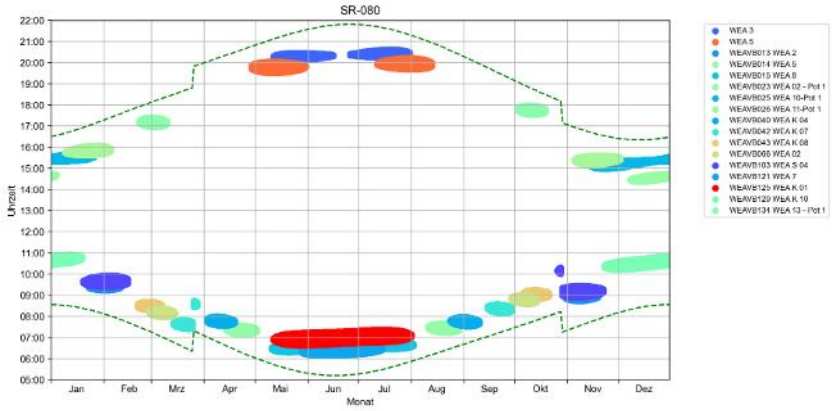
Grafischer Schattenkalender für SR-077



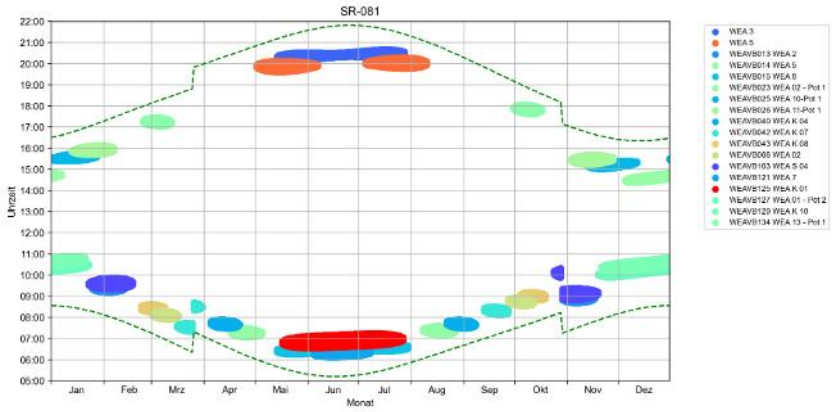
Grafischer Schattenkalender für SR-078



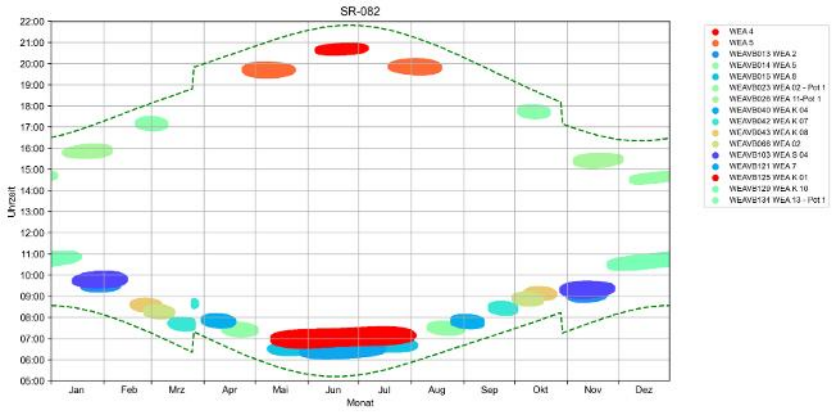
Grafischer Schattenkalender für SR-079



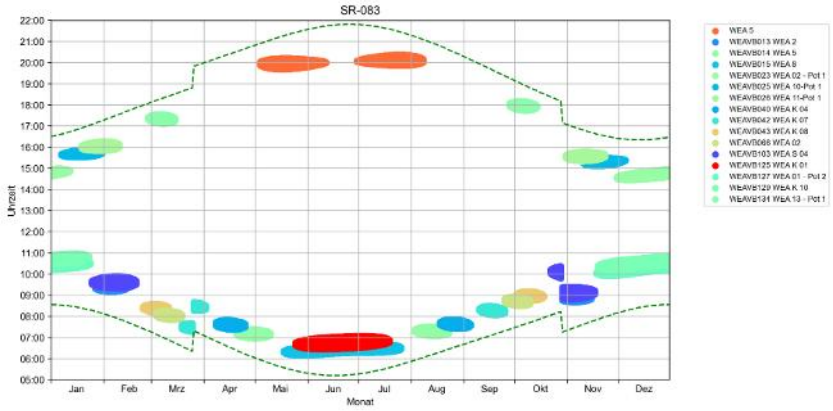
Grafischer Schattenkalender für SR-080



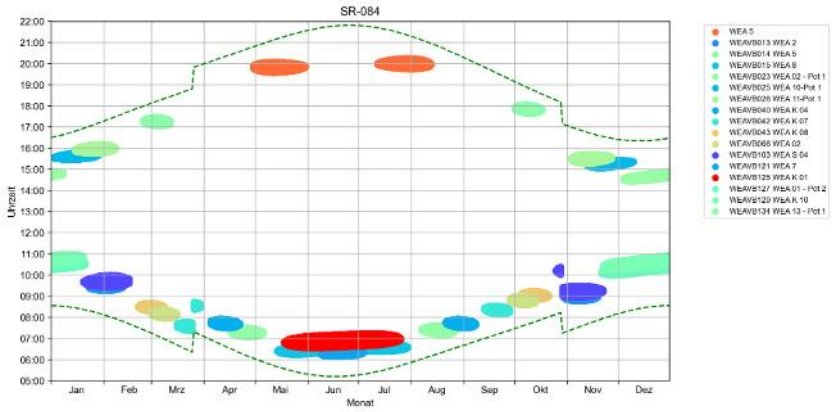
Grafischer Schattenkalender für SR-081



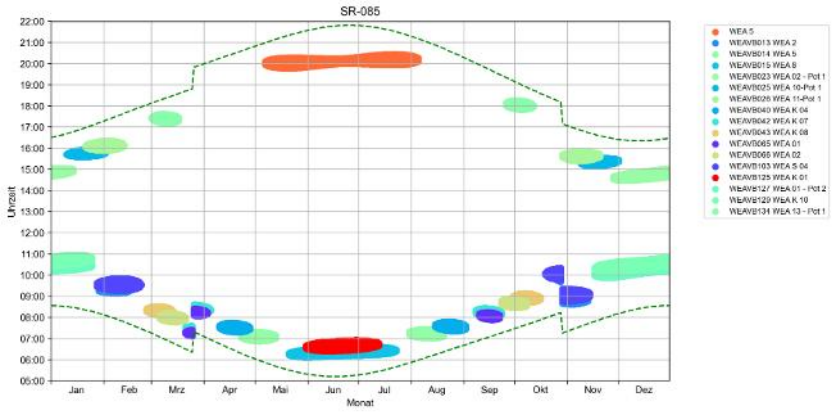
Grafischer Schattenkalender für SR-082



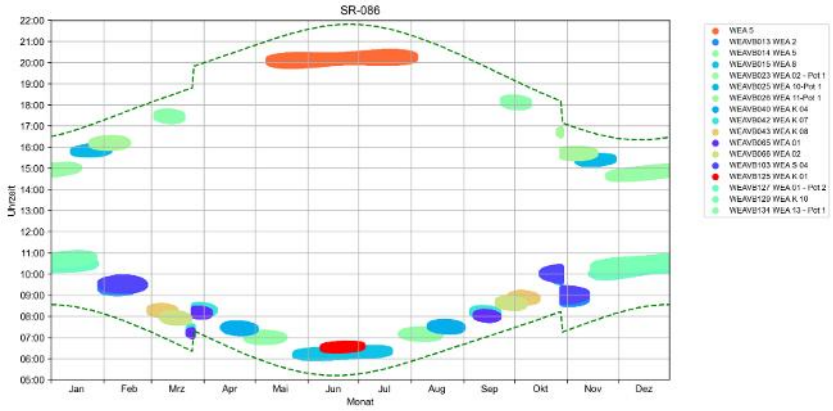
Grafischer Schattenkalender für SR-083



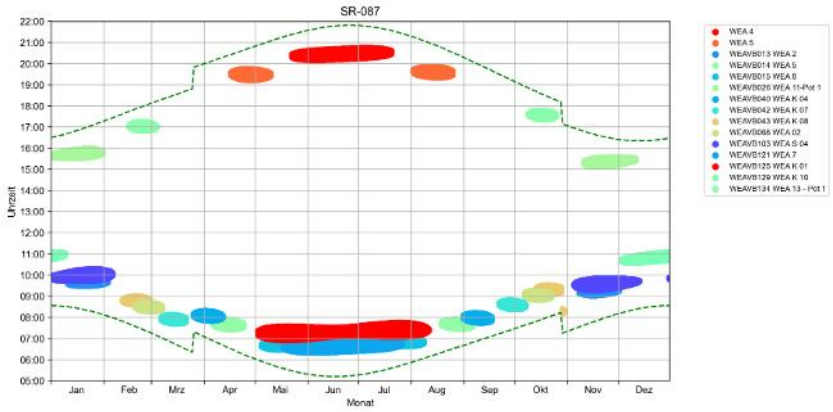
Grafischer Schattenkalender für SR-084



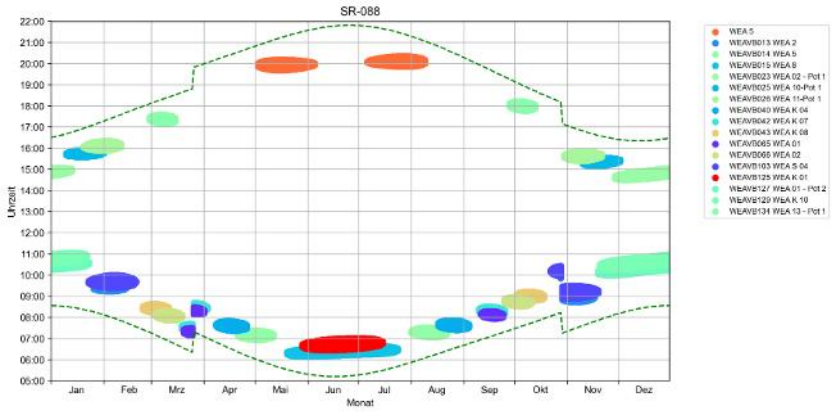
Grafischer Schattenkalender für SR-085



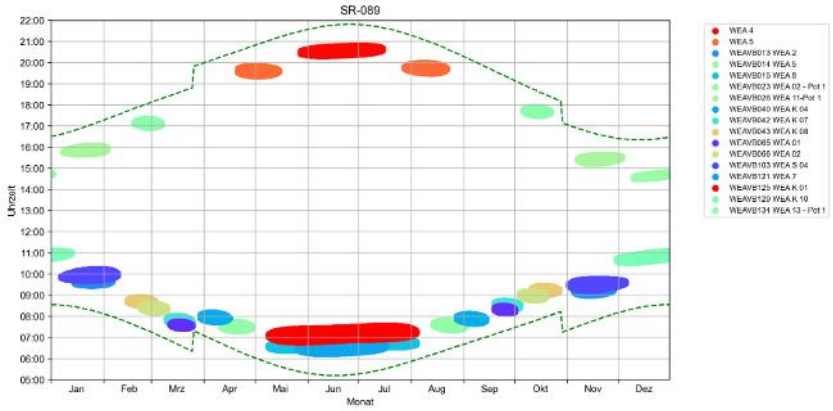
Grafischer Schattenkalender für SR-086



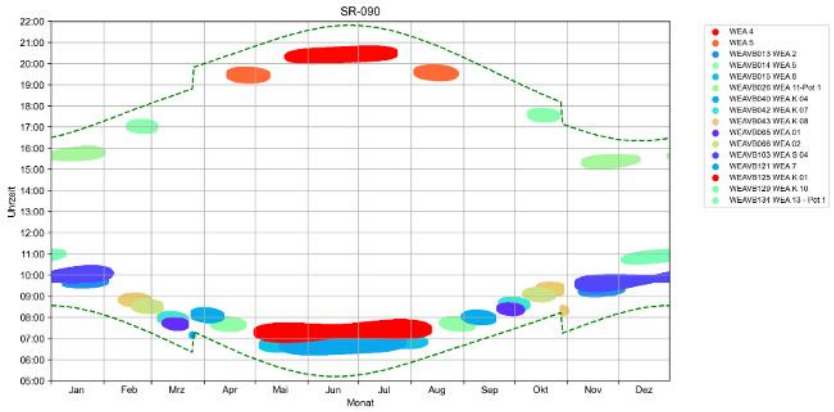
Grafischer Schattenkalender für SR-087



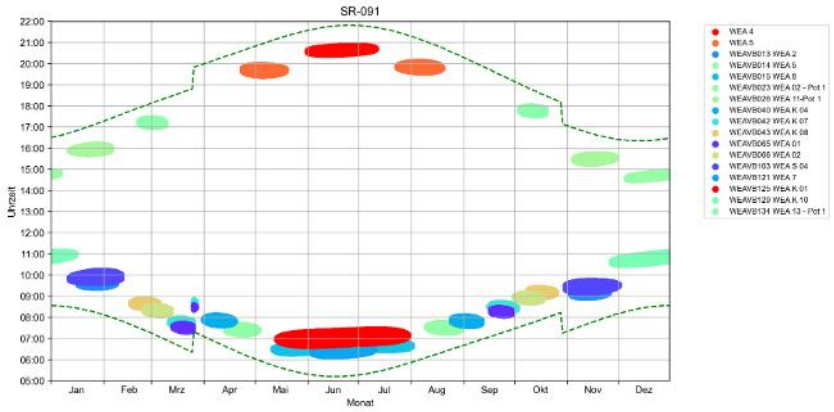
Grafischer Schattenkalender für SR-088



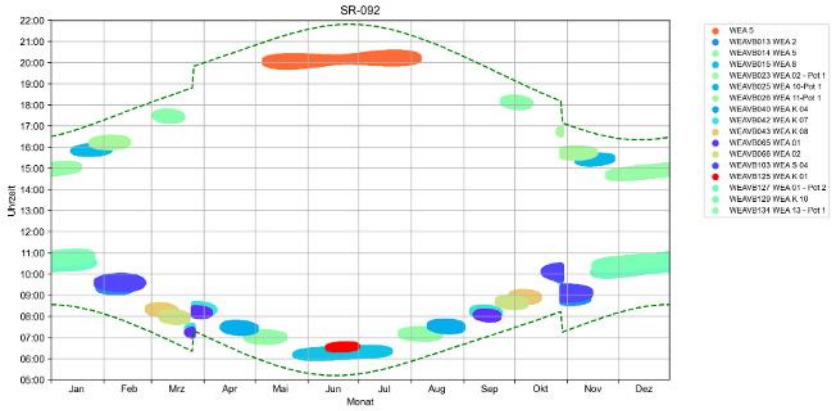
Grafischer Schattenkalender für SR-089



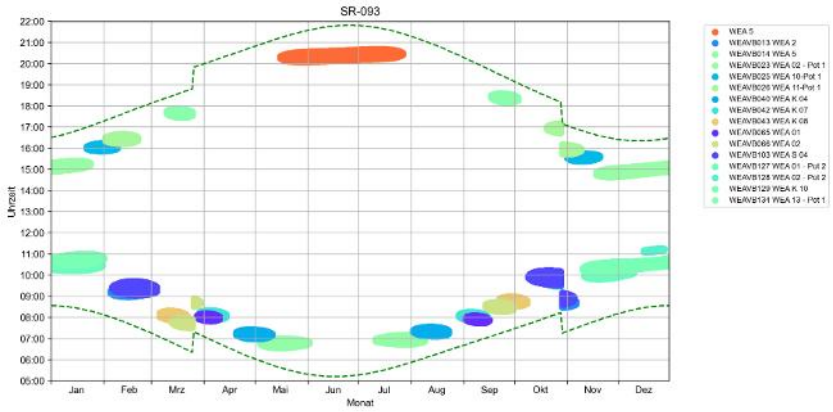
Grafischer Schattenkalender für SR-090



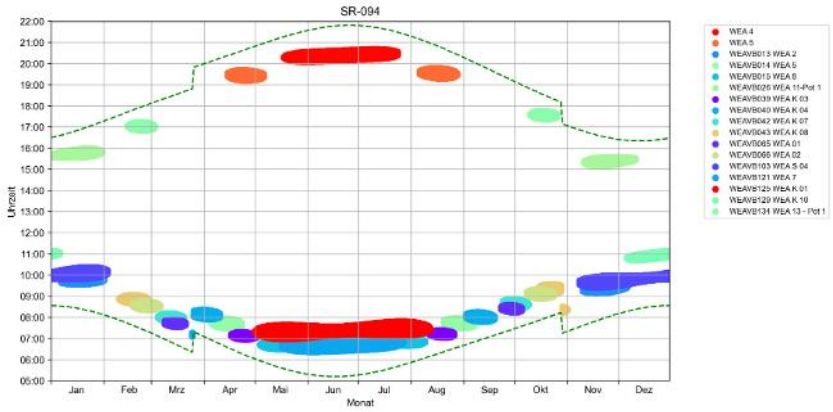
Grafischer Schattenkalender für SR-091



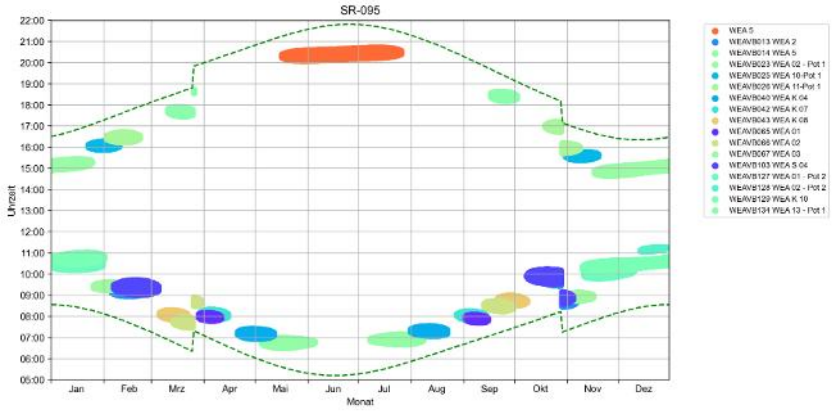
Grafischer Schattenkalender für SR-092



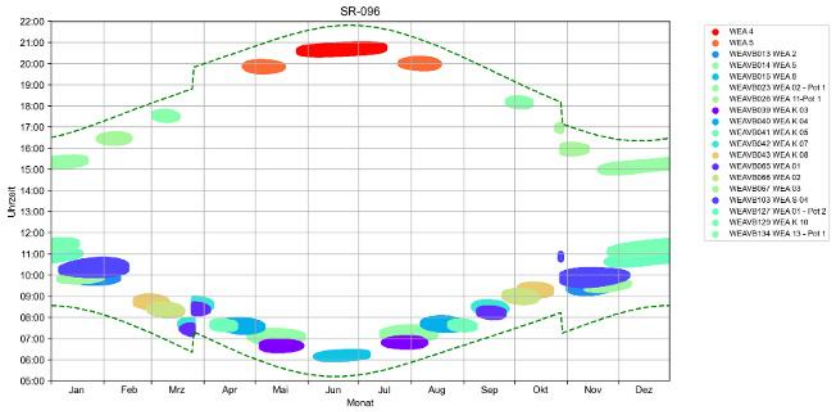
Grafischer Schattenkalender für SR-093



Grafischer Schattenkalender für SR-094



Grafischer Schattenkalender für SR-095



Grafischer Schattenkalender für SR-096

C Kalender der Gesamtbelastung pro WEA

Nachfolgend ist der Kalender mit den Schattenzeiten je Windenergieanlage über das gesamte Jahr dargestellt.

