



REGIONE PUGLIA



COMUNE di  
MINERVINO MURGE



COMUNE di  
ANDRIA



PROVINCIA di  
BARLETTA-ANDRIA-TRANI

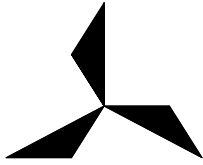


COMUNE di  
SPINAZZOLA



**Edison Rinnovabili Spa**  
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<p>Opera</p>	<p align="center"><b>PROGETTO DEFINITIVO PER IL RIFACIMENTO DI UN PARCO EOLICO DELLA POTENZA COMPLESSIVA DI 59,4MW COSTITUITO DA N°9 AEROGENERATORI TIPO SG155 DA 6,6MW SITO NEL COMUNE DI MINERVINO MURGE(BAT), NONCHÉ DELLE OPERE CONNESSE E DELLE INFRASTRUTTURE INDISPENSABILI ALLA COSTRUZIONE E ALL'ESERCIZIO DELL'IMPIANTO.</b></p>					
<p>Oggetto</p>	<p>Nome Elaborato: LCLJPL2-FLICK_Relazione Shadow Flicker</p>		<p>Folder: VIA_02_Relazioni Specialistiche</p>			
	<p>Descrizione Elaborato: Relazione Shadow Flicker</p>					
<p>00</p>	<p>Gennaio 2024</p>	<p>Emissione per progetto definitivo</p>		<p>Studio Mezzina</p>	<p>TAUW Italia S.r.l</p>	<p>Edison Rinnovabili S.p.A.</p>
<p>Rev.</p>	<p>Data</p>	<p>Oggetto della revisione</p>		<p>Elaborazione</p>	<p>Verifica</p>	<p>Approvazione</p>
<p>Scala:</p>	<p align="center"><b>PROGETTO DEFINITIVO</b></p>					
<p>Formato: A4</p>	<p>Codice progetto AU   <b>LCLJPL2</b>  </p>					



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## 1. PREMESSA

La presente relazione è relativa alla progettazione definitiva in seno al procedimento autorizzativo del “Progetto per il rifacimento e potenziamento di un parco eolico” che la **EDISON RINNOVABILI S.P.A.** intende realizzare in territorio di Minervino Murge in provincia di Barletta-Andria-Trani(BAT).

Il rifacimento progettuale trova fondamento nei vantaggi che si possono trarre dagli interventi di repowering, come:

- l’ottimizzazione della localizzazione delle nuove turbine grazie alla conoscenza della risorsa eolica acquisita durante la gestione dell’impianto;
- Incremento delle prestazioni a valle dell’intervento con aumenti di performance;
- riduzione del numero di turbine che consente una riduzione dell’impatto visivo.
- Utilizzo di aree già sfruttate per impianti eolici riducendo così il consumo di ulteriore suolo.
- Opportunità di sfruttare infrastrutture esistenti, quali cavidotti e strade, con minori costi e impatti sul territorio.
- Minore manutenzione e nuove opportunità di lavoro

Il progetto di rifacimento totale dell’impianto eolico consiste essenzialmente nella dismissione dell’impianto esistente, costituito da 16 aerogeneratori da 2MW, e nell’installazione di 9 aerogeneratori di maggiore potenza, pari a 6,6MW, e dimensioni; la potenza complessiva viene pertanto incrementata dagli attuali 32MW a 59,4 MW, quindi con un incremento di circa il 100% a fronte della riduzione del numero di aerogeneratori di quasi il 50%.

Le nuove turbine sono localizzate in parte nella stessa posizione di alcune di quelle esistenti (IR03, IR06, IR13, IR14), mentre per le restanti 5 è stato effettuato uno spostamento in nuove posizioni per le motivazioni qui di seguito dettagliate:

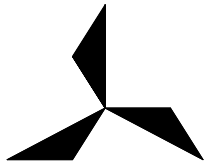
- IR02: spostamento di 195m a NORD-OVEST.

Lo spostamento è stato operato per portare questo aerogeneratore a maggiore distanza, pari a 450m rispetto al Recettore R42, con effetti certamente migliorativi rispetto all’impatto acustico e della sicurezza;

Nella nuova posizione l’aerogeneratore mantiene la medesima distanza di 100m dal Parco Nazionale dell’Alta Murgia.

- IR10: spostamento di 50m a NORD.

Lo spostamento è stato effettuato per portarlo ad una distanza di almeno 450m dai Recettori R55, R56, R58, R59, R60 al fine di migliorare l’impatto acustico su di essi.



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- IR11: spostamento 175m a SUD-OVEST.

Lo spostamento è stato effettuato al fine di rispettare la distanza minima dagli aerogeneratori vicini, prevista dalle Linee Guida Nazionali - Ex DM 10/09/2010 -, pari a 5-7 e 3-5 volte il diametro, rispetto, rispettivamente, alla direzione prevalente e a quella perpendicolare del vento;

- IR21: spostamento di 140m a NORD.

Lo spostamento è stato effettuato per ragioni di salvaguardia archeologica. Infatti, nell'ambito delle indagini archeologiche condotte in sito, in prossimità della piazzola della postazione esistente è stato rinvenuto un frammento di ceramica di interesse archeologico.

- IR22: spostamento di 600m a SUD-OVEST.

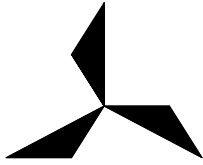
La posizione di questo aerogeneratore è la rilocalizzazione in area esterna al Parco Nazionale dell'Alta Murgia di due aerogeneratori esistenti interni a detto Parco Nazionale. Nella rilocalizzazione, il nuovo aerogeneratore, oltre ad essere stato posto in posizione più vicina agli altri aerogeneratori del parco eolico, è localizzato in area migliore dal punto di vista geomorfologico: più pianeggiante e quindi tale da indurre movimenti terra molto più limitati nella fase di realizzazione.