Erklärung der nachfolgenden WEA Schattenkalender Tabellen

	Monat		
Tag	Sonnenaufgang HH:MM	Erster Schattenwurf HH:MM	
	Sonnenuntergang HH:MM	Letzter Schattenwurf HH:MM	Schattenminuten
	. . .		
Sonne [h]	Monatliche Sonnenstunden		
Schatten [min]	Monatliche Summe der Schattenminuten		

An einem Tag können mehrere Schattenzeiträume entstehen. Bei diesen wurde der erste und letzte Zeitstempel gewählt. Dadurch sind die Schattenwurfzeiten nicht immer durchgängig und die Summe der Schattenminuten kann entsprechend abweichen.

Gesamtbelastung Windenergieanlage: WEA 1

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
1	08:33		08:07		07:15	16:08	07:05	08:09	06:02		05:19		05:16		05:52		06:41		07:28	17:00	07:20		08:10	
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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		415		647		197		0		0		0		0		341		938		0		0

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engineering@noxt.de · 20. August 2025

noxt! engineering

Gesamtbelastung Windenergieanlage: WEA 2

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
1	08:33		08:07		07:15	16:35	07:05		06:02	07:21	05:19		05:16		05:52	07:34	06:41		07:28	08:53	07:20		08:10	
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Schatten [min]	0		399		489		557		364		129		11		927		418		481		0		0	

noxt! engineering GmbH
Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

noxt! engineering

Gesamtbelastung Windenergieanlage: WEA 3

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]		35			365			437			195			1006			1202			1260			182			467			336			231			0	

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Gesamtbelastung Windenergieanlage: WEA 4

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	1049		140		0		0		340		1288		797		0		0		0		975		304	

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Gesamtbelastung Windenergieanlage: WEA 5

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
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Schatten [min]	0		0		0		774		2652		3018		2979		1587		0		0		0		0	

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noxt! engineering

Gesamtbelastung Windenergieanlage: WEAVB001 WEA 01

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB002 WEA 02

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Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB003 WEA 03

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Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB004 WEA 04

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Schatten [min]		0		0		0		0		0		0		0		0				0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB005 WEA 05

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Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB006 WEA 06

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Schatten [min]	0		0		0		0		0		0		0		0		0		0		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB007 WEA 07

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Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB008 WEA 08

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Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB009 WEA 09

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Schatten [min]	0		0		0		0		0		0		0		0		0		0		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB010 WEA 10

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Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB011 WEA 11

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Schatten [min]	0		0		0		0		0		0		0		0		0		0		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB012 WEA 12

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Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB013 WEA 2

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		931		983		0		0		0		0		0		0		0		387		1476		68

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Gesamtbelastung Windenergieanlage: WEAVB014 WEA 5

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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		35		1150		1322		52		847		1361		376		0		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB015 WEA 8

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Schatten [min]	0		0		0		0		918		1059		1192		179		0		0		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB016 WEA 10

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Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB020 WEA 13

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Gesamtbelastung Windenergieanlage: WEAVB021 WEA 14

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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		0		0		0		0		0		0		0		0		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB022 WEA 01 - Pot 1

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB023 WEA 02 - Pot 1

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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	985		0		0		0		0		0		0		0		0		0		410		1829	

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Gesamtbelastung Windenergieanlage: WEAVB024 WEA 09-Pot 1

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB025 WEA 10-Pot 1

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Schatten [min]	1737			223			0			0			0			0			0			0			0			3			1222			2099		

noxt! engineering GmbH
Dipl.-Ing. Marcel Boßmeyer
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Gesamtbelastung Windenergieanlage: WEAVB026 WEA 11-Pot 1

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	2531		868		0		0		0		0		0		0		0		361		2074		2675	

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Gesamtbelastung Windenergieanlage: WEAVB039 WEA K 03

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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		0		243		451		0		286		410		0		0		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB040 WEA K 04

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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		312		1361		351		0		0		1234		812		0		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB041 WEA K 05

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Schatten [min]	0		0		0		253		0		0		0		143		120		0		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB042 WEA K 07

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Schatten [min]	0		0		1068		476		0		0		0		53		1232		278		0		0	

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noxt! engineering

Gesamtbelastung Windenergieanlage: WEAVB043 WEA K 08

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Schatten [min]	0		705		840		0		0		0		0		0		228		1338		4		0	

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Gesamtbelastung Windenergieanlage: WEAVB044 WEA M 06

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB063 WEA 10

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB064 WEA 11

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Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB065 WEA 01

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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		688		263		0		0		0		0		877		84		0		0	

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noxt! engineering

Gesamtbelastung Windenergieanlage: WEAVB066 WEA 02

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
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Schatten [min]	0		368		1213		0		0		0		0		0		630		977		0		0	

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noxt! engineering

Gesamtbelastung Windenergieanlage: WEAVB067 WEA 03

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Schatten [min]		537		217		0		0		0		0		0		0		0		15		666		78

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Gesamtbelastung Windenergieanlage: WEAVB068 WEA 04

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB069 WEA 05

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
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Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB070 WEA 06

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0				0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB071 WEA 07

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Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB072 WEA 08

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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noxt! engineering

Gesamtbelastung Windenergieanlage: WEAVB073 WEA 09

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
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Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB074 WEA 1

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB075 WEA 2

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Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB076 WEA 3

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB077 WEA 4

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Gesamtbelastung Windenergieanlage: WEAVB082

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB083 W3

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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		0		0		0		0		0		0		0		0		0		0	

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noxt! engineering

Gesamtbelastung Windenergieanlage: WEAVB084 W2

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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		0		0		0		0		0		0		0		0		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB085

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Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB089 WEA 4

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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		0		0		0		0		0		0		0		0		0		0	

Gesamtbelastung Windenergieanlage: WEAVB090 WEA 02

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

noxt! engineering GmbH
Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

Gesamtbelastung Windenergieanlage: WEAVB091 WEA 03

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		0		0		0		0		0		0		0		0		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB092 WEA 04

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Gesamtbelastung Windenergieanlage: WEAVB093 WEA 05

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Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB094 WEA 06

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Gesamtbelastung Windenergieanlage: WEAVB095 WEA 07

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

noxt! engineering GmbH
Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

Gesamtbelastung Windenergieanlage: WEAVB096 WEA 08

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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		0		0		0		0		0		0		0		0		0		0	

Gesamtbelastung Windenergieanlage: WEAVB097 WEA 09

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB098 WEA 03 - Pot 1

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Schatten [min]		0		0		0		0		0		0		0		0				0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB099 WEA 04 - Pot 1

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB100 WEA 05 - Pot 1

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB103 WEA S 04

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Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	2074			2207			117			0			0			0			0			0			0			1250			2799			736		

noxt! engineering GmbH
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noxt! engineering

Gesamtbelastung Windenergieanlage: WEAVB105 WEA M 09

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
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Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB106 WEA M 10

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB107 WEA M 11

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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		0		0		0		0		0		0		0		0		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB110 WEA M 02

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	17:15				19:58				21:33				21:19		20:19				17:05				16:29	
Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		333		0		0		0		0		0		275		60		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB112 WEA M 04

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		528		0		0		0		595		187		0		0		393		142		0	

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Gesamtbelastung Windenergieanlage: WEAVB113 WEA M 05

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB114 WEA M 07

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Schatten [min]	0		0		0		0		0		0		0		0		0		0		0		0	

Gesamtbelastung Windenergieanlage: WEAVB115 WEA M 08

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

noxt! engineering GmbH
Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

Gesamtbelastung Windenergieanlage: WEAVB116 WEA 11

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
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Schatten [min]	0		0		0		0		0		0		0		0		0		0		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB117 WEA 8

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB118 WEA 9

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Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB119 WEA 10

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB120 WEA 9

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Schatten [min]		0		0		0		0		268		1017		644		0		0		0		0		0

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noxt! engineering

Gesamtbelastung Windenergieanlage: WEAVB121 WEA 7

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Schatten [min]	0		0		0		182		1416		1690		1579		674		0		0		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB122 WEA M 01

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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		488		1116		0		0		0		0		0		353		1278		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB123 WEA M 03

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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		224		590		0		0		0		0		0		65		764		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB124 WEA S 01/1

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Schatten [min]	0		0		0		0		312		1320		782		0		0		0		0		0	

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noxt! engineering

Gesamtbelastung Windenergieanlage: WEAVB125 WEA K 01

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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		0		571		1777		2112		2026		1177		0		0		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB126 WEA 0.5 - Pot 2

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	17:15				19:58				21:33				21:19		20:19				17:05				16:29	
Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		0		0		0		0		0		0		0		0		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB127 WEA 01 - Pot 2

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	17:06	10:38 22	18:02		19:50		20:41		21:27		21:49		21:26		20:30		19:20		18:15		16:29	10:44 41	16:25	11:03 47
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31	08:08	10:23			07:07				05:19				05:51		06:39				07:19				08:33	10:10
	17:15	10:32 9			19:58				21:33				21:19		20:19				17:05				16:29	11:06 49
Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	1155		0		0		0		0		0		0		0		0		0		591		1540	

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Gesamtbelastung Windenergieanlage: WEAVB128 WEA 02 - Pot 2

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	17:15				19:58				21:33				21:19		20:19				17:05				16:29		
Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		124

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Gesamtbelastung Windenergieanlage: WEAVB129 WEA K 10

	Januar			Februar			März			April			Mai			Juni			Juli			August			September			Oktober			November			Dezember		
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Sonne [h]	262			279			368			415			483			495			499			452			380			332			268			247		
Schatten [min]	2441			11			0			0			0			0			0			0			0			0			1286			3282		

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Gesamtbelastung Windenergieanlage: WEAVB130 WEA 06 - Pot 1

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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		0		0		0		0		0		0		0		0		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB131 WEA 07 - Pot 1

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
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Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB132 WEA 08 - Pot 1

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Sonne [h]		262		279		368		415		483		495		499		452		380		332		268		247
Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB133 WEA 14 - Pot 1

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Schatten [min]		0		0		0		0		0		0		0		0				0		0		0

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Gesamtbelastung Windenergieanlage: WEAVB134 WEA 13 - Pot 1

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Schatten [min]		60		1778		1160		0		0		0		0		0		423		2086		530		0

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noxt! engineering

Gesamtbelastung Windenergieanlage: WEAVB135 9997023

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Schatten [min]	0		0		0		0		0		0		0		0		0		0		0		0	

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Gesamtbelastung Windenergieanlage: WEAVB136 9997024

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Gesamtbelastung Windenergieanlage: WEAVB137 9997025

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Schatten [min]		0		0		0		0		0		0		0		0		0		0		0		0

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noxt! engineering

Gesamtbelastung Windenergieanlage: WEAVB138 9997026

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Gesamtbelastung Windenergieanlage: WEAVB139 8194986.8

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Schatten [min]	0		0		0		0		0		0		0		0		0		0		0		0	

Gesamtbelastung Windenergieanlage: WEAVB140 8194986.1

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Sonne [h]	262		279		368		415		483		495		499		452		380		332		268		247	
Schatten [min]	0		0		0		0		0		0		0		0		0		0		0		0	

noxt! engineering GmbH
Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

Gesamtbelastung Windenergieanlage: WEAVB141 8194986.2

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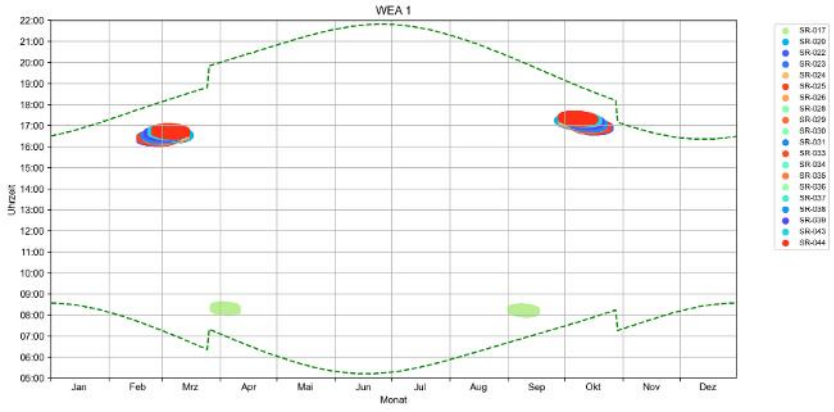
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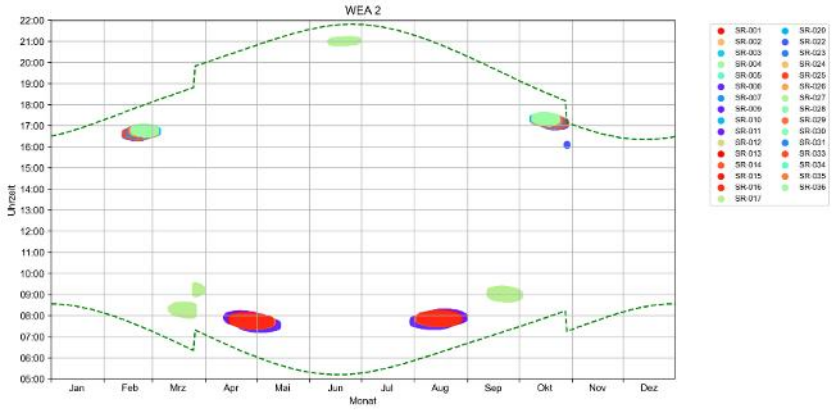
noxt! engineering GmbH
Dipl.-Ing. Marcel Boßmeyer
engineering@noxt.de · 20. August 2025

D Grafischer Kalender der Gesamtbelastung pro WEA

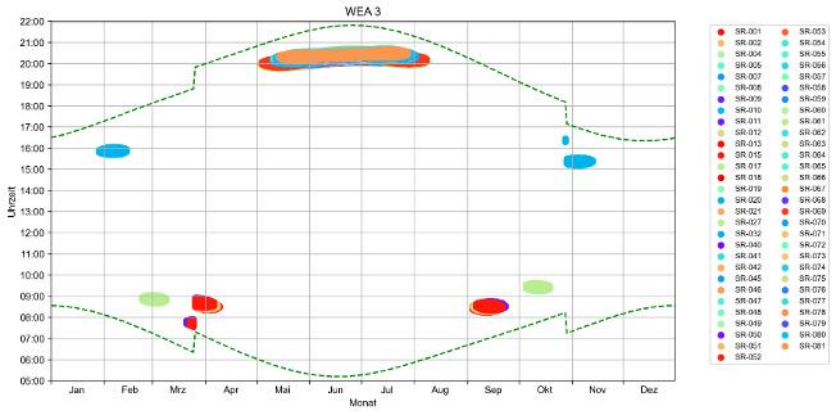
Nachfolgend ist der grafische Kalender mit den Schattenzeiten je Windenergieanlage über das gesamte Jahr dargestellt.