**Il presente elaborato ha lo scopo di valutare in maniera tecnica l'eventuale impatto generato dall'evoluzione dell'ombra derivante dalla futura installazione dell'impianto eolico sopra descritto.**

## **2. LO SHADOW FLICKERING**

Lo Shadow-Flickering è l'espressione comunemente impiegata in ambito specialistico per descrivere l'effetto stroboscopico delle ombre proiettate dalle pale rotanti degli aerogeneratori eolici quando sussistono le condizioni meteorologiche opportune; infatti la possibilità e la durata di tali effetti dipendono da una serie di condizioni ambientali, tra cui: la posizione del sole, l'ora del giorno, il giorno dell'anno, le condizioni atmosferiche ambientali e la posizione della turbina eolica rispetto ad un recettore sensibile. La valutazione tecnica è eseguita con l'ausilio di un software di simulazione specifico per la progettazione degli impianti eolici WIND PRO®, costituito da un insieme di moduli di elaborazione orientati alla simulazione di una serie di aspetti che caratterizzano le diverse fasi progettuali. Il modulo SHADOW è quello specifico per la valutazione dell'evoluzione dell'ombra e del flickering. In tale report è riportata:

- *La descrizione del caso studio con le posizioni delle turbine e loro caratteristiche tecniche*
- *Una breve descrizione tecnica del fenomeno di shadow flickering*
- *La descrizione dei recettori soggetti al fenomeno per i quali è stata richiesta questa analisi*



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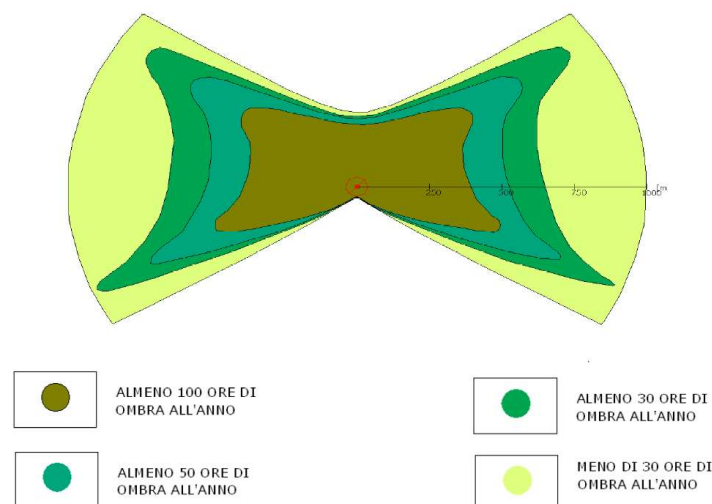


- Sintesi della metodologia di analisi seguita per lo studio
- Sintesi dei risultati ottenuti, con allegati grafici ed analitici di dettaglio che descrivono il fenomeno su ognuno dei recettori e da parte di ognuna delle turbine per tutto l'anno solare.

### 3. STUDIO DELL'EVOLUZIONE DELL'OMBRA GIORNALIERA GENERATA DAGLI AEROGENERATORI

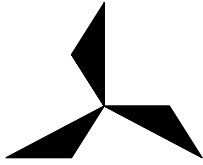
Le turbine eoliche, come altre strutture fortemente sviluppate in altezza, proiettano un'ombra sulle aree adiacenti in presenza della luce solare diretta. Per chi vive in tali zone prossime all'insediamento eolico può essere molto fastidioso il cosiddetto fenomeno del "flicker" che consiste in un effetto di lampeggiamento che si verifica quando le pale del rotore in movimento "tagliano" la luce solare in maniera intermittente. Una progettazione attenta a questa problematica permette di evitare questo spiacevole fenomeno semplicemente prevedendo il luogo di incidenza dell'ombra e disponendo le turbine in maniera tale che l'ombra sulle zone sensibili non superi un certo numero di ore all'anno. Il grafico in figura i riporta l'evoluzione annuale dell'ombra di una turbina considerando il caso peggiore di pale sempre in rotazione intorno al mozzo, e orientate sempre ortogonalmente al sole durante la sua evoluzione giornaliera.

Come è evidente dal grafico e dalla legenda le ore annue di ombra sono sempre minori con l'aumentare della distanza dal pilone secondo una particolare geometria dettata dalla posizione geografica; da osservare che l'ombra arriva a proiettarsi anche sino ad una distanza di 1 km, anche se solo per pochi minuti all'anno.



*Figura 1: Evoluzione annuale tipo dell'ombra di una pala*

Considerati i pochi precedenti esistenti (Germania) e le ipotesi così penalizzanti con cui è stato calcolato tale grafico si è ritenuto opportuno effettuare una sovrapposizione sull'impianto della parte più interna del grafico ovvero dell'area **che supera le 100 ore all'anno di ombra dei punti di installazione, intendendo**



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**questo come limite da non superarsi. Nel prosieguo della presente relazione si fa riferimento anche ad una condizione più restrittiva di 30 ore/anno, come sarà più oltre analizzato.**

In Italia, così come nella maggior parte dei paesi Europei ed extraeuropei non esiste una normativa specifica in relativa al disturbo generato dal fenomeno di Shadow – Flickering. Esistono delle regolamentazioni locali ma quasi mai comprendono limiti numerici specifici, quanto piuttosto delle raccomandazioni tese a sottolineare che il fenomeno non sia “unreasonable” o “significant”.

#### **4. INDIVIDUAZIONE DEI RECETTORI ED IPOTESI DI CALCOLO**

L’analisi di shadow-flickering di cui al presente studio è stata elaborata per specifici 83 recettori che circondano l’impianto; tuttavia, alcune strutture inserite nel modello di simulazione potrebbero essere ruderi non abitati e sostanzialmente privi di caratteristiche minime di abitabilità o agibilità; il che sarà analizzato nel seguito.

Lo studio, i cui risultati in dettaglio sono riportati nei report allegati alla presente relazione, è stato condotto con uno specifico software (WindPRO).

Nello studio ci si è posti nella condizione più sfavorevole possibile, in quanto si è considerato che:

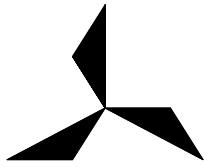
- il sole risplende per tutta la giornata dall'alba al tramonto (cioè, si è **sempre** in assenza di copertura nuvolosa);
- il piano di rotazione delle pale è sempre perpendicolare alla linea che passa per il sole e per l'aerogeneratore (l'aerogeneratore “insegue” il sole);
- l'aerogeneratore è sempre operativo.

Allo stesso tempo, si è trascurata la presenza degli alberi e di altri ostacoli che bordano le strade “intercettando” l’ombra degli aerogeneratori riducendo il fenomeno del flickering sui recettori.

Ciò significa che i risultati forniti dal calcolo sono ampiamente cautelativi.

In base alla metodologia descritta nei paragrafi precedenti, sono stati utilizzati i seguenti dati di input per impostare il modello di simulazione per la valutazione del fenomeno di Shadow-Flickering degli aerogeneratori di progetto:

- a) **Il DTM o Modello del terreno digitale** per caratterizzare l'orografia è stato estrapolato dal grid disponibile in download dal SIT della Regione Puglia, georeferenziato, sovrapposto, confrontato e adeguato con le curve di livello presenti sulla cartografia ufficiale CTR 1: 5.000 con uno step di 5 m. Il modello digitale ottenuto copre un’area sufficiente ad inglobare l’area del parco eolico di progetto e trova un ottimo riscontro con l’andamento orografico verificato in sito.
- b) **Posizioni geografiche di recettori con dettaglio dimensionale delle aree più esposte.** Sono i ricettori



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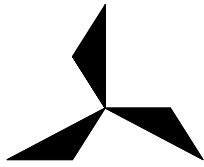
individuati dallo studio acustico e in quello della gittata massima degli elementi rotanti; essi sono classificati secondo la loro abitabilità e destinazione d'uso. Per tutti i ricettori si è ritenuto opportuno usare l'ipotesi di cautela della modalità "green house mode". Questa scelta è stata operata poiché in talune circostanze anche lo spazio antistante le strutture può essere considerato o adibito a luogo di riposo e relax. La scelta di una singola finestra o di una facciata in alcune condizioni potrebbe risultare riduttiva allo scopo di una vera valutazione d'impatto.