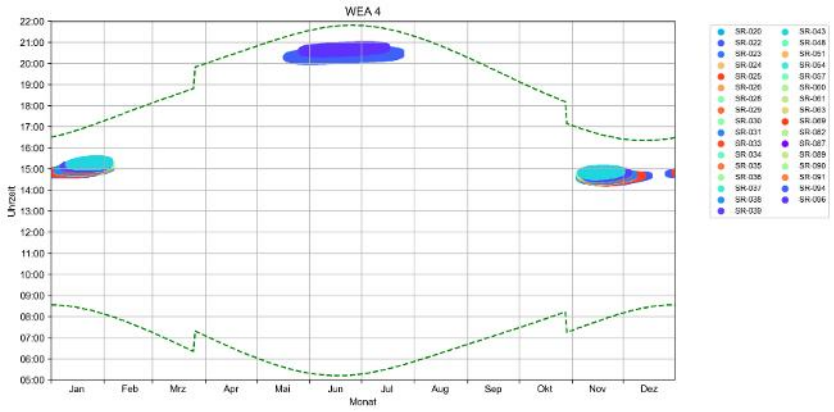
Grafischer Schattenkalender für WEA 1



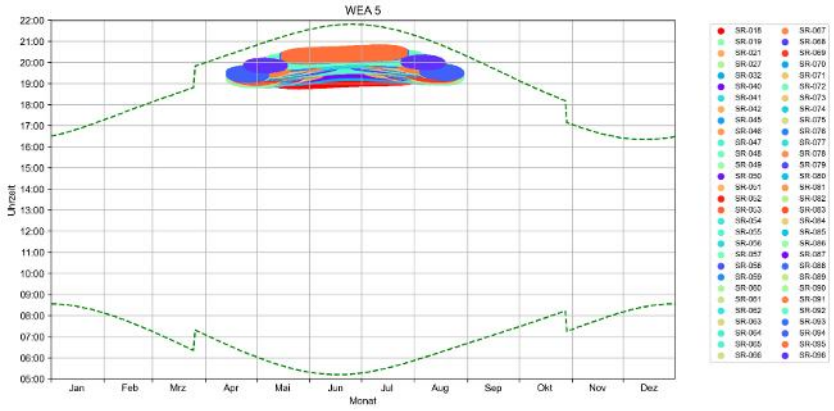
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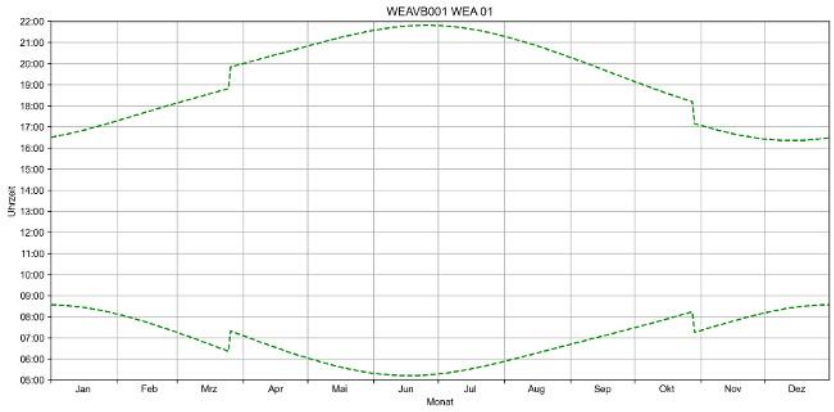
Grafischer Schattenkalender für WEA 3



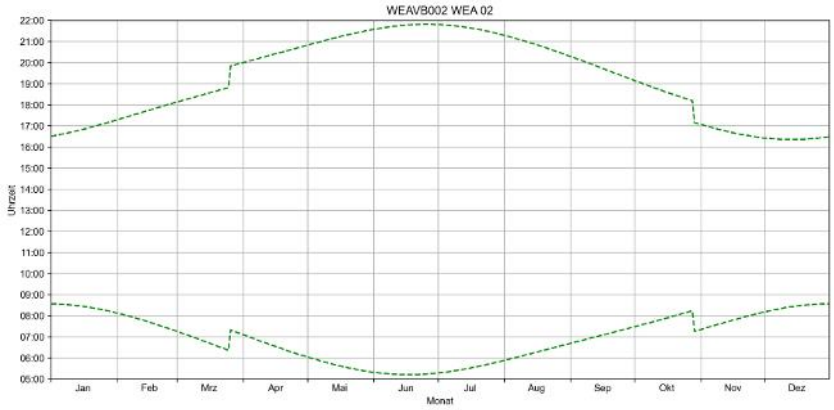
Grafischer Schattenkalender für WEA 4



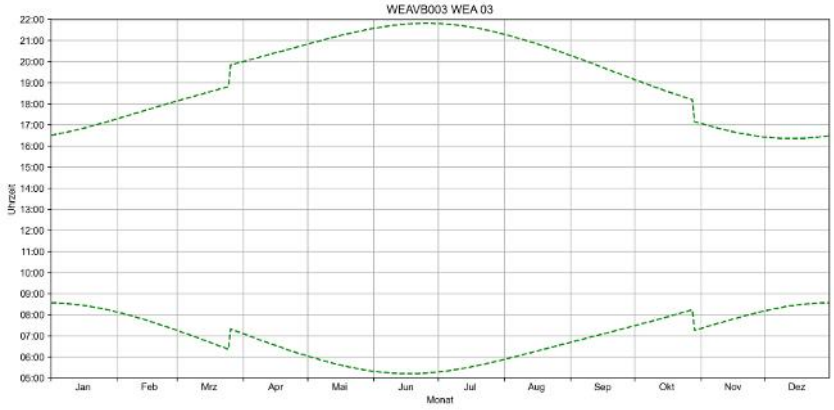
Grafischer Schattenkalender für WEA 5



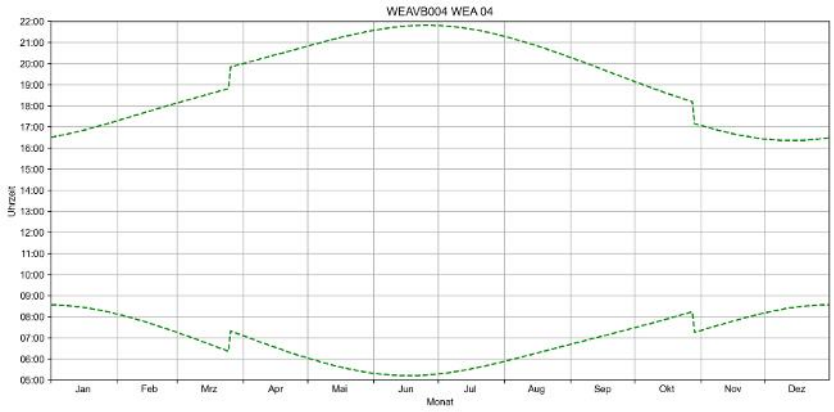
Grafischer Schattenkalender für WEAVB001 WEA 01



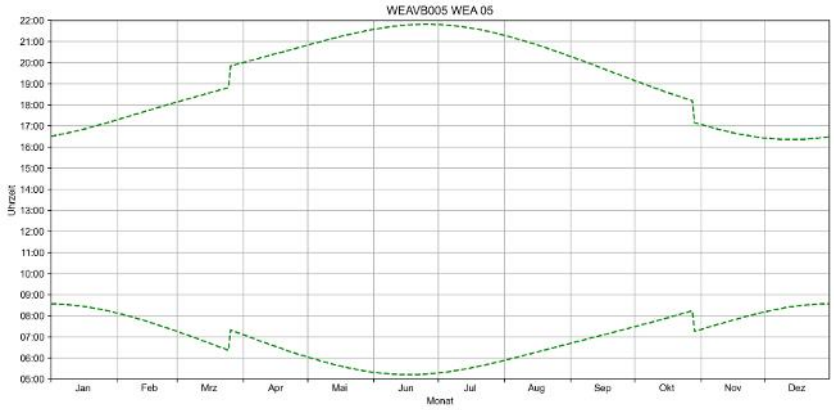
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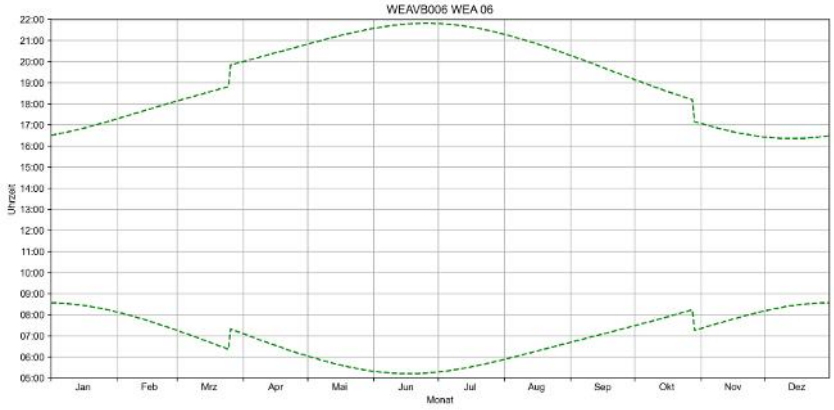
Grafischer Schattenkalender für WEAVB003 WEA 03



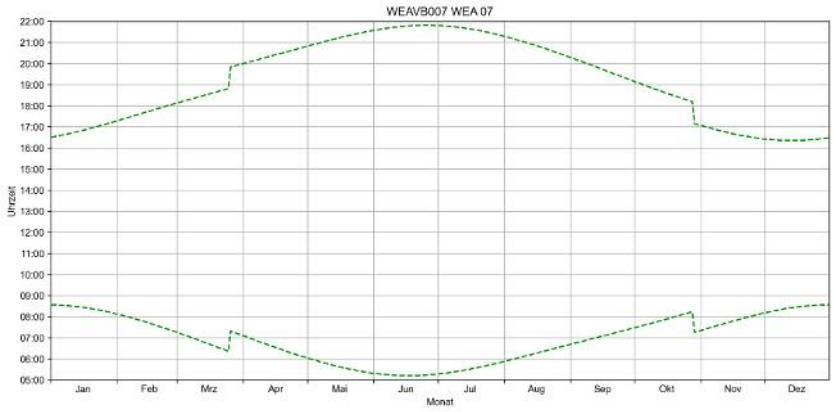
Grafischer Schattenkalender für WEAVB004 WEA 04



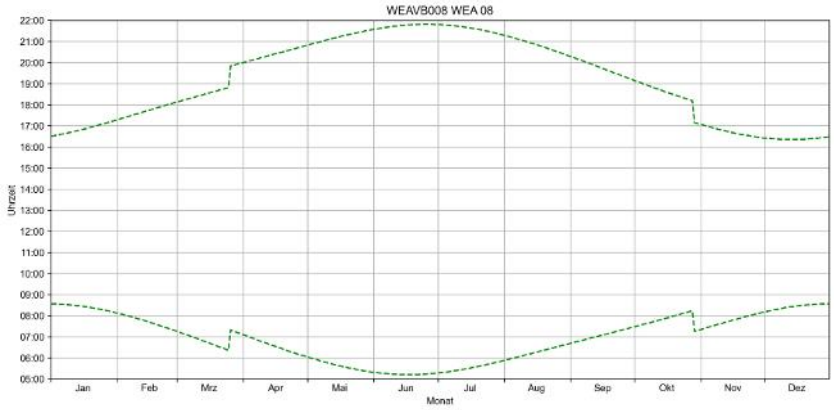
Grafischer Schattenkalender für WEAVB005 WEA 05



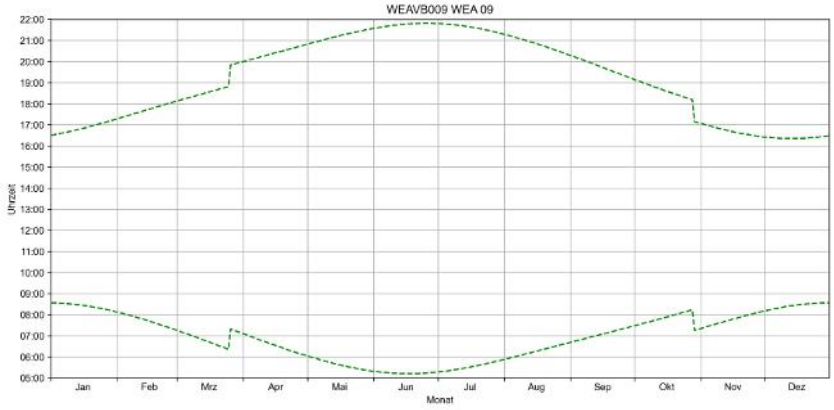
Grafischer Schattenkalender für WEAVB006 WEA 06



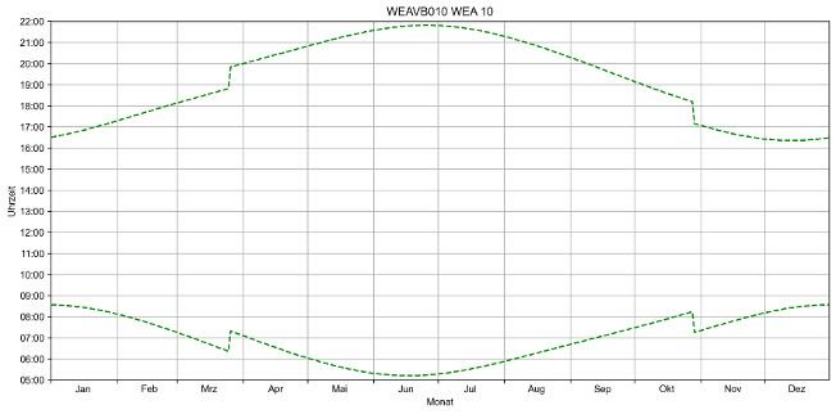
Grafischer Schattenkalender für WEAVB007 WEA 07



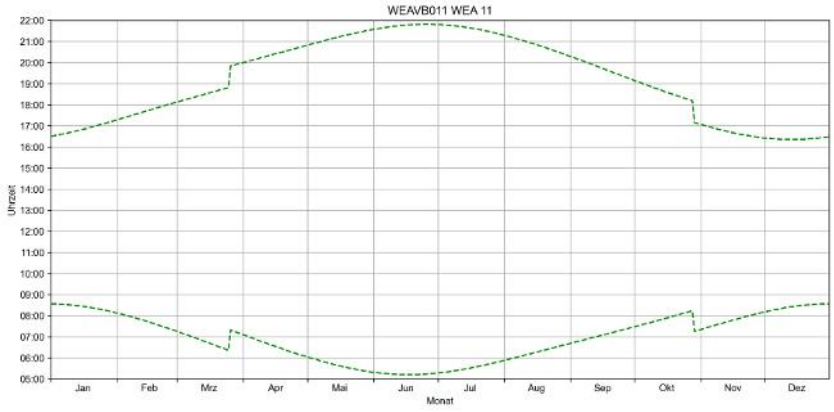
Grafischer Schattenkalender für WEAVB008 WEA 08



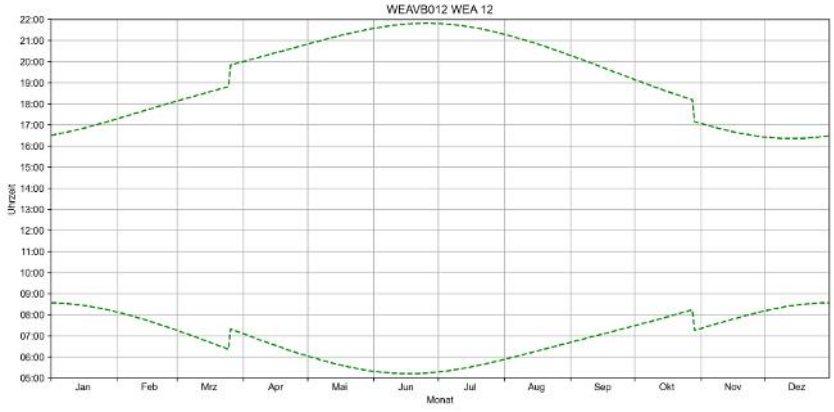
Grafischer Schattenkalender für WEAVB009 WEA 09



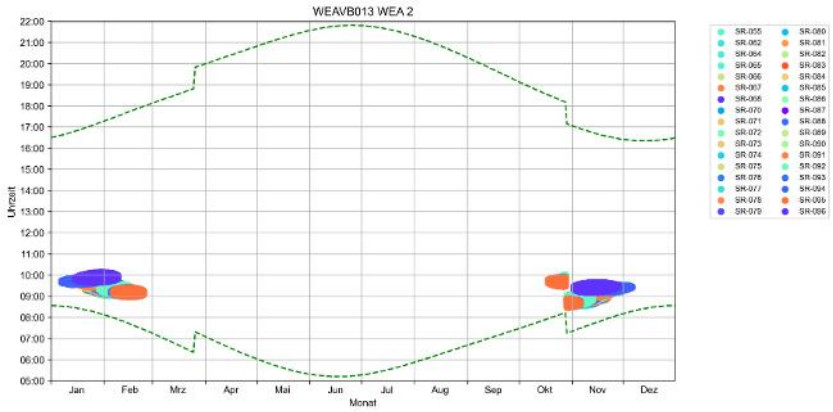
Grafischer Schattenkalender für WEAVB010 WEA 10



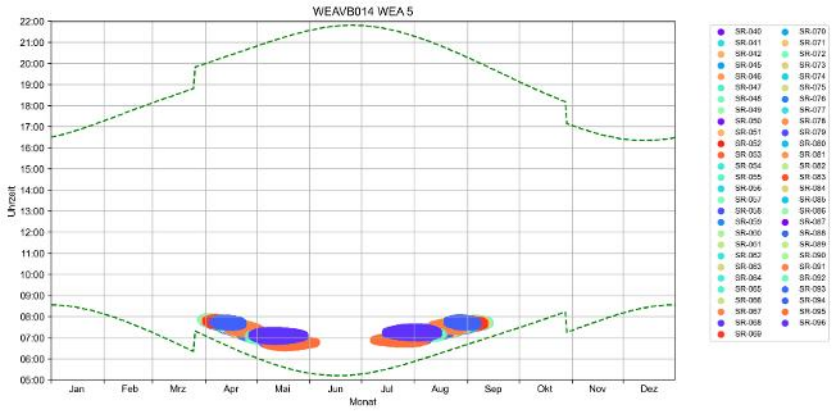
Grafischer Schattenkalender für WEAVB011 WEA 11



Grafischer Schattenkalender für WEAVB012 WEA 12



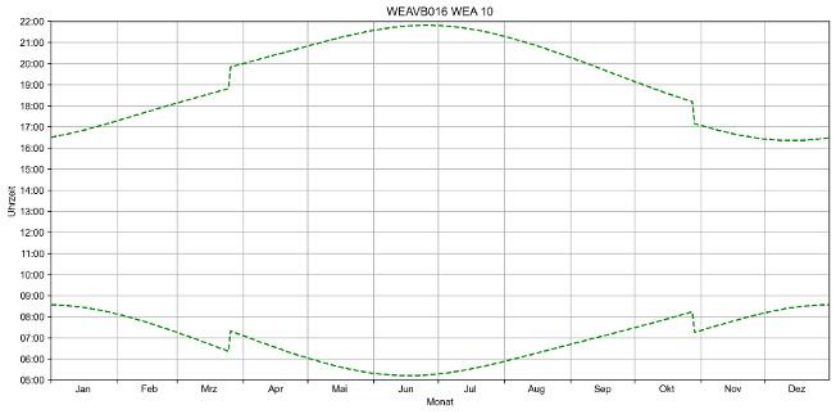
Grafischer Schattenkalender für WEAVB013 WEA 2



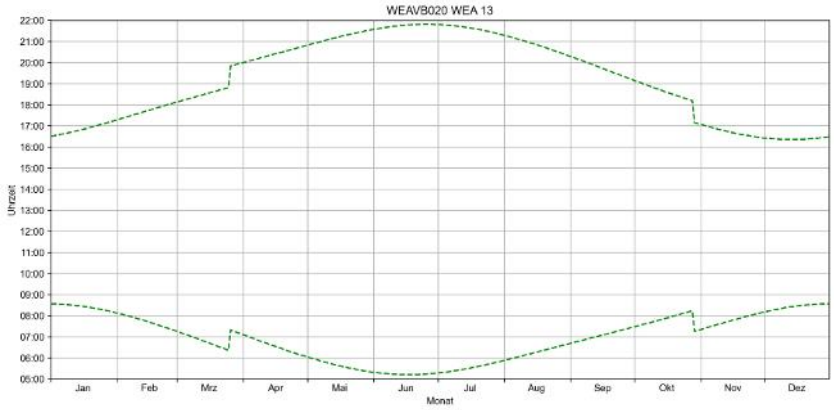
Grafischer Schattenkalender für WEAVB014 WEA 5



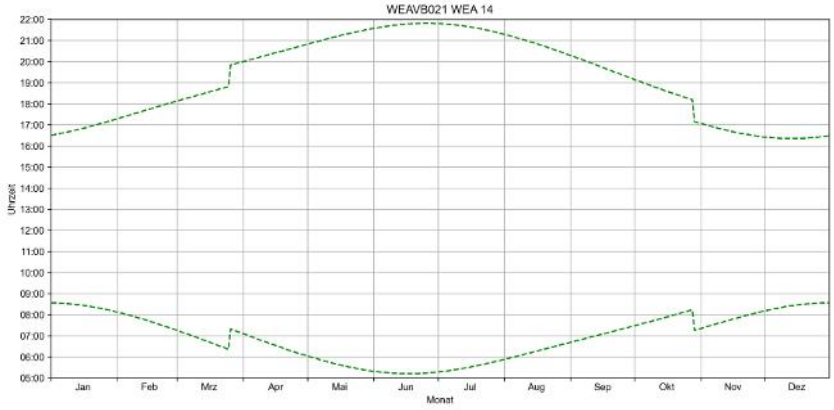
Grafischer Schattenkalender für WEAVB015 WEA 8



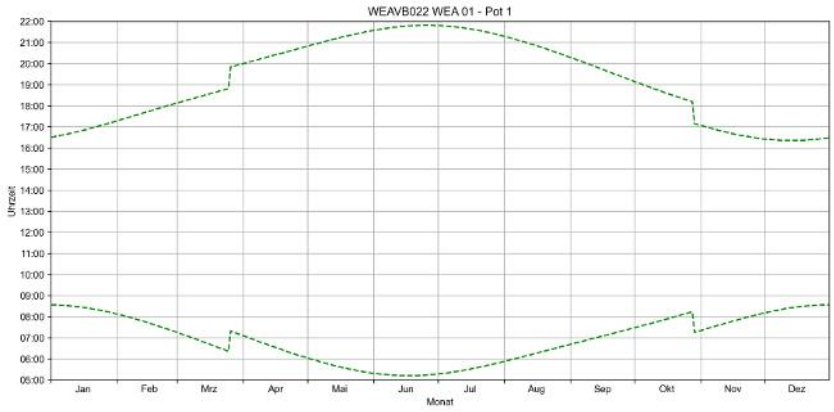
Grafischer Schattenkalender für WEAVB016 WEA 10



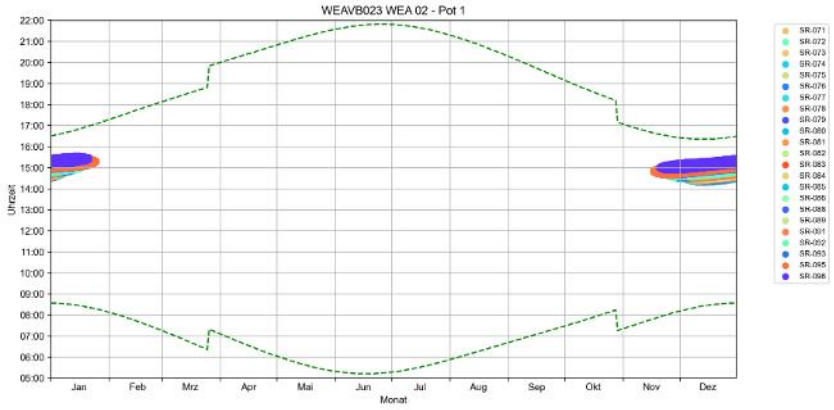
Grafischer Schattenkalender für WEAVB020 WEA 13



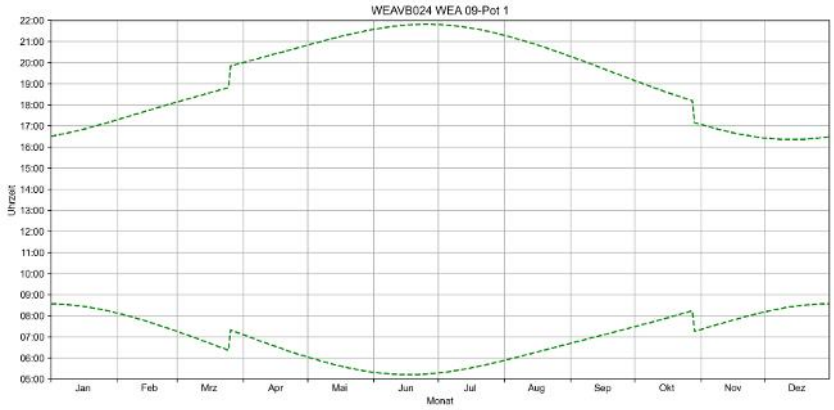
Grafischer Schattenkalender für WEAVB021 WEA 14



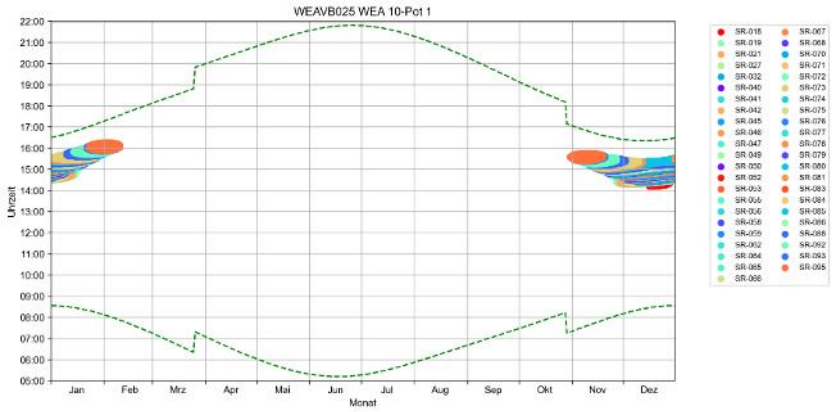
Grafischer Schattenkalender für WEAVB022 WEA 01 - Pot 1



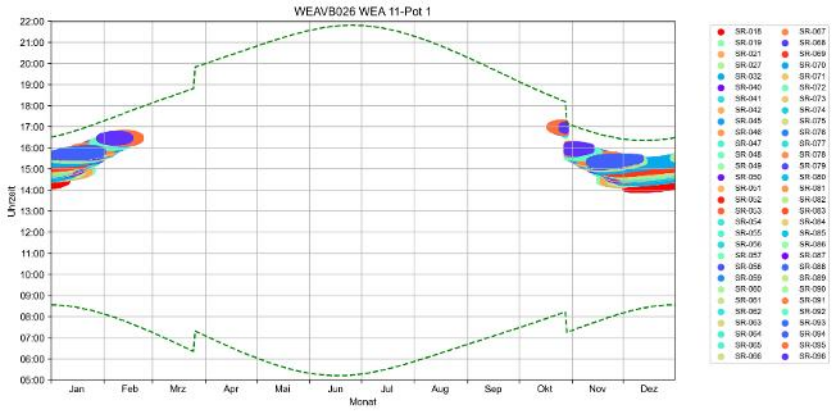
Grafischer Schattenkalender für WEAVB023 WEA 02 - Pot 1



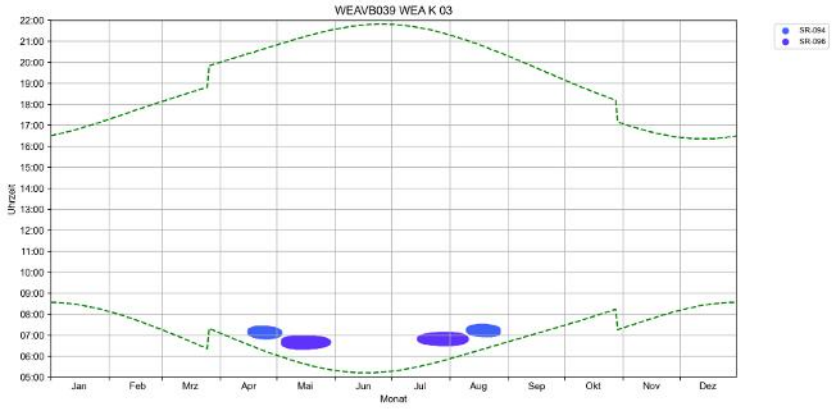
Grafischer Schattenkalender für WEAVB024 WEA 09-Pot 1



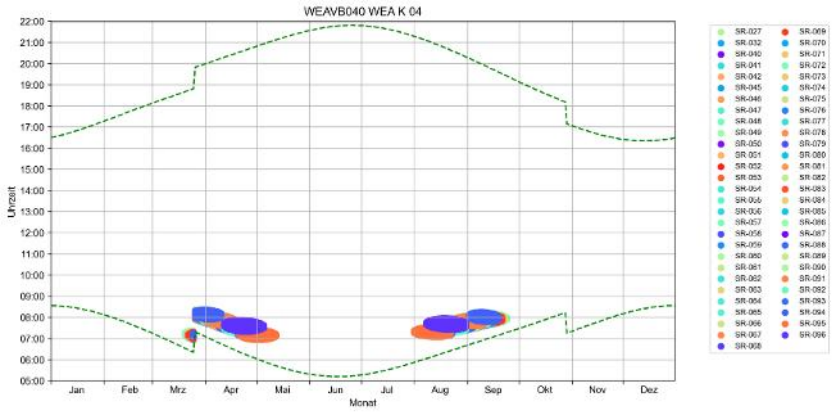
Grafischer Schattenkalender für WEAVB025 WEA 10-Pot 1



Grafischer Schattenkalender für WEAVB026 WEA 11-Pot 1



Grafischer Schattenkalender für WEAVB039 WEA K 03



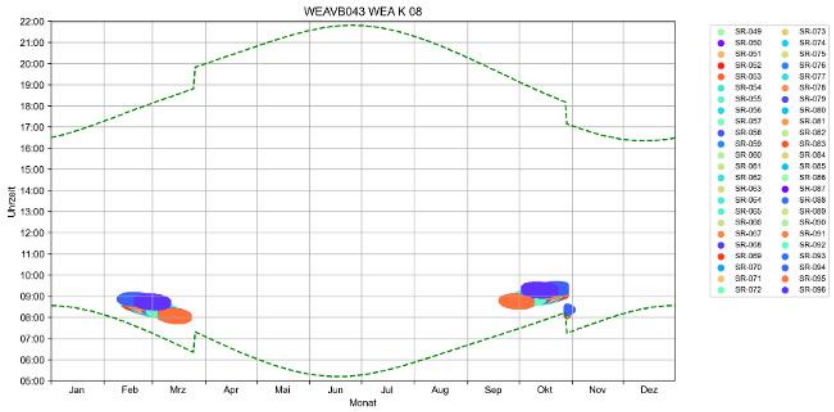
Grafischer Schattenkalender für WEAVB040 WEA K 04



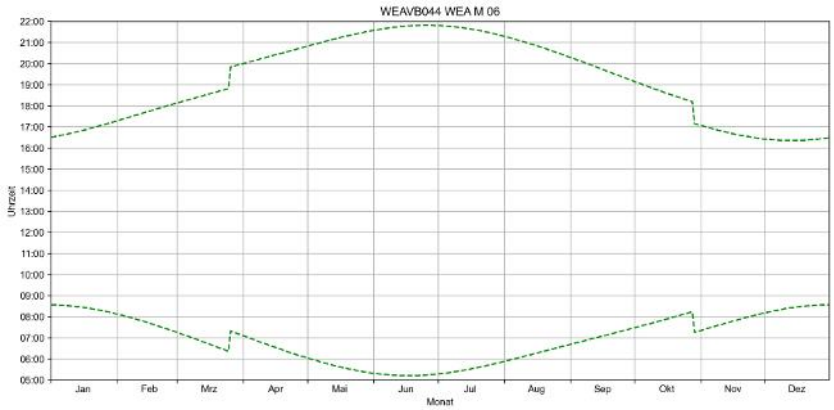
Grafischer Schattenkalender für WEAVB041 WEA K 05



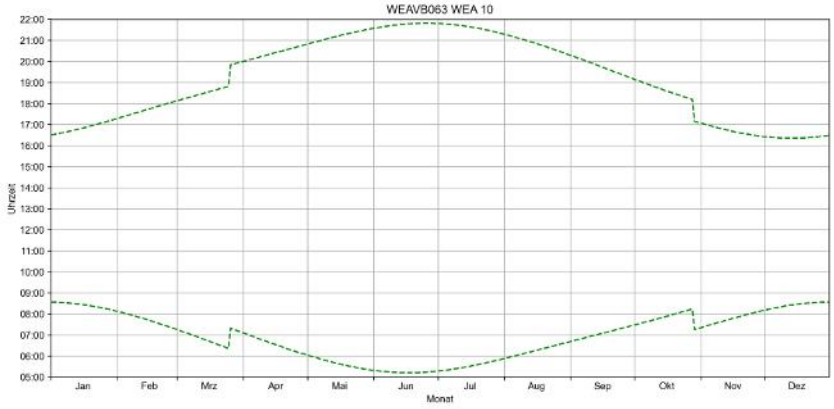
Grafischer Schattenkalender für WEAVB042 WEA K 07



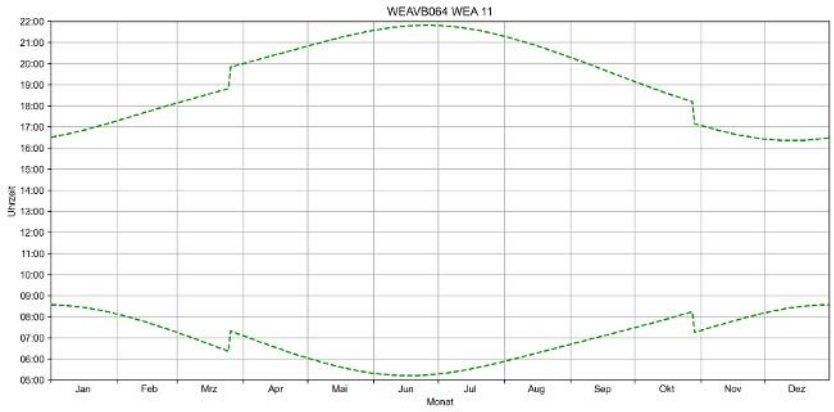
Grafischer Schattenkalender für WEAVB043 WEA K 08



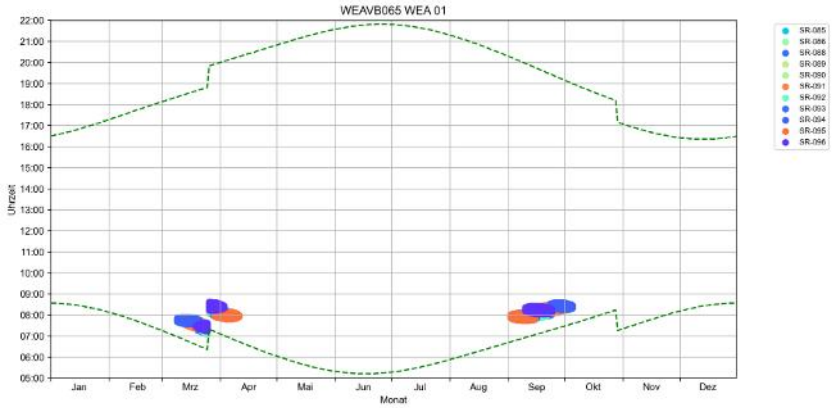
Grafischer Schattenkalender für WEAVB044 WEA M 06



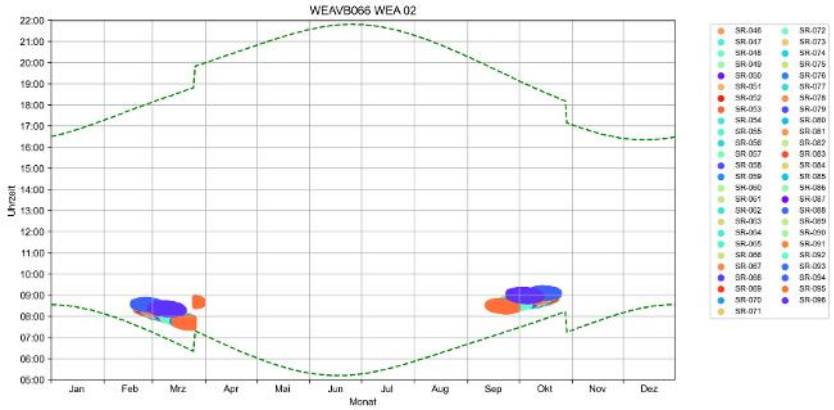
Grafischer Schattenkalender für WEAVB063 WEA 10