**c) Posizioni geografiche delle turbine eoliche e loro caratteristiche dimensionali**

Gli aerogeneratori di progetto con le loro caratteristiche dimensionali e tecnologiche

**d) Nessun ostacolo naturale o artificiale è stato modellato.**

INDIVIDUAZIONE RICETTORI							Distanze Torri										Ore di ombra per anno "Worst Case"	Ore di ombra per anno "Real Case"	Giorni di ombra per anno	Max ore ombra per giorno
COD.	COMUNE	CATEGORIA	E	N	F	P.L.A.	IR02	IR03	IR06	IR10	IR11	IR13	IR14	IR21	IR22					
R1	MINERVINO MURGE	FABB DIRUTO	594304	4548388	93	50	R1	705												
R2	MINERVINO MURGE	COSTR NO AB	594214	4548553	93	70	R2	755												
R3	MINERVINO MURGE	FABB DIRUTO	594069	4548629	93	104	R3	745												
R4	MINERVINO MURGE	FABB DIRUTO	593649	4548996	84	103	R4	1035												
R5	MINERVINO MURGE	COSTR NO AB	592941	4548171	118	207	R5	830												
R6	MINERVINO MURGE	FABB DIRUTO	593122	4547926	118	211	R6	795												
R7	MINERVINO MURGE	FABB DIRUTO	593073	4548596	152	149	R7		1045	950										
R8	MINERVINO MURGE	A03.D10	592738	4546202	152	166	R8			955							52.34	26.37	132	00:38:00
R9	MINERVINO MURGE	A03.D10	592704	4546194	152	41	R9			985							48.38	24.39	125	00:37:00
R10	MINERVINO MURGE	AREA RURALE	595523	4544326	171	168	R10						1105							
R12	MINERVINO MURGE	COSTR NO AB	595765	4544274	171	169	R12						1145							
R13	MINERVINO MURGE	FABB DIRUTO	596383	4544472	191	167	R13						1170							
R14	MINERVINO MURGE	F02	597125	4544367	173	95	R14													
R15	MINERVINO MURGE	ENTE URBANO(SOPPRESSO)	597198	4544380	154	237	R15													
R16	MINERVINO MURGE	F02	596923	4544636	154	236	R16													
R17	MINERVINO MURGE	F02	596934	4544622	154	244	R17													
R18	MINERVINO MURGE	COSTR NO AB	596662	4547938	96	84	R18		1197											
R19	MINERVINO MURGE	AREA FAB DM	596260	4548251	96	38	R19		1000											
R20	MINERVINO MURGE	AREA FAB DM	596052	4548572	95	143	R20		1135											
R21	MINERVINO MURGE	C02	595738	4548721	95	146	R21		1160											
R22	MINERVINO MURGE	FABB DIRUTO	594931	4548380	94	104	R22		965											
R23	MINERVINO MURGE	AREA FAB DM	594939	4548327	94	252	R23		940											
R24	MINERVINO MURGE	FABB DIRUTO	594919	4548316	94	251	R24		945											
R25	MINERVINO MURGE	FABB DIRUTO	594849	4548087	94	248	R25		1115	935										
R26	MINERVINO MURGE	D10	594618	4548093	94	241	R26		885	1030										
R27	MINERVINO MURGE	D10	594588	4548087	94	242	R27		840	1090										
R28	MINERVINO MURGE	A03.D10	594577	4548074	94	243	R28		855	1055							29.27	14.43	54	00:42:00
R29	MINERVINO MURGE	D10	594551	4548077	94	256	R29		815	1080										
R30	MINERVINO MURGE	D10	594551	4548025	94	245	R30		810	1055										
R31	MINERVINO MURGE	D10	594533	4548031	94	244	R31		795	1075										
R32	MINERVINO MURGE	D10	594609	4548072	94	227	R32		875	1025										
R33	MINERVINO MURGE	D10	594557	4548049	94	254	R33		820	1060										
R34	MINERVINO MURGE	D10	594574	4548037	94	258	R34		835	1040										
R35	MINERVINO MURGE	D10	594525	4548046	94	257	R35		785	1085										
R36	MINERVINO MURGE	A04.D10	594526	4548091	94	255	R36		795	1110							32.51	16.26	57	00:45:00
R37	MINERVINO MURGE	FABB DIRUTO	594492	4548107	93	63	R37		765	1145										
R38	MINERVINO MURGE	FABB DIRUTO	594533	4548208	93	106	R38		827	1160										
R39	MINERVINO MURGE	COSTR NO AB	594235	4548296	93	56	R39		680											
R40	MINERVINO MURGE	AREA FAB DM	594137	4548063	93	87	R40		405											
R41	MINERVINO MURGE	AREA FAB DM	594138	4548054	93	88	R41		405											
R42	MINERVINO MURGE	A03.D10.F03	594157	4547787	119	33	R42		450	1130							66.32	44.34	86	01:18:00
R43	MINERVINO MURGE	D10	594222	4547826	119	39	R43		500	1180										
R44	MINERVINO MURGE	C02	594181	4547551	120	90	R44		600	895										
R45	MINERVINO MURGE	FABB DIRUTO	594523	4547737	120	13	R45		815	1000	1155									