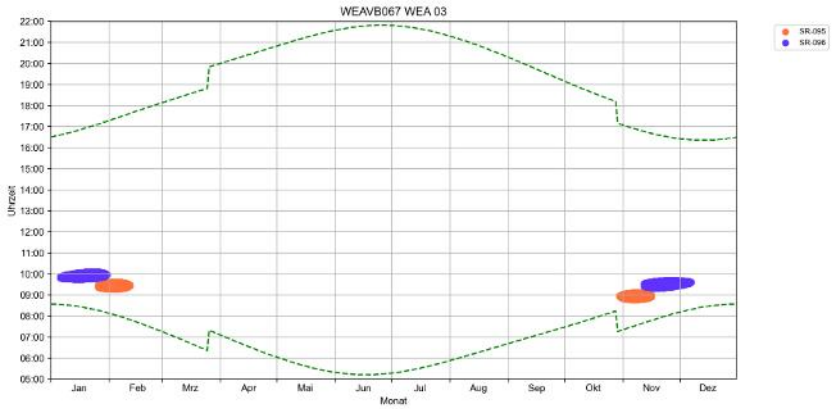
Grafischer Schattenkalender für WEAVB064 WEA 11



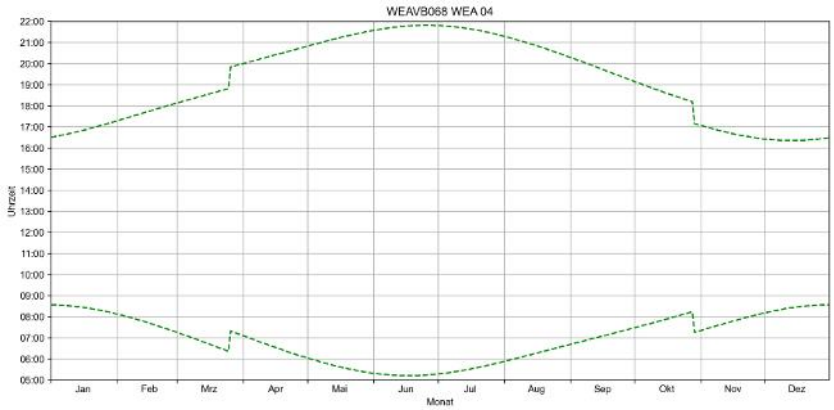
Grafischer Schattenkalender für WEAVB065 WEA 01



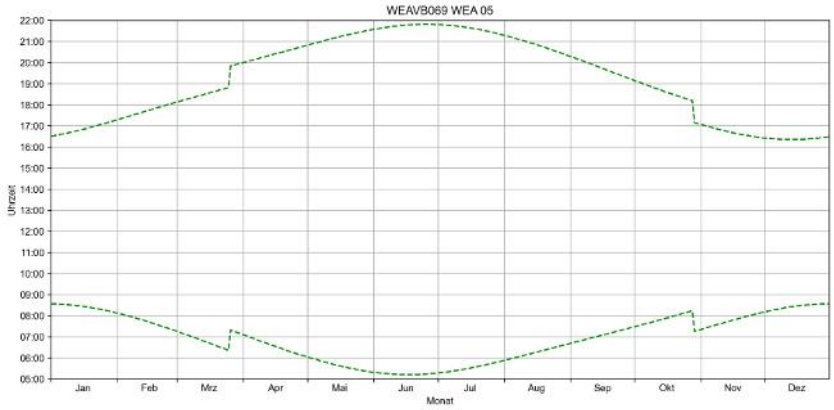
Grafischer Schattenkalender für WEAVB066 WEA 02



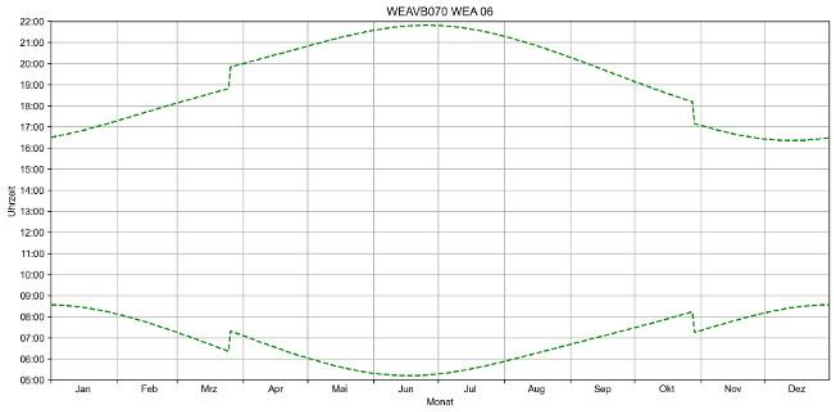
Grafischer Schattenkalender für WEAVB067 WEA 03



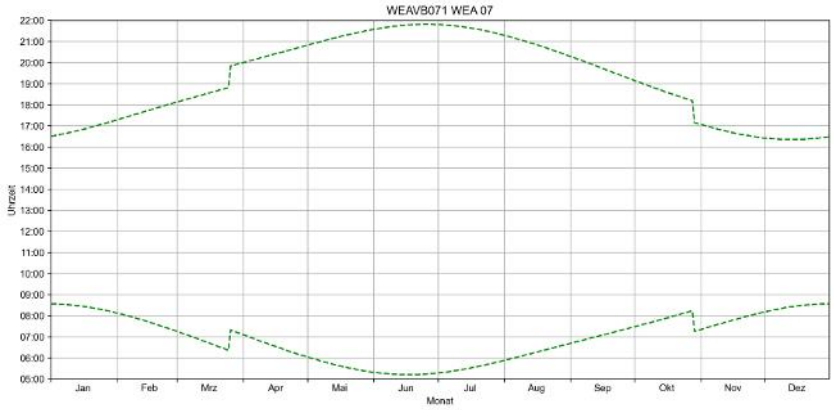
Grafischer Schattenkalender für WEAVB068 WEA 04



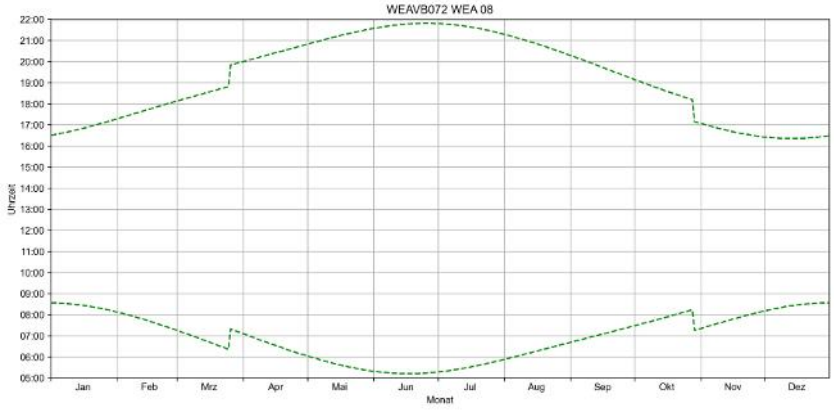
Grafischer Schattenkalender für WEAVB069 WEA 05



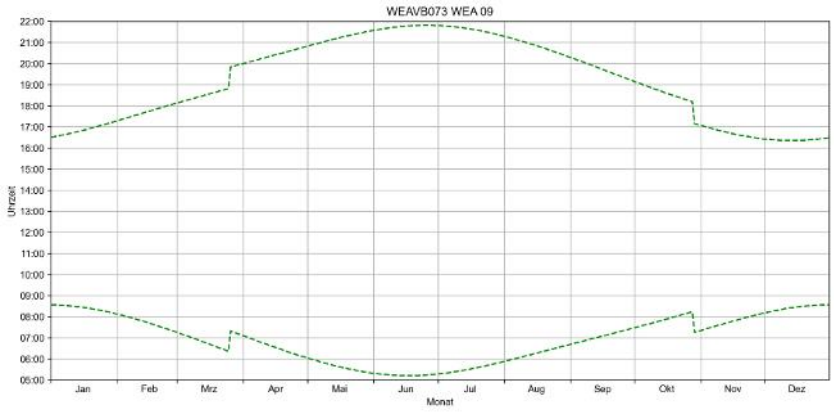
Grafischer Schattenkalender für WEAVB070 WEA 06



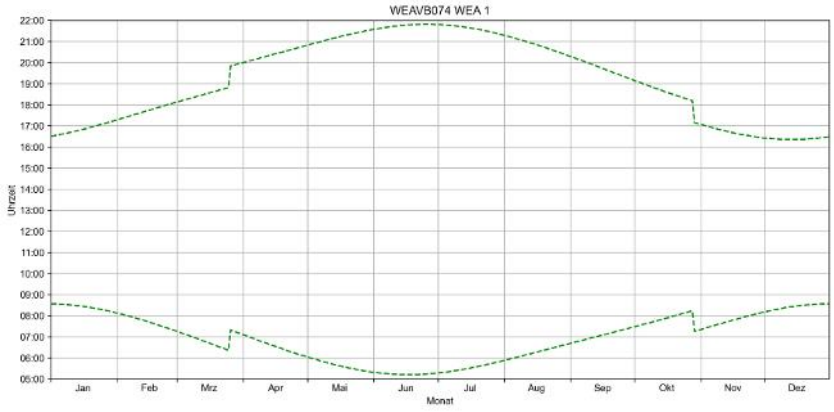
Grafischer Schattenkalender für WEAVB071 WEA 07



Grafischer Schattenkalender für WEAVB072 WEA 08



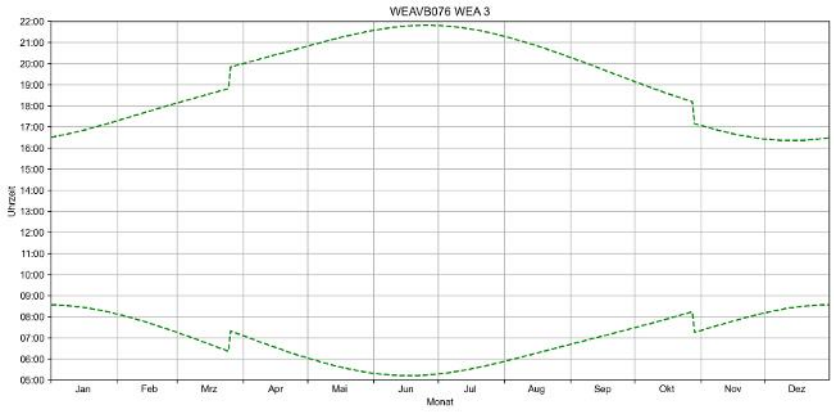
Grafischer Schattenkalender für WEAVB073 WEA 09



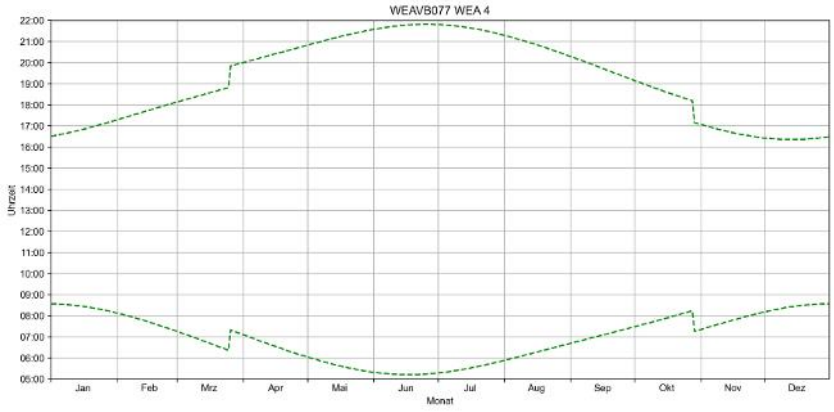
Grafischer Schattenkalender für WEAVB074 WEA 1



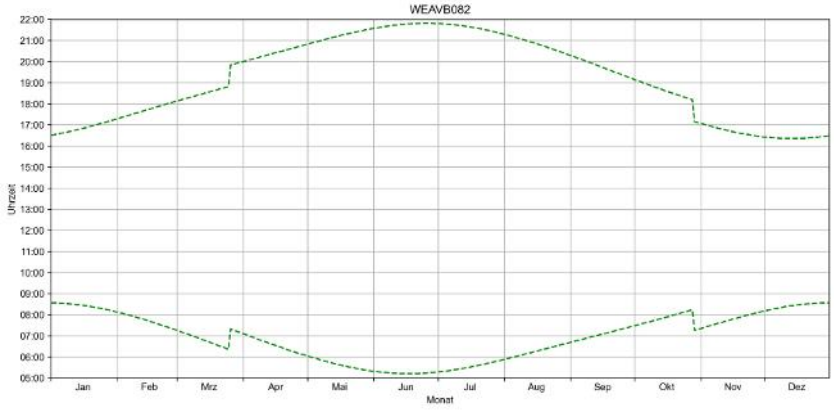
Grafischer Schattenkalender für WEAVB075 WEA 2



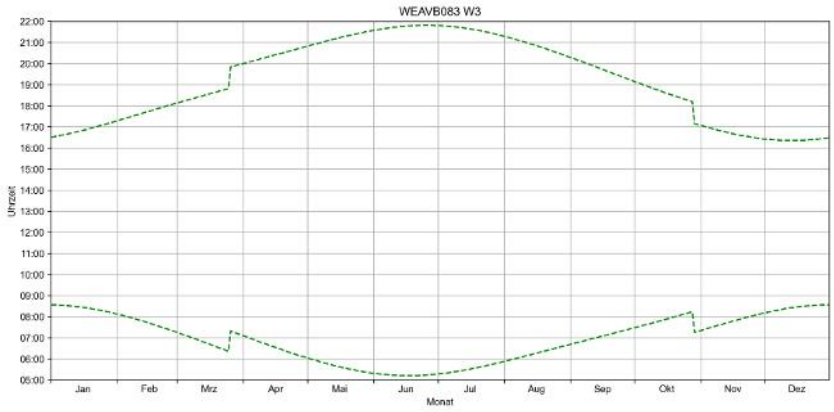
Grafischer Schattenkalender für WEAVB076 WEA 3



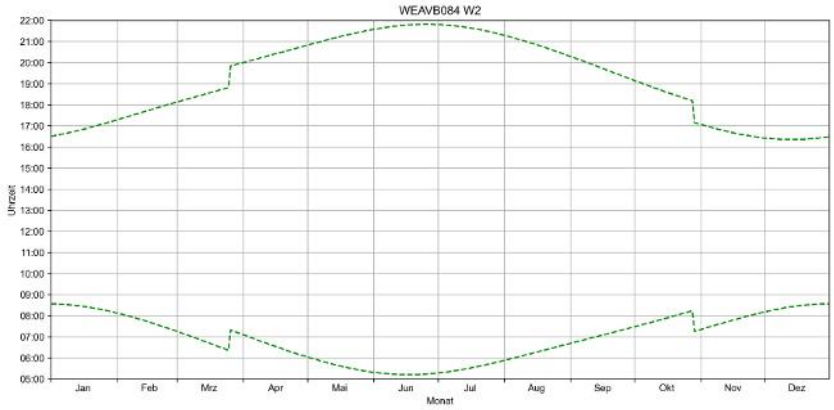
Grafischer Schattenkalender für WEAVB077 WEA 4



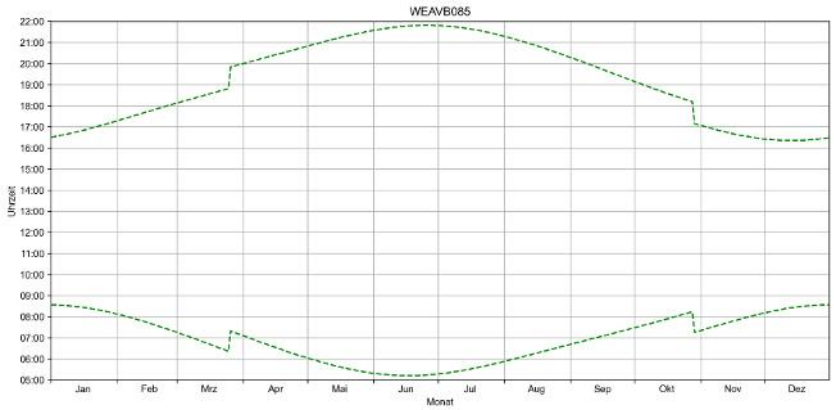
Grafischer Schattenkalender für WEAVB082



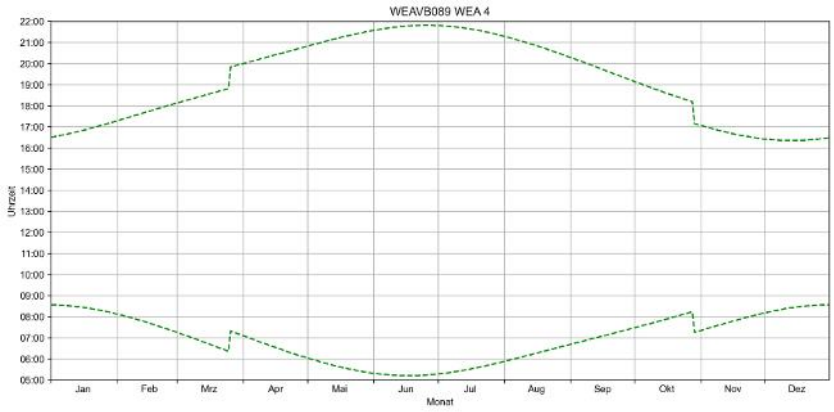
Grafischer Schattenkalender für WEAVB083 W3