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R46	MINERVINO MURGE	CO2.FO2	594534	4547728	120	91	R46	815	1000	1175				1198							
R47	MINERVINO MURGE	CORTE	594565	4547738	120	15	R47	855	955	1175				1188							
R48	MINERVINO MURGE	CORTE	594558	4547748	120	17	R48	845	965	1150											
R49	MINERVINO MURGE	AREA FAB DM	594730	4547718	120	85	R49	1015	790					1110							
R50	MINERVINO MURGE	AREA FAB DM	594904	4547532	120	86	R50		610	1180				885							
R51	MINERVINO MURGE	AREA FAB DM	594732	4547329	120	87	R51	1175	815	915				750							
R52	MINERVINO MURGE	AREA FAB DM	594580	4547369	120	88	R52	1025	955	850				860							
R53	MINERVINO MURGE	FABB DIRUTO	593670	4546416	153	27	R53		505	605	890			1197							
R54	MINERVINO MURGE	FABB DIRUTO	593620	4546426	153	8	R54		545	610	935										
R55	MINERVINO MURGE	D10	593345	4545432	153	155	R55			465	1080										
R56	MINERVINO MURGE	D10	593343	4545422	153	156	R56			475	1085										
R57	MINERVINO MURGE	A07.D10	593338	4545414	153	231	R57			485	1090			44.51	22.25	90					00:18:00
R58	MINERVINO MURGE	D10	593371	4545435	153	214	R58			450	1055										
R59	MINERVINO MURGE	CO2.O2	593394	4545430	153	220	R59			450	1035										
R60	MINERVINO MURGE	D08	593389	4545406	153	173	R60			465	1050										
R61	MINERVINO MURGE	CO2	594447	4545483	153	140	R61		900	170	810										
R62	MINERVINO MURGE	CO2	594446	4545491	153	234	R62		900	160	805										
R63	MINERVINO MURGE	CO2	594448	4545499	153	139	R63		895	155	795										
R64	MINERVINO MURGE	CO2	594432	4545499	153	138	R64		880	150	810										
R65	MINERVINO MURGE	CO2	594930	4545476	153	228	R65			690	645			770							
R66	MINERVINO MURGE	CO2	594930	4545469	153	77	R66			690	655			770							
R67	MINERVINO MURGE	CO2	594930	4545465	153	194	R67			695	655			765							
R68	MINERVINO MURGE	CO2	594929	4545460	153	233	R68		700	660	770										
R69	MINERVINO MURGE	AREA FAB DM	594930	4545451	153	80	R69		705	670	765										
R70	MINERVINO MURGE	CO2	594913	4545447	153	200	R70		690	675	785										
R71	MINERVINO MURGE	CO2	594915	4545436	153	193	R71		700	690	780										
R72	MINERVINO MURGE	ENTE URBANO	595272	4545497	154	190	R72		990	705	1185	435		113.10	56.35	105					01:37:00
R73	MINERVINO MURGE	ENTE URBANO	595251	4545503	154	27	R73		970	685	1175	455									
R74	MINERVINO MURGE	CO2	595295	4545459	154	252	R74		1025	745	405										
R75	MINERVINO MURGE	CO2	595287	4545437	154	251	R75		1025	765	410										
R76	MINERVINO MURGE	AREA FAB DM	595882	4545920	154	164	R76			955	1097	535	1060								
R77	MINERVINO MURGE	AREA FAB DM	595951	4545945	154	165	R77			1045	1199	540	978								
R78	MINERVINO MURGE	AREA FAB DM	595973	4545889	154	6	R78			1055	1185	545	970								
R79	MINERVINO MURGE	AREA FAB DM	596013	4545870	154	166	R79			1099		555	930								
R80	MINERVINO MURGE	FQ2	595767	4544937	154	194	R80					485	1115								
R81	MINERVINO MURGE	A04	595941	4545019	154	73	R81					465	920	9.44	4.52	53					00:15:00
R82	MINERVINO MURGE	A04.CO2	595960	4544985	154	238	R82					505	910	7.13	3.36	47					00:13:00
R83	MINERVINO MURGE	FQ2	595984	4544944	154	239	R83					555	915								
R84	MINERVINO MURGE	FABB RURALE	596002	4544916	154	93	R84					590	905								
R85	MINERVINO MURGE	FQ2	596039	4544891	154	196	R85					630	890								
R86	MINERVINO MURGE	FQ2	596019	4544889	154	197	R86					620	905								
R87	MINERVINO MURGE	FQ2	596014	4544874	154	198	R87					630	925								
R88	MINERVINO MURGE	A03.CO1	596632	4544813	154	168	R88					1115	575	0.00	0.00	0					00:00:00
R89	MINERVINO MURGE	CO2	596674	4544794	154	235	R89					1160	580								
R90	MINERVINO MURGE	A02	594071	4546149	153	208	R90			510	570	415	870	1130							

*Tab.1 – Recettori: Coordinate in UTM-WGS84, caratteristiche e ore di ombra*

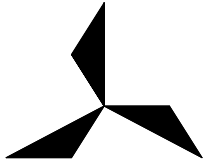
## 5. I RISULTATI DEL CALCOLO DELL'EVOLUZIONE DELL'OMBRA

Come sopra accennato, nella procedura "Worst case", (quella di cui ai calcoli effettuati), il fenomeno di shadow/flickering viene calcolato non tenendo conto di una serie di fattori, i cui dati allo stato dell'arte per il sito in questione non sono disponibili. Se fossero considerati tali fattori si potrebbe calcolare il fenomeno di shadow/flickering con la metodologia "real case", nel qual caso, da quanto riportato nella letteratura specialistica secondo altri casi simili, si avrebbero risultati indicanti una riduzione del fenomeno ad 1/3 dei valori.

Cautelativamente assumiamo per effetto di tali fattori una riduzione del fenomeno del flickering di 1/2.

Dalle simulazioni effettuate, i cui risultati sono riportati nella **Tab. 1**, si evince che gli aerogeneratori di progetto generano maggiormente il fenomeno di shadow/flickering sui seguenti recettori, considerando solo quelli di categoria catastale più interessante per il fenomeno (recettori con categoria catastale A e con più di 30 ore/anno nel "Worst Case":

**"R8, R9, R36, R42, R57, R72"**



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Per tali recettori si ha un massimo di ore di ombra calcolato pari a 113:10 ore/anno.

In riferimento alle considerazioni sopra fatte circa i fattori attenuanti, nel “Real Case” tale valore diventa pari alla metà e quindi di 56.35 ore/anno.

Qui di seguito sono riportate le immagini dei precedenti ricettori al fine di inquadrarli meglio da un punto di vista visivo e analizzarli nel loro stato di fatto rispetto ad una riduzione del fenomeno di flickering.

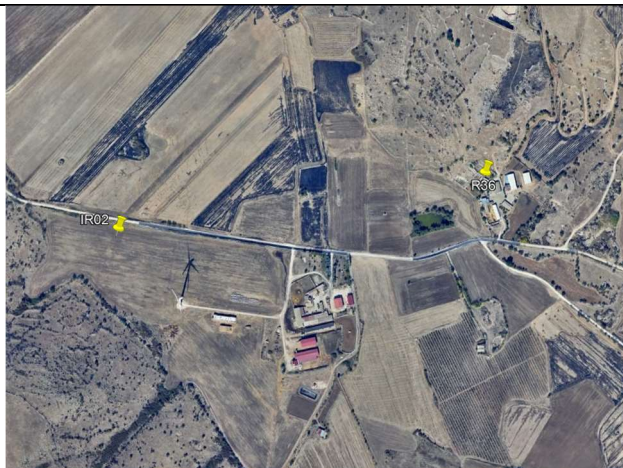


Ricettori R8-R9 e WTG IR10



Ricettori R8-R9

Il ricettore R8-R9 è essenzialmente un insieme di case di campagna e depositi agricoli alle quali verranno aggiunte in fase esecutiva essenze arbustive per limitare o azzerare il fenomeno di flickering.



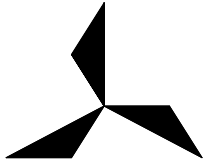
Ricettore R36 e WTG IR02



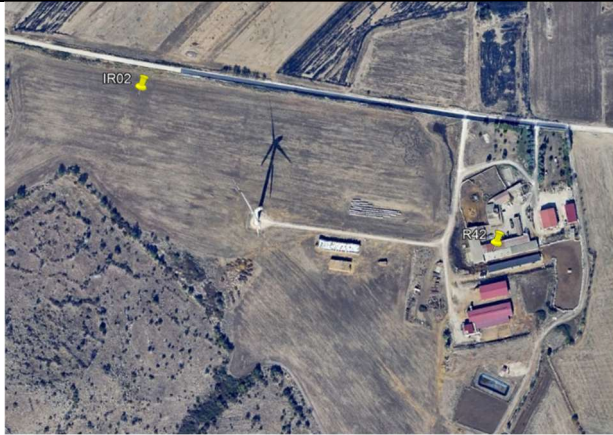
Ricettore R36

Il ricettore R36 è essenzialmente un insieme di case di campagna e depositi agricoli alle quali verranno aggiunte in fase esecutiva essenze arbustive per limitare o azzerare il fenomeno di flickering.





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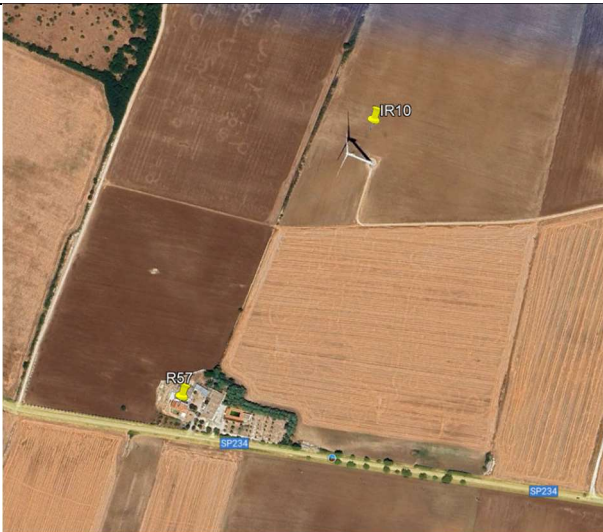


Ricettore R42 e WTG IR02



Ricettore R42

Il ricettore R42 è essenzialmente un insieme di case di campagna e depositi agricoli alle quali verranno aggiunte in fase esecutiva essenze arbustive per limitare o azzerare il fenomeno di flickering.

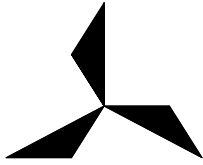


Ricettore R57 e WTG IR10



Ricettore R57

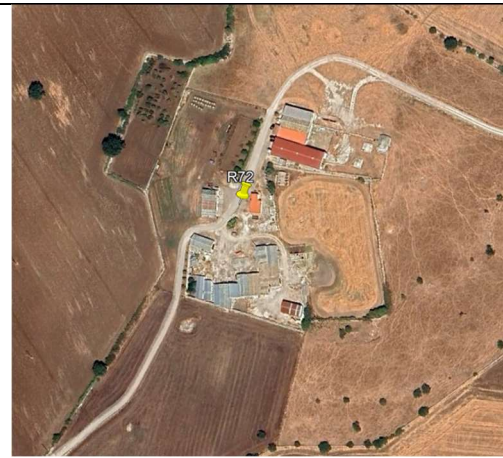
Il ricettore R57 è essenzialmente un insieme di case di campagna e depositi agricoli alle quali verranno aggiunte in fase esecutiva essenze arbustive per limitare o azzerare il fenomeno di flickering.



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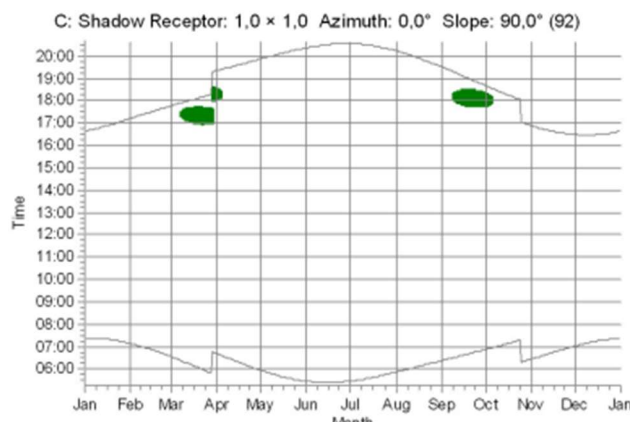
Ricettore R72 e WTG IR21



Ricettore R72

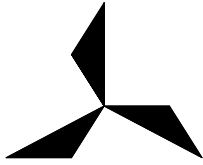
Il ricettore R72 è essenzialmente un insieme di case di campagna e depositi agricoli privi di essenze arbustive di alto fusto le quali verranno aggiunte in fase esecutiva per limitare o azzerare il fenomeno di flickering.

È stato elaborato un calendario dell'ombra riportato in appendice (rif. Appendice Calendar), che riporta in maniera grafica giorno per giorno, per tutto l'anno, la durata giornaliera del fenomeno, l'orario di inizio e di fine del fenomeno, nelle condizioni di caso reale. Dalla lettura del "Calendar" si legge che il fenomeno dell'ombreggiamento, si esplica sui recettori con intensità maggiore nel periodo compreso tra Gennaio/Febbraio, Novembre/Dicembre nelle prime ore del pomeriggio e Aprile/Maggio, Agosto/Ottobre nelle tarde ore pomeridiane. Nella figura che segue è riportato a titolo di esempio il grafico "calendar" di un recettore: le macchie individuano i momenti di shadow, la posizione nel grafico individua tempo e durata del fenomeno, il colore della macchia individua la turbina che causa il fenomeno.



1: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (1)

L'allegato 2 riporta il dettaglio analitico di quanto espresso dal grafico precedente con gli specifici orari di inizio e di fine del fenomeno. A seguire è altresì riportata la sintesi grafica annuale (come mostra l'immagine



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precedente) dell'apporto di ombreggiamento a carico di ogni recettore ed il/gli aerogeneratore/i responsabile/i del fenomeno.

È stata inoltre elaborata una mappa (report Map, Allegato 3) in cui vengono riportate, con diverse gradazioni di colore, le zone soggette ad una determinata durata del fenomeno dell'ombreggiamento oltre all'estensione areale nella quale il fenomeno risulta significativo.