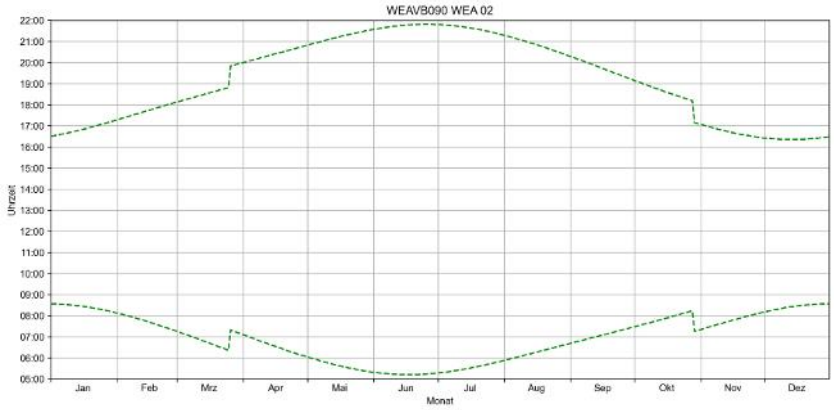
Grafischer Schattenkalender für WEAVB084 W2



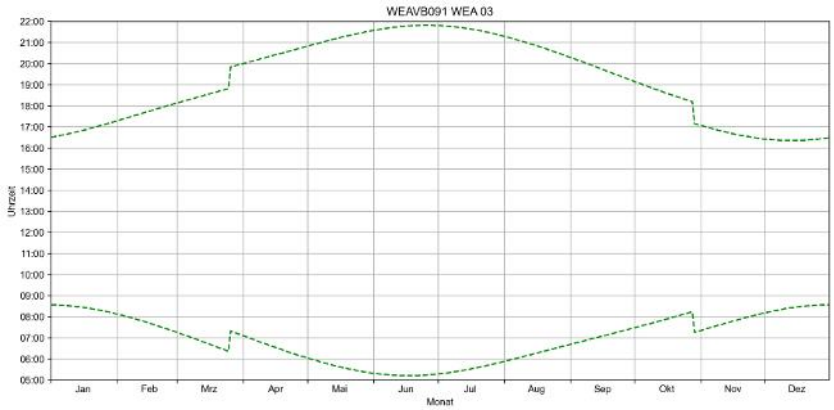
Grafischer Schattenkalender für WEAVB085



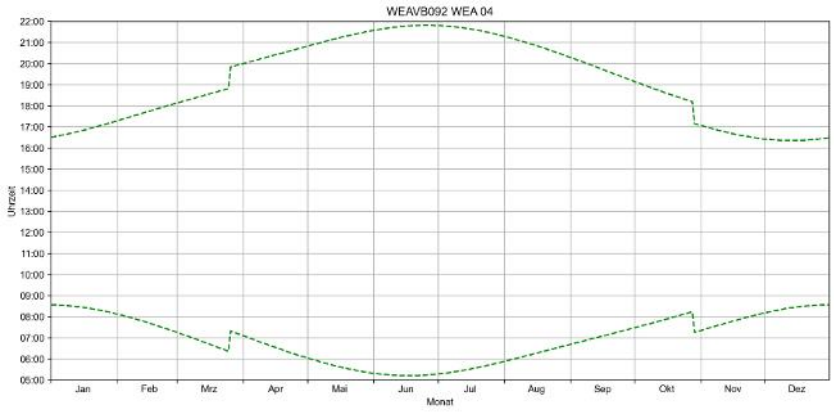
Grafischer Schattenkalender für WEAVB089 WEA 4



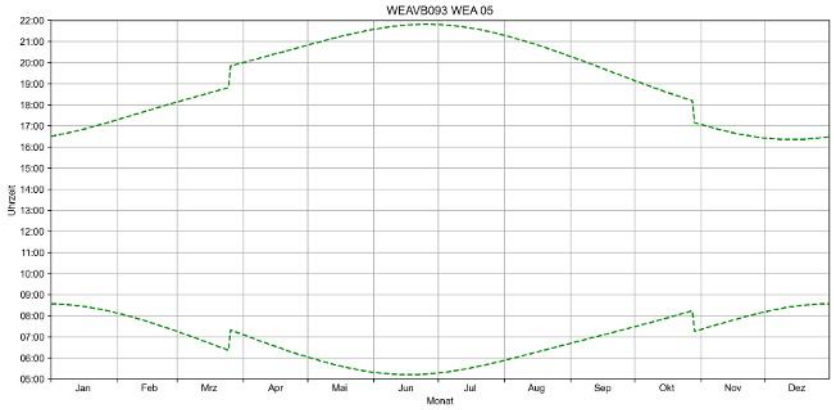
Grafischer Schattenkalender für WEAVB090 WEA 02



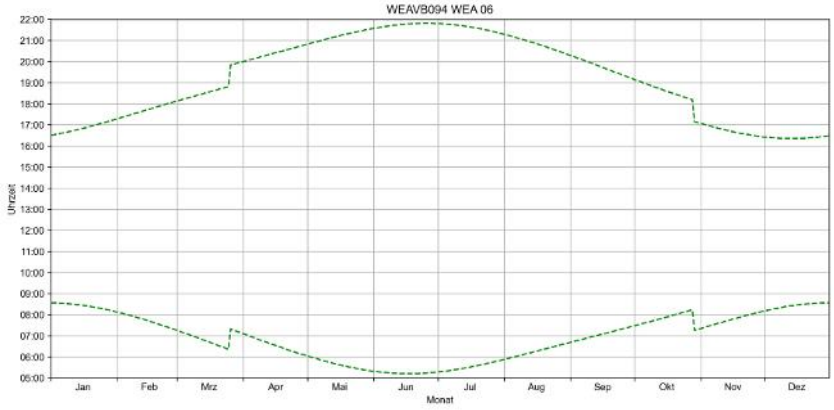
Grafischer Schattenkalender für WEAVB091 WEA 03



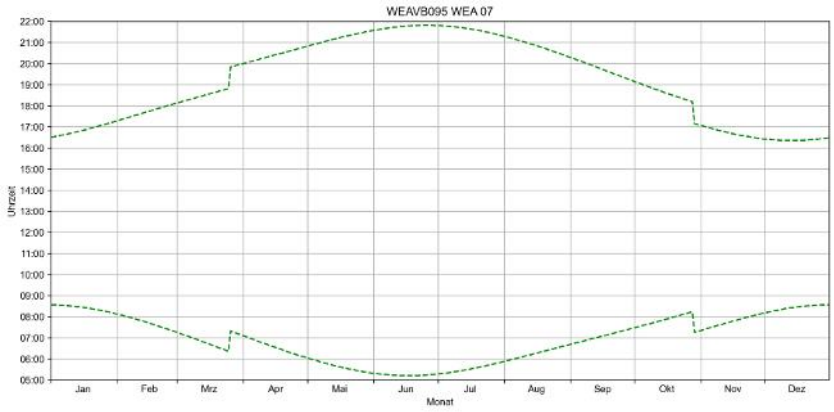
Grafischer Schattenkalender für WEAVB092 WEA 04



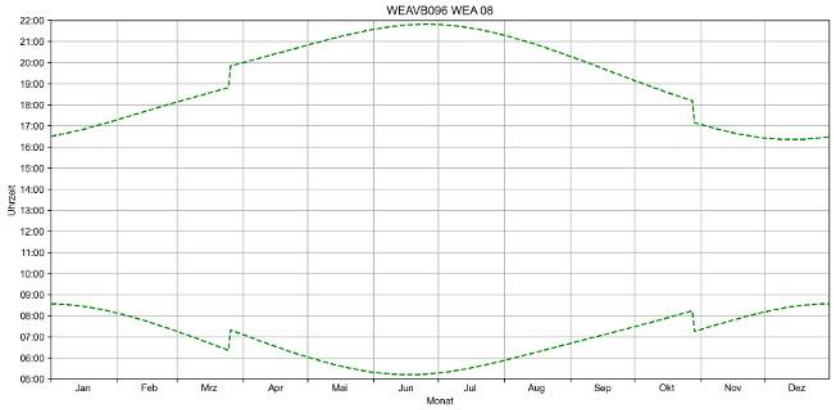
Grafischer Schattenkalender für WEAVB093 WEA 05



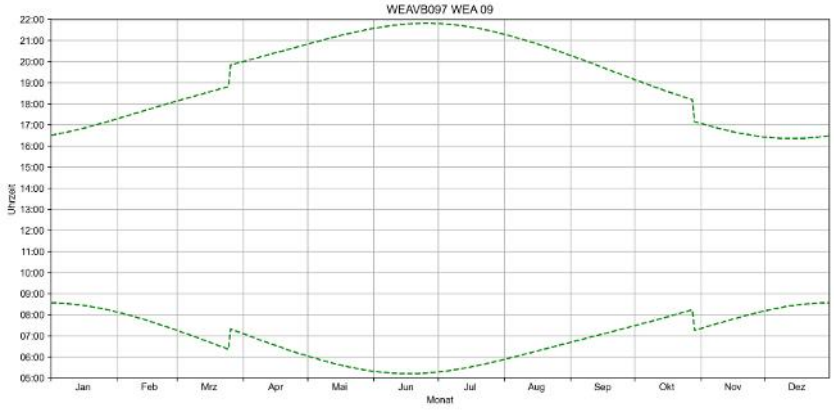
Grafischer Schattenkalender für WEAVB094 WEA 06



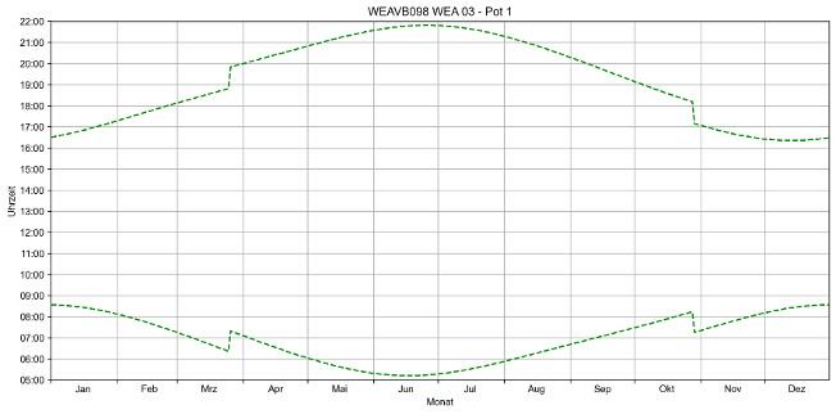
Grafischer Schattenkalender für WEAVB095 WEA 07



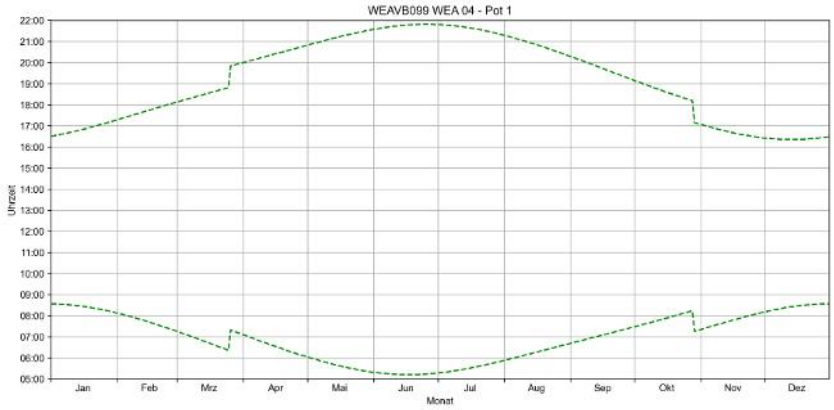
Grafischer Schattenkalender für WEAVB096 WEA 08



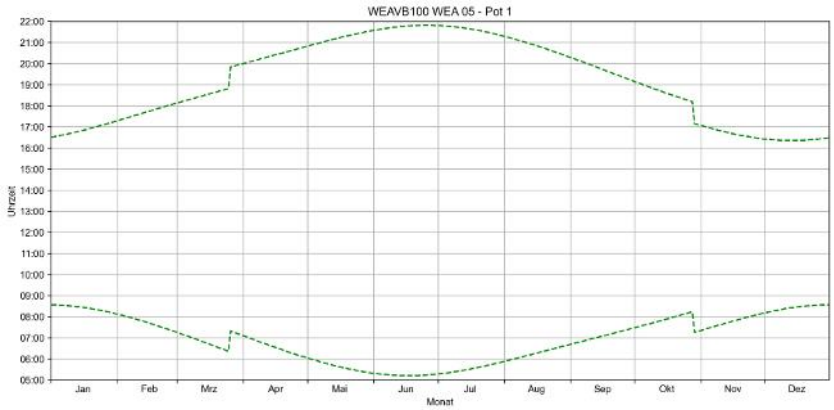
Grafischer Schattenkalender für WEAVB097 WEA 09



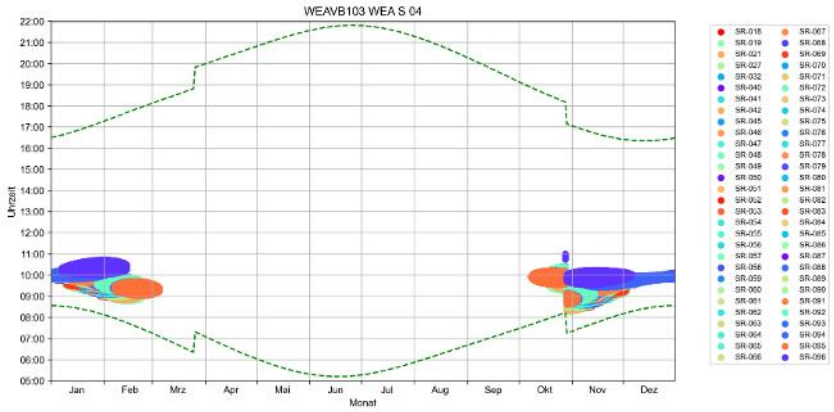
Grafischer Schattenkalender für WEAVB098 WEA 03 - Pot 1



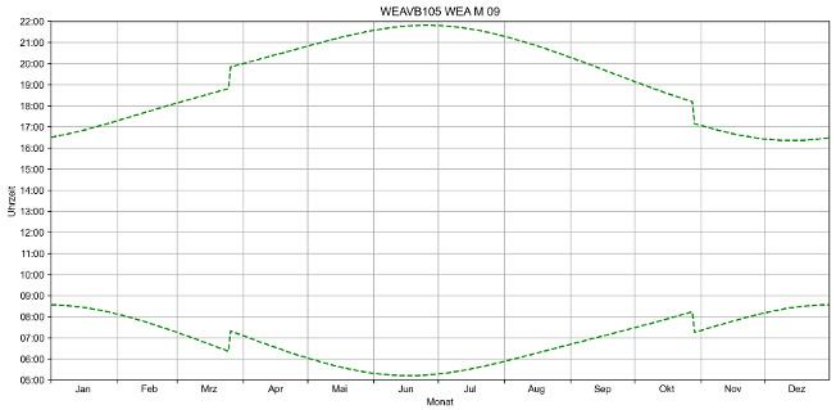
Grafischer Schattenkalender für WEAVB099 WEA 04 - Pot 1



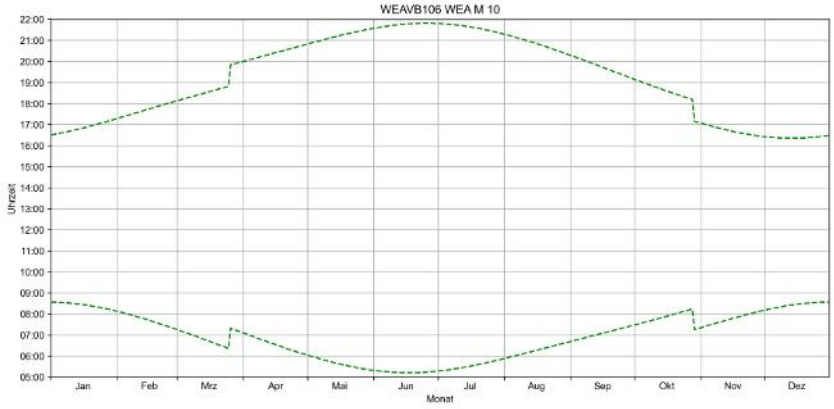
Grafischer Schattenkalender für WEAVB100 WEA 05 - Pot 1



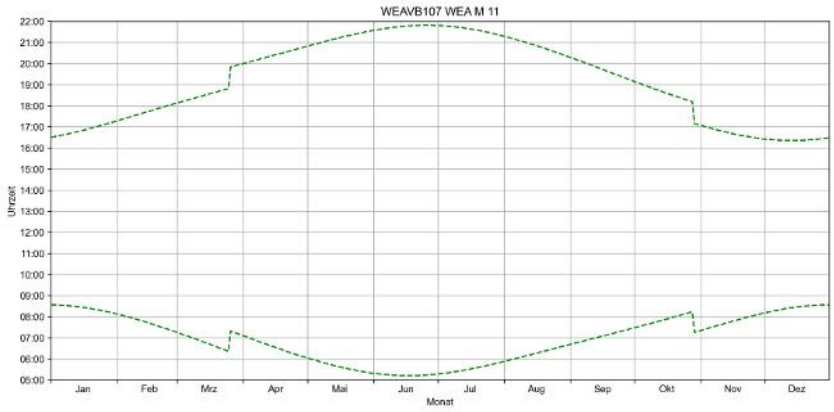
Grafischer Schattenkalender für WEAVB103 WEA S 04



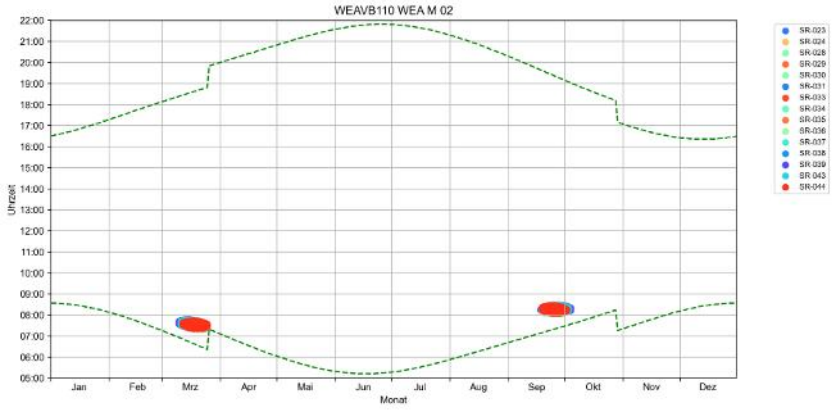
Grafischer Schattenkalender für WEAVB105 WEA M 09



Grafischer Schattenkalender für WEAVB106 WEA M 10



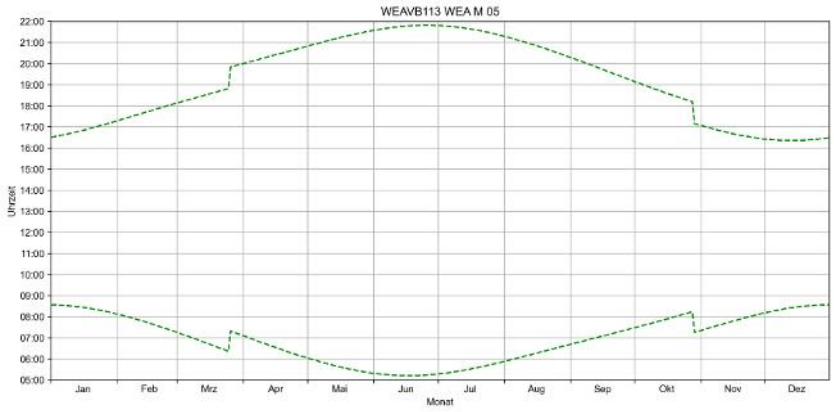
Grafischer Schattenkalender für WEAVB107 WEA M 11



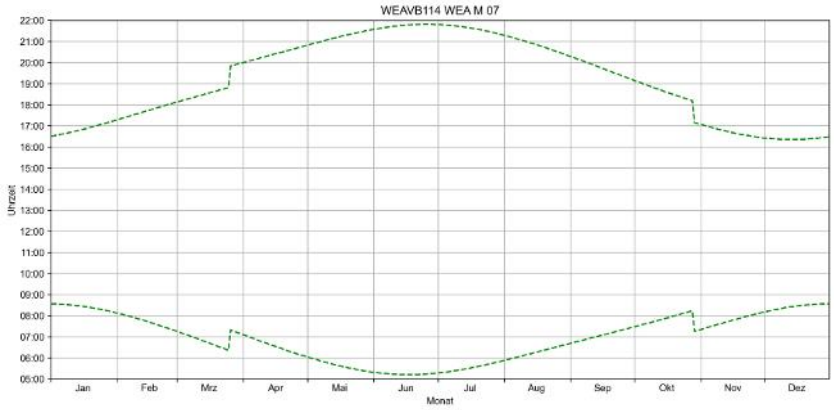
Grafischer Schattenkalender für WEAVB110 WEA M 02



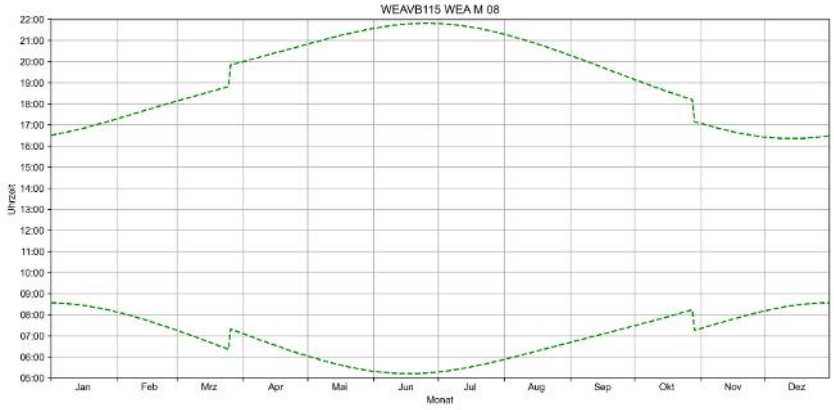
Grafischer Schattenkalender für WEAVB112 WEA M 04



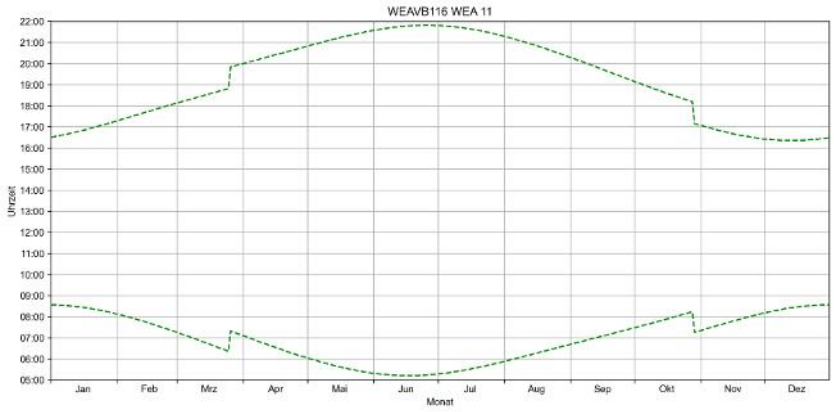
Grafischer Schattenkalender für WEAVB113 WEA M 05



Grafischer Schattenkalender für WEAVB114 WEA M 07



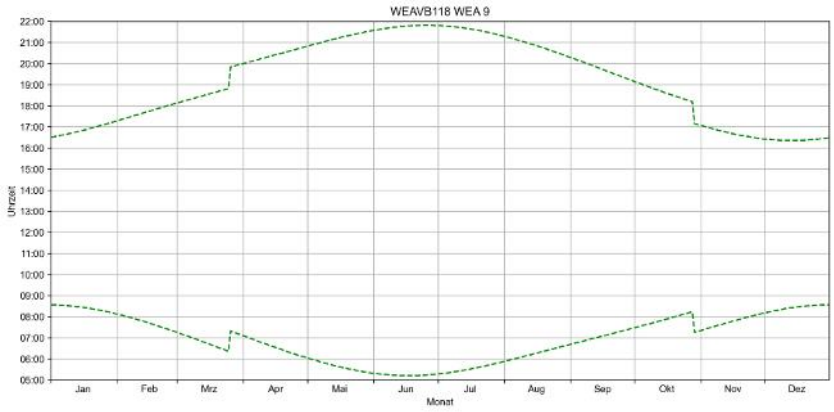
Grafischer Schattenkalender für WEAVB115 WEA M 08



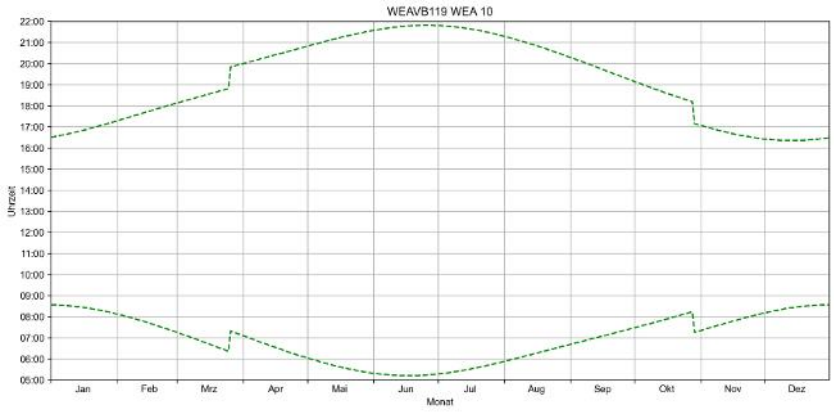
Grafischer Schattenkalender für WEAVB116 WEA 11



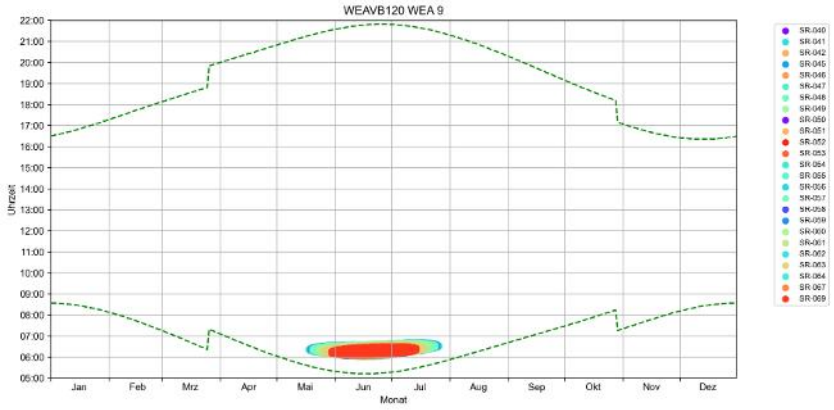
Grafischer Schattenkalender für WEAVB117 WEA 8



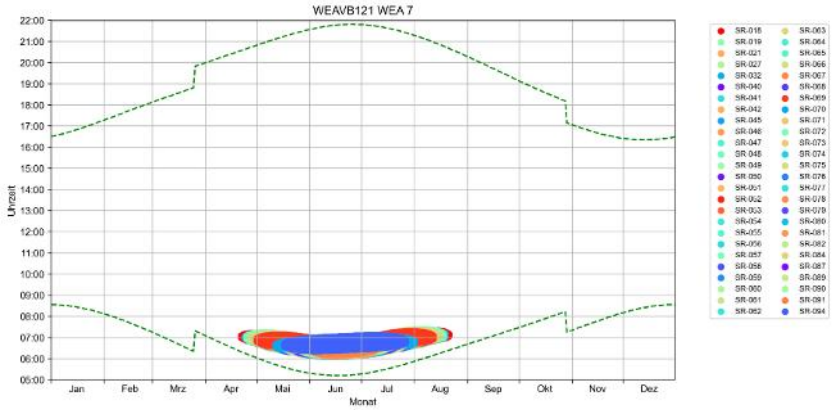
Grafischer Schattenkalender für WEAVB118 WEA 9



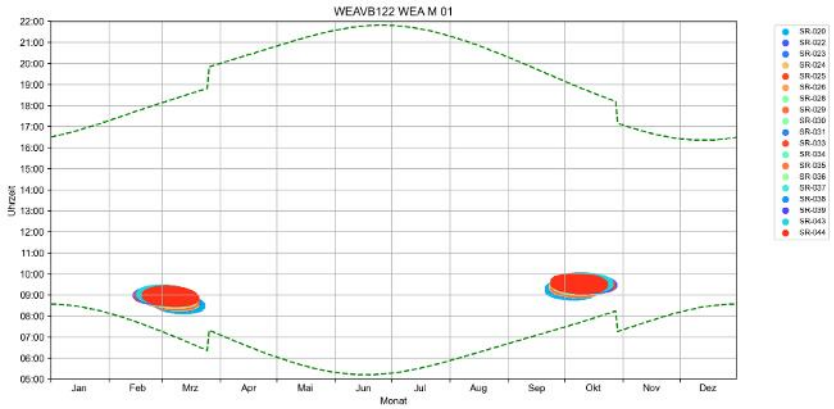
Grafischer Schattenkalender für WEAVB119 WEA 10



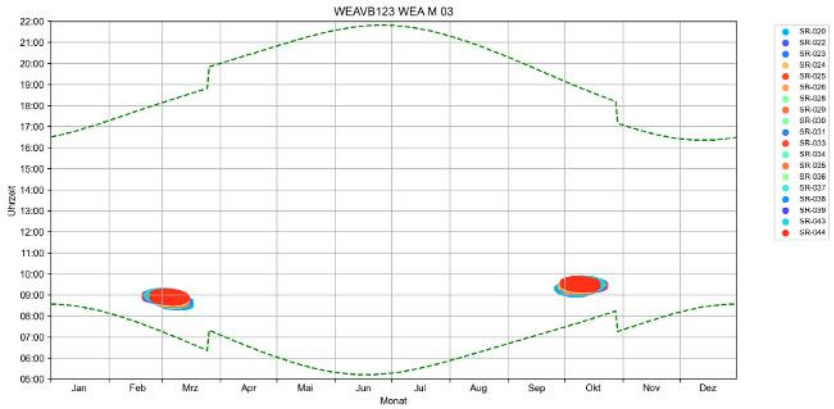
Grafischer Schattenkalender für WEAVB120 WEA 9



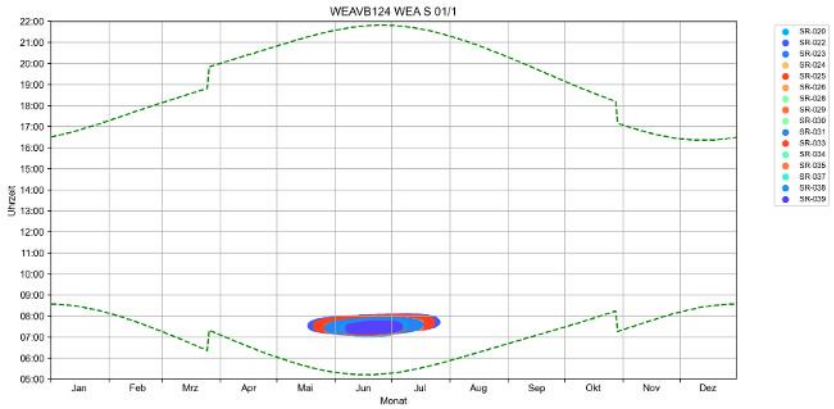
Grafischer Schattenkalender für WEAVB121 WEA 7



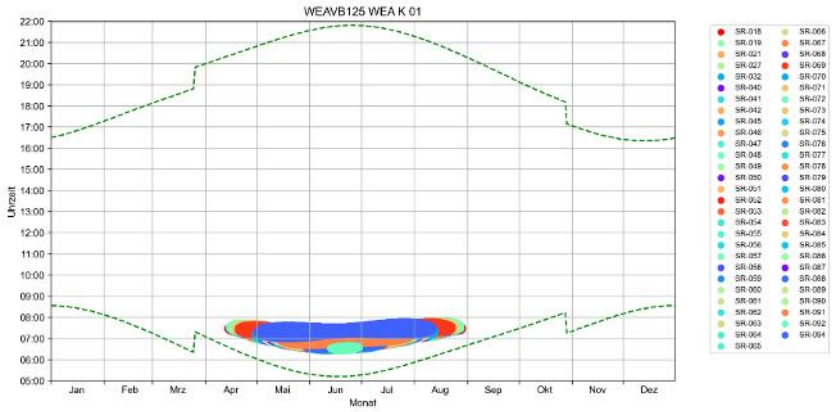
Grafischer Schattenkalender für WEAVB122 WEA M 01



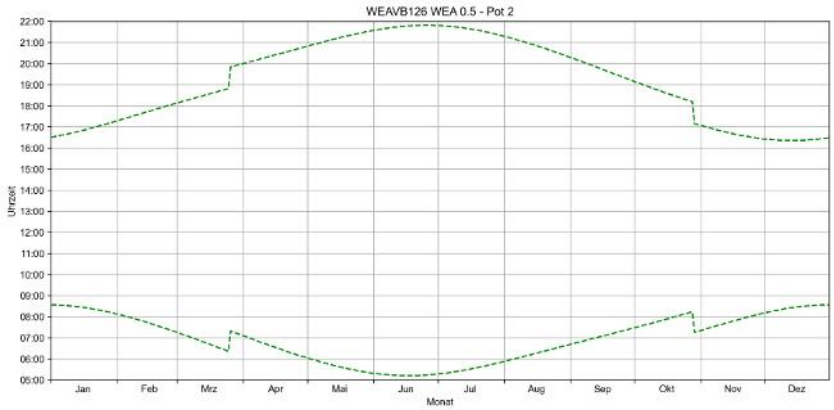
Grafischer Schattenkalender für WEAVB123 WEA M 03



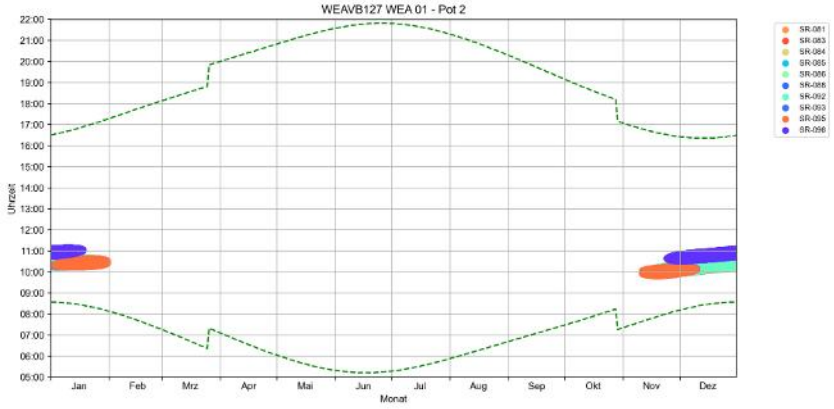
Grafischer Schattenkalender für WEAVB124 WEA S 01/1



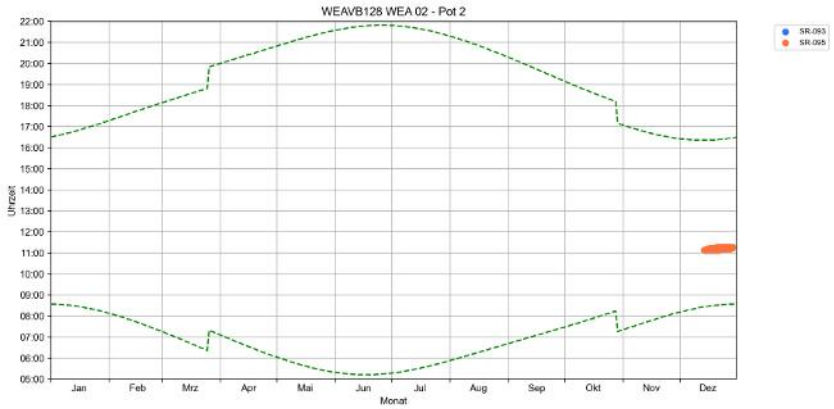
Grafischer Schattenkalender für WEAVB125 WEA K 01