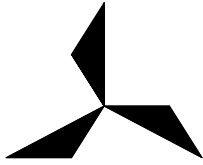
Il fenomeno dell'ombreggiamento interessa marginalmente tratti di strade comunali e/o private per un numero di ore all'anno molto limitato e peraltro solo per alcuni tratti. È da evidenziare tuttavia che occorre tener conto della possibile presenza di vegetazione capace di offrire un effetto "barriera" ai recettori e/o alle strade limitrofe. Inoltre, la percezione dell'impianto dalla strada risulterebbe essere "in movimento" e quindi legata alla breve permanenza delle automobili in transito, per cui il fastidio indotto sarebbe temporalmente molto limitato.

## **6. CONCLUSIONI E RACCOMANDAZIONI**

In conclusione, si può affermare che i risultati ottenuti dall'elaborazione evidenziano, nel "Real Case", che le turbine di progetto generano effetti di shadow flickering sui recettori più sensibili (classificati abitativi) **i cui impatti risultano essere nulli o comunque inferiori alle 30 ore/anno per la maggior parte dei recettori individuati. Per gli altri, il valore calcolato è superato; tuttavia analizzando ciascuno di essi si rileva che la situazione reale di fatto li vede già ampiamente o in buona parte circondati di essenze arbustive di alto fusto tali per cui il fenomeno di shadow flickering su essi è ampiamente limitato. Ci si riserva comunque, in fase di progettazione esecutiva, di eseguire opportune verifiche e misurazioni per valutare con i proprietari la necessità di ampliare le fasce arbustive in modo da limitare ulteriormente o addirittura azzerare il fenomeno (ipotesi di condizione di ottemperanza post progetto esecutivo).**

In ogni caso è comunque da rimarcare l'effetto di sovrastima dovuto al grado di cautela utilizzato per la simulazione che non tiene in conto di tutte le possibili fonti di attenuazione dell'effetto cui ogni recettore è (o può essere) soggetto quali presenza di alberi, ostacoli, siepi e quant'altro possa attenuare il fenomeno dell'evoluzione giornaliera dell'ombra.

Per la viabilità, il fenomeno dell'ombreggiamento interessa marginalmente solo alcuni tratti di strade comunali e/o private. È da evidenziare tuttavia che occorre tener conto della possibile presenza di vegetazione lungo tale viabilità tale da limitare l'effetto. Inoltre, la percezione dell'impianto dalla strada risulterebbe essere "in movimento" e quindi legata alla breve permanenza delle automobili in transito, per cui il fastidio indotto sarebbe temporalmente molto limitato.



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## 7. ELENCO ALLEGATI

Di seguito vengono riportati i risultati dello Shadow Flicker elaborati con il software *WindPro*

1. Main result: quadro sintetico dei risultati di calcolo;
2. Calendar: analisi giornaliera dell'effetto "flickering" ricevuto da ogni recettore;
3. Calendar, graphical: grafico dell'analisi giornaliera dell'effetto "flickering" ricevuto da ogni recettore;
4. Calendar per WTG: analisi giornaliera dell'effetto "flickering" indotto da ogni aerogeneratore sui recettori;
5. Map: mappa delle aree soggette ad ombreggiamento.

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## SHADOW - Main Result

Calculation: ombra

### Assumptions for shadow calculations

Maximum distance for influence  
Calculate only when more than 20 % of sun is covered by the blade  
Please look in WTG table

Minimum sun height over horizon for influence 3 °  
Day step for calculation 1 days  
Time step for calculation 1 minutes

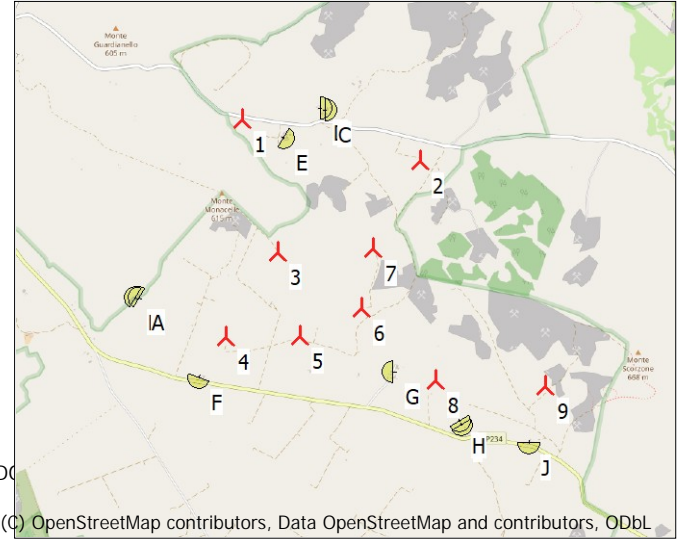
The calculated times are "worst case" given by the following assumptions:  
The sun is shining all the day, from sunrise to sunset  
The rotor plane is always perpendicular to the line from the WTG to the sun  
The WTG is always operating

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:  
Height contours used: Elevation Grid Data Object: IR\_Minervino50volte\_EMD  
Receptor grid resolution: 1,0 m

All coordinates are in  
UTM (north)-WGS84 Zone: 33

### WTGs

	Easting	Northing	Z	Row data/Description	WTG type		Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data	
					Valid	Manufact.					Calculation distance [m]	RPM [RPM]
			[m]									
1	593.742	4.547.962	528,9	Siemens Gamesa SG 6.6-...	Yes	Siemens Gamesa	SG 6.6-155-6.600	6.600	155,0	125,0	2.006	9,3
2	595.509	4.547.579	532,2	Siemens Gamesa SG 6.6-...	Yes	Siemens Gamesa	SG 6.6-155-6.600	6.600	155,0	125,0	2.006	9,3
3	594.113	4.546.656	611,0	Siemens Gamesa SG 6.6-...	Yes	Siemens Gamesa	SG 6.6-155-6.600	6.600	155,0	125,0	2.006	9,3
4	593.611	4.545.816	518,8	Siemens Gamesa SG 6.6-...	Yes	Siemens Gamesa	SG 6.6-155-6.600	6.600	155,0	125,0	2.006	9,3
5	594.344	4.545.838	525,0	Siemens Gamesa SG 6.6-...	Yes	Siemens Gamesa	SG 6.6-155-6.600	6.600	155,0	125,0	2.006	9,3
6	594.947	4.546.120	527,9	Siemens Gamesa SG 6.6-...	Yes	Siemens Gamesa	SG 6.6-155-6.600	6.600	155,0	125,0	2.006	9,3
7	595.066	4.546.711	561,2	Siemens Gamesa SG 6.6-...	Yes	Siemens Gamesa	SG 6.6-155-6.600	6.600	155,0	125,0	2.006	9,3
8	595.696	4.545.416	527,0	Siemens Gamesa SG 6.6-...	Yes	Siemens Gamesa	SG 6.6-155-6.600	6.600	155,0	125,0	2.006	9,3
9	596.791	4.545.366	547,7	Siemens Gamesa SG 6.6-...	Yes	Siemens Gamesa	SG 6.6-155-6.600	6.600	155,0	125,0	2.006	9,3