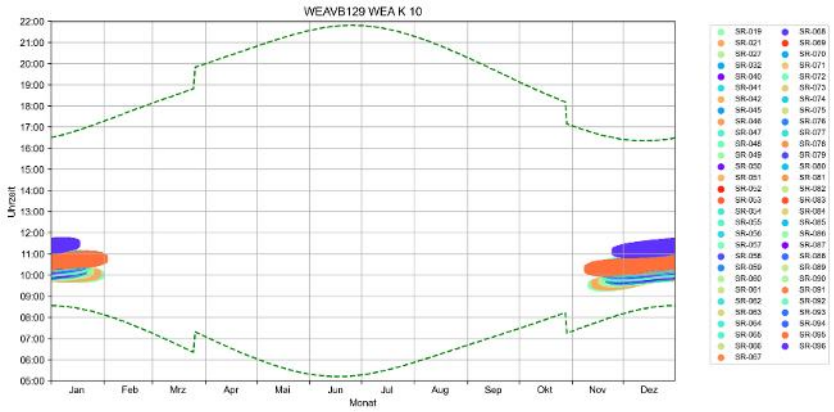
Grafischer Schattenkalender für WEAVB126 WEA 0.5 - Pot 2



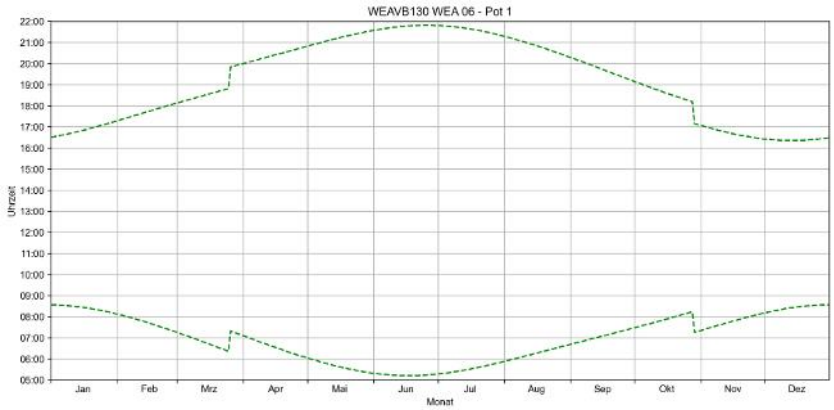
Grafischer Schattenkalender für WEAVB127 WEA 01 - Pot 2



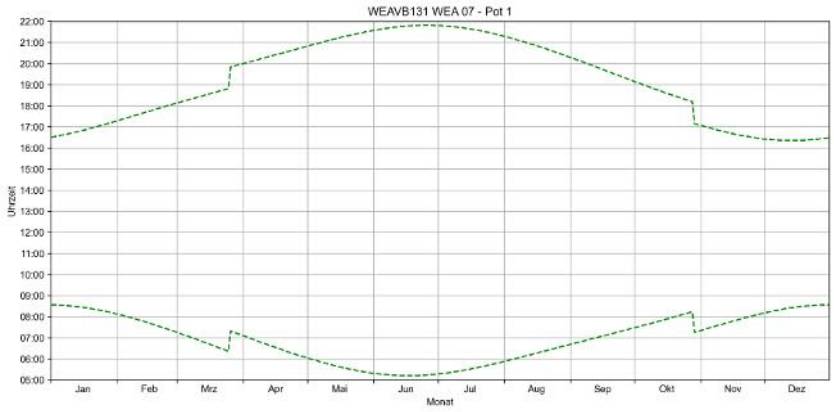
Grafischer Schattenkalender für WEAVB128 WEA 02 - Pot 2



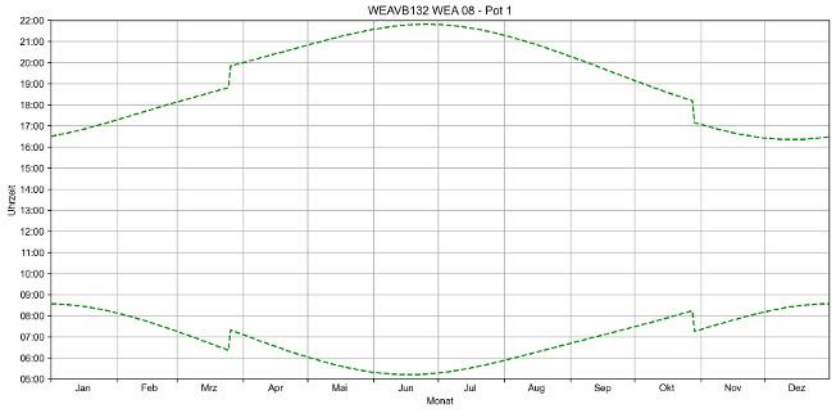
Grafischer Schattenkalender für WEAVB129 WEA K 10



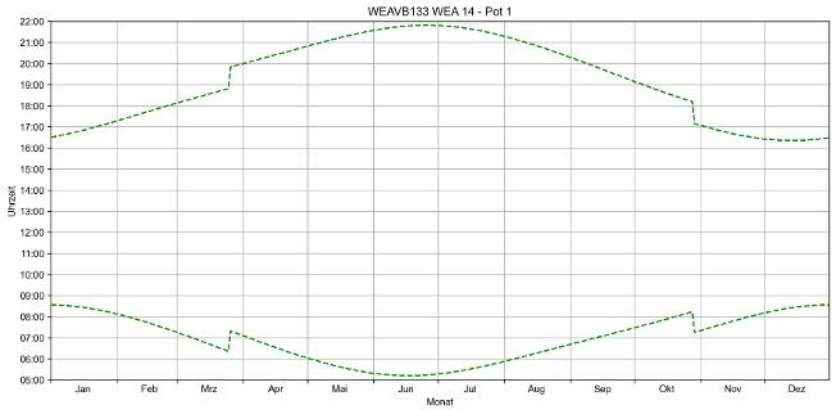
Grafischer Schattenkalender für WEAVB130 WEA 06 - Pot 1



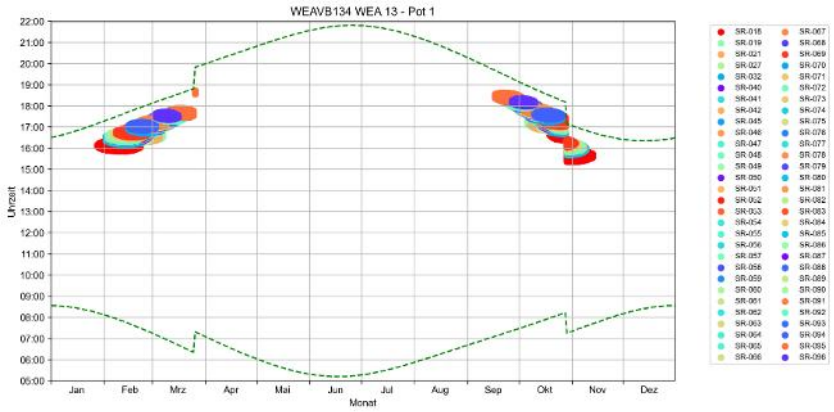
Grafischer Schattenkalender für WEAVB131 WEA 07 - Pot 1



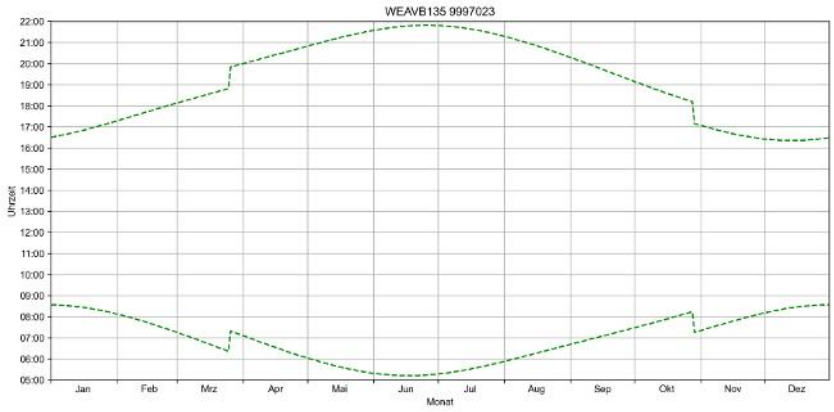
Grafischer Schattenkalender für WEAVB132 WEA 08 - Pot 1



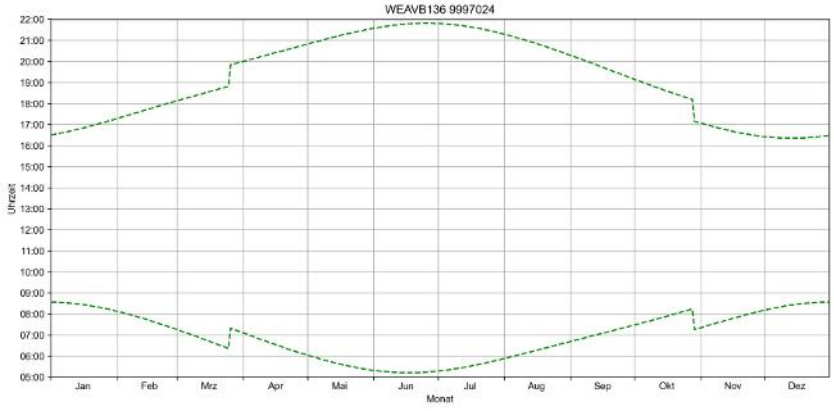
Grafischer Schattenkalender für WEAVB133 WEA 14 - Pot 1



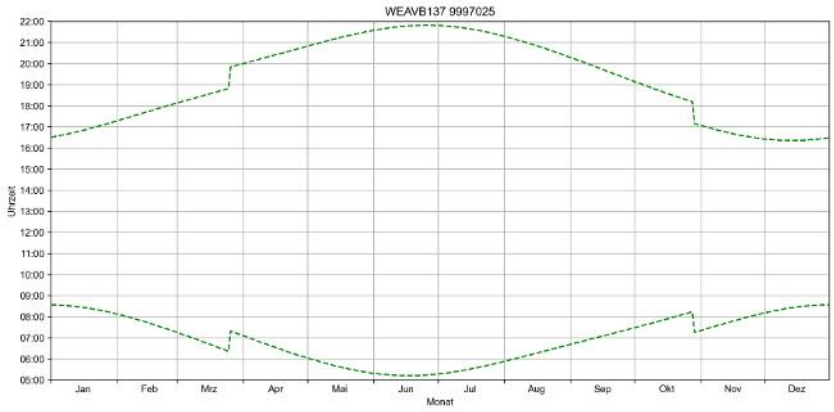
Grafischer Schattenkalender für WEAVB134 WEA 13 - Pot 1



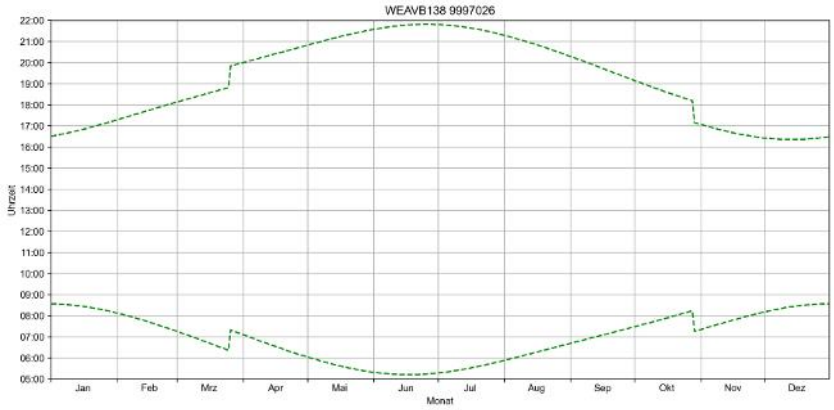
Grafischer Schattenkalender für WEAVB135 9997023



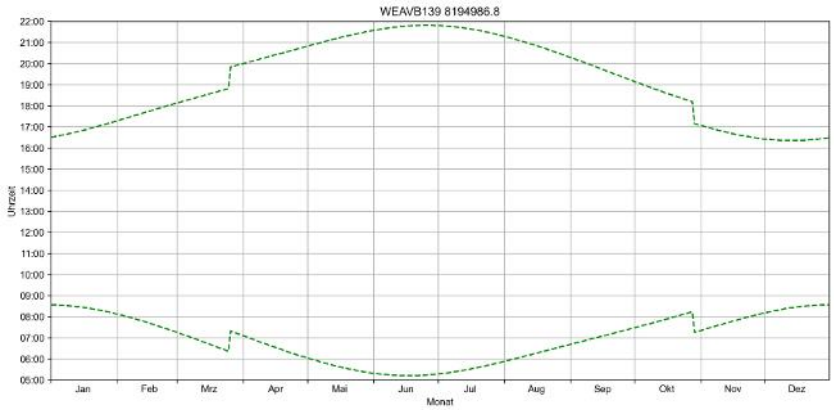
Grafischer Schattenkalender für WEAVB136 9997024



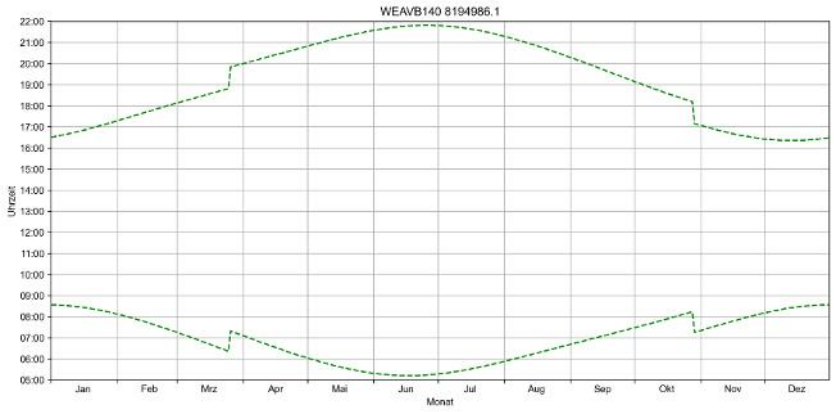
Grafischer Schattenkalender für WEAVB137 9997025



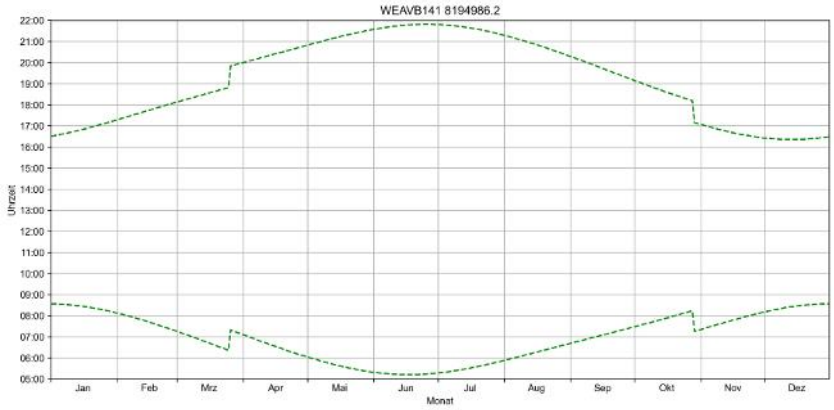
Grafischer Schattenkalender für WEAVB138 9997026



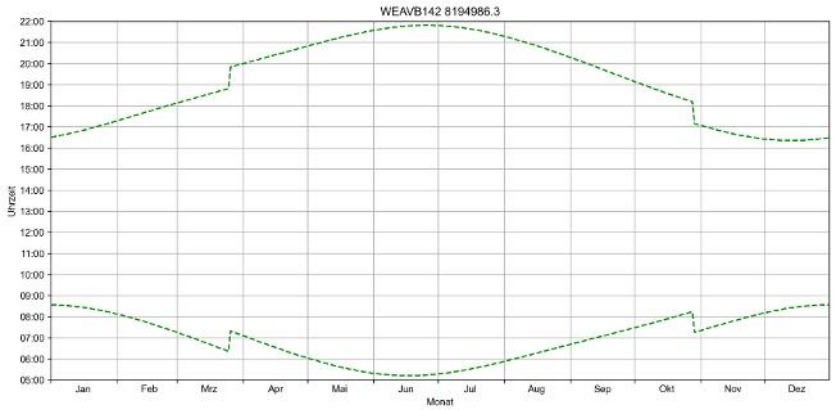
Grafischer Schattenkalender für WEAVB139 8194986.8



Grafischer Schattenkalender für WEAVB140 8194986.1



Grafischer Schattenkalender für WEAVB141 8194986.2



Grafischer Schattenkalender für WEAVB142 8194986.3

E Revisionsübersicht

Tabelle E.1: Revisionsübersicht

Revision	Änderungen	Anmerkungen	Datum
Rev. 0	Initiale Version		09.01.2025
Rev. 1	Anlagenänderung	Anpassung ZB und VB	17.06.2025
Rev. 2	Anlagenänderung	Ergänzung Vorbelastung	20.08.2025

F Abkürzungsübersicht

Tabelle F.1: Abkürzungsübersicht

Abkürzung	Bedeutung
BImSchG	Bundes-Immissionsschutzgesetz
E	Überschreitung der Vorbelastung
ETRS89	Europäisches Terrestrisches Referenzsystem 1989
GB	Gesamtbelastung
LAI	Bund/Länder-Arbeitsgemeinschaft Immissionsschutz
NH	Nabenhöhe
OT	Ortstermin
PN	Nennleistung
R	Relevanz des Schattenrezeptors
RD	Rotordurchmesser
SR	Schattenrezeptor
UTM	Koordinatensystem
VB	Vorbelastung
WEA	Windenergieanlage
ZB	Zusatzbelastung