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

Scale 1:75.000

▲ New WTG

◐ Shadow receptor

### Shadow receptor-Input

No.	Easting	Northing	Z	Width	Height	Elevation a.g.l.	Degrees from south cw	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
			[m]	[m]	[m]	[m]	[°]	[°]		[m]
A	592.738	4.546.202	516,5	1,0	1,0	1,0	-60,0	90,0	Fixed direction	2,0
B	592.704	4.546.194	517,7	1,0	1,0	1,0	-60,0	90,0	Fixed direction	2,0
C	594.577	4.548.074	529,7	1,0	1,0	1,0	90,0	90,0	Fixed direction	2,0
D	594.526	4.548.091	529,8	1,0	1,0	1,0	90,0	90,0	Fixed direction	2,0
E	594.157	4.547.787	533,8	1,0	1,0	1,0	120,0	90,0	Fixed direction	2,0
F	593.338	4.545.414	519,2	1,0	1,0	1,0	-160,0	90,0	Fixed direction	2,0
G	595.272	4.545.497	527,0	1,0	1,0	1,0	-90,0	90,0	Fixed direction	2,0
H	595.941	4.545.019	534,9	1,0	1,0	1,0	150,0	90,0	Fixed direction	2,0
I	595.960	4.544.985	534,6	1,0	1,0	1,0	150,0	90,0	Fixed direction	2,0
J	596.632	4.544.813	546,3	1,0	1,0	1,0	180,0	90,0	Fixed direction	2,0

### Calculation Results

#### Shadow receptor

Shadow, worst case

No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
A	52:34	131	0:38
B	48:38	126	0:37
C	29:27	54	0:42
D	32:51	56	0:44
E	88:32	84	1:17

To be continued on next page...

## SHADOW - Main Result

Calculation: ombra

...continued from previous page

Shadow, worst case

No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
F	44:51	89	0:38
G	113:10	103	1:37
H	9:44	53	0:15
I	7:13	46	0:13
J	0:00	0	0:00

Total amount of flickering on the shadow receptors caused by each WTG

No.	Name	Worst case [h/year]
1	Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (1)	126:12
2	Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (2)	0:00
3	Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (3)	18:36
4	Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (4)	31:01
5	Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (5)	61:25
6	Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (6)	12:23
7	Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (7)	0:00
8	Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (8)	105:13
9	Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (9)	8:39

Total times in Receptor wise and WTG wise tables can differ, as a WTG can lead to flicker at 2 or more receptors simultaneously and/or receptors may receive flicker from 2 or more WTGs simultaneously.

## SHADOW - Calendar

Calculation: ombra Shadow receptor: A - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (90)  
Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:  
The sun is shining all the day, from sunrise to sunset  
The rotor plane is always perpendicular to the line from the WTG to the sun  
The WTG is always operating

	January	February	March	April	May	June		
1	07:21 16:38	07:08 17:12	07:28 (4) 07:47 (4)	06:32 17:46	06:51 (5) 07:08 (5)	06:41 19:20	05:55 19:52	05:26 20:21
2	07:21 16:39	07:07 17:13	07:27 (4) 07:49 (4)	06:30 17:47	06:49 (5) 07:08 (5)	06:40 19:21	05:54 19:53	05:26 20:22
3	07:21 16:39	07:06 17:14	07:26 (4) 07:50 (4)	06:29 17:48	06:48 (5) 07:08 (5)	06:38 19:22	05:53 19:54	05:26 20:23
4	07:22 16:40	07:05 17:16	07:25 (4) 07:52 (4)	06:27 17:49	06:46 (5) 07:07 (5)	06:36 19:23	05:52 19:55	06:27 (3) 05:25
5	07:22 16:41	07:04 17:17	07:24 (4) 07:53 (4)	06:26 17:51	06:47 (5) 07:07 (5)	06:35 19:24	05:50 19:56	06:25 (3) 05:25
6	07:21 16:42	07:03 17:18	07:23 (4) 07:54 (4)	06:24 17:52	06:47 (5) 07:06 (5)	06:33 19:25	05:49 19:57	06:23 (3) 05:25
7	07:21 16:43	07:02 17:19	07:21 (4) 07:54 (4)	06:23 17:53	06:48 (5) 07:04 (5)	06:31 19:26	05:48 19:58	06:21 (3) 05:24
8	07:21 16:44	07:01 17:21	07:21 (4) 07:55 (4)	06:21 17:54	06:50 (5) 07:03 (5)	06:30 19:28	05:47 19:59	06:20 (3) 05:24
9	07:21 16:45	06:59 17:22	07:20 (4) 07:56 (4)	06:19 17:55	06:52 (5) 06:59 (5)	06:28 19:29	05:46 20:00	06:20 (3) 05:24
10	07:21 16:46	06:58 17:23	07:20 (4) 07:57 (4)	06:18 17:56		06:26 19:30	05:44 20:01	06:19 (3) 05:24
11	07:21 16:47	06:57 17:24	07:20 (4) 07:57 (4)	06:16 17:57		06:25 19:31	05:43 20:02	06:19 (3) 05:23
12	07:21 16:48	06:56 17:26	07:19 (4) 07:57 (4)	06:14 17:58		06:23 19:32	05:42 20:03	06:18 (3) 05:23
13	07:20 16:49	06:55 17:27	07:19 (4) 07:57 (4)	06:13 18:00		06:22 19:33	05:41 20:04	06:18 (3) 05:23
14	07:20 16:50	06:53 17:28	07:20 (4) 07:58 (4)	06:11 18:01		06:20 19:34	05:40 20:05	06:18 (3) 05:23
15	07:20 16:51	06:52 17:29	07:19 (4) 07:57 (4)	06:10 18:02		06:19 19:35	05:39 20:06	06:18 (3) 05:23
16	07:19 16:53	06:51 17:31	07:20 (4) 07:57 (4)	06:08 18:03		06:17 19:36	05:38 20:07	06:18 (3) 05:23
17	07:19 16:54	06:49 17:32	07:20 (4) 07:57 (4)	06:06 18:04		06:15 19:37	05:37 20:08	06:19 (3) 05:23
18	07:18 16:55	06:48 17:33	07:20 (4) 07:56 (4)	06:05 18:05		06:14 19:38	05:36 20:09	06:19 (3) 05:23
19	07:18 16:56	06:47 17:34	07:21 (4) 07:56 (4)	06:03 18:06		06:12 19:39	05:35 20:10	06:19 (3) 05:23
20	07:17 16:57	06:45 17:35	07:21 (4) 07:54 (4)	06:01 18:07		06:11 19:40	05:35 20:11	06:19 (3) 05:23
21	07:17 16:58	06:44 17:37	07:22 (4) 07:54 (4)	06:00 18:08		06:09 19:41	05:34 20:12	06:19 (3) 05:24
22	07:16 17:00	06:42 17:38	07:23 (4) 07:53 (4)	05:58 18:09		06:08 19:42	05:33 20:13	06:20 (3) 05:24
23	07:15 17:01	06:41 17:39	07:24 (4) 07:51 (4)	05:56 18:10		06:06 19:43	05:32 20:14	06:21 (3) 05:24
24	07:15 17:02	06:39 17:40	06:59 (5) 07:50 (4)	05:55 18:12		06:05 19:45	05:31 20:15	06:21 (3) 05:24
25	07:14 17:03	06:38 17:41	06:57 (5) 07:47 (4)	05:53 18:13		06:04 19:46	05:31 20:16	06:22 (3) 05:25
26	07:13 17:04	06:36 17:43	06:56 (5) 07:45 (4)	05:51 18:14		06:02 19:47	05:30 20:17	06:23 (3) 05:25
27	07:12 17:06	06:35 17:44	06:54 (5) 07:07 (5)	05:50 18:15		06:01 19:48	05:29 20:17	06:24 (3) 05:25
28	07:11 17:07	06:33 17:45	06:52 (5) 07:08 (5)	05:48 18:16		05:59 19:49	05:29 20:18	06:25 (3) 05:26
29	07:11 17:08			06:46 19:17		05:58 19:50	05:28 20:19	06:26 (3) 05:26
30	07:10 17:09			06:44 19:18		05:57 19:51	05:28 20:20	06:29 (3) 05:26
31	07:09 17:11	07:31 (4) 07:44 (4)		06:43 19:19			05:27 20:21	06:35 (3) 05:26
Potential sun hours	297	297	369	399	448	452		
Total, worst case	13	859	152	537				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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## SHADOW - Calendar

Calculation: ombra Shadow receptor: A - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (90)

### Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	July	August	September	October	November	December
1	05:27 20:32	05:51 20:13	06:29 (3) 25 06:54 (3)	06:22 19:30	06:52 18:40	06:26 16:53
2	05:27 20:32	05:52 20:12	06:29 (3) 24 06:53 (3)	06:23 19:29	06:53 18:38	06:27 16:52
3	05:28 20:32	05:53 20:11	06:30 (3) 23 06:53 (3)	06:24 19:27	06:54 18:36	06:28 16:51
4	05:28 20:32	05:54 20:10	06:30 (3) 22 06:52 (3)	06:25 19:25	06:55 18:35	06:29 16:49
5	05:29 20:32	05:55 20:09	06:31 (3) 21 06:52 (3)	06:26 19:24	06:56 18:33	07:28 (5) 06:31
6	05:30 20:31	05:56 20:08	06:32 (3) 19 06:51 (3)	06:27 19:22	06:57 18:31	10 07:38 (5) 16:48
7	05:30 20:31	05:57 20:07	06:33 (3) 16 06:49 (3)	06:28 19:20	06:58 18:30	18 07:41 (5) 16:46
8	05:31 20:31	05:58 20:05	06:35 (3) 12 06:47 (3)	06:29 19:19	06:59 18:28	20 07:42 (5) 16:45
9	05:32 20:31	05:59 20:04	06:38 (3) 6 06:44 (3)	06:30 19:17	07:00 18:27	21 07:42 (5) 16:44
10	05:32 20:30	06:00 20:03		06:31 19:15	07:01 18:25	21 07:42 (5) 16:43
11	05:33 20:30	06:01 20:01		06:32 19:14	07:02 18:23	20 07:42 (5) 16:42
12	05:34 20:29	06:02 20:00		06:33 19:12	07:03 18:22	18 07:42 (5) 16:41
13	05:34 20:29	06:39 (3) 3 06:42 (3)	06:03 19:59	06:34 19:10	07:04 18:20	17 07:42 (5) 16:40
14	05:35 20:28	06:36 (3) 9 06:45 (3)	06:04 19:57	06:35 19:09	07:05 18:19	15 07:41 (5) 16:39
15	05:36 20:28	06:34 (3) 12 06:46 (3)	06:05 19:56	06:36 19:07	07:07 18:17	21 08:13 (4) 16:38
16	05:37 20:27	06:33 (3) 14 06:47 (3)	06:06 19:55	06:37 19:05	07:08 18:15	26 08:17 (4) 16:37
17	05:37 20:26	06:33 (3) 16 06:49 (3)	06:07 19:53	06:38 19:04	07:09 18:14	29 08:20 (4) 16:36
18	05:38 20:26	06:32 (3) 18 06:50 (3)	06:08 19:52	06:39 19:02	07:10 18:12	28 08:21 (4) 16:36
19	05:39 20:25	06:32 (3) 19 06:51 (3)	06:09 19:50	06:40 19:00	07:11 18:11	28 08:23 (4) 16:35
20	05:40 20:24	06:30 (3) 21 06:51 (3)	06:10 19:49	06:41 18:58	07:12 18:09	30 08:24 (4) 16:34
21	05:41 20:24	06:30 (3) 22 06:52 (3)	06:11 19:47	06:42 18:57	07:13 18:08	33 08:25 (4) 16:34
22	05:42 20:23	06:30 (3) 22 06:52 (3)	06:12 19:46	06:43 18:55	07:14 18:07	34 08:25 (4) 16:33
23	05:43 20:22	06:30 (3) 23 06:53 (3)	06:13 19:44	06:44 18:53	07:15 18:05	36 08:26 (4) 16:32
24	05:43 20:21	06:29 (3) 24 06:53 (3)	06:14 19:43	06:45 18:52	07:17 18:04	37 08:27 (4) 16:32
25	05:44 20:20	06:29 (3) 25 06:54 (3)	06:15 19:41	06:46 18:50	06:18 17:02	37 07:27 (4) 16:31
26	05:45 20:19	06:29 (3) 25 06:54 (3)	06:16 19:40	06:47 18:48	06:19 17:01	38 07:27 (4) 16:31
27	05:46 20:18	06:28 (3) 26 06:54 (3)	06:17 19:38	06:48 18:46	06:20 17:00	38 07:27 (4) 16:30
28	05:47 20:18	06:28 (3) 26 06:54 (3)	06:18 19:37	06:49 18:45	06:21 16:58	38 07:26 (4) 16:30
29	05:48 20:17	06:28 (3) 26 06:54 (3)	06:19 19:35	06:50 18:43	06:22 16:57	38 07:27 (4) 16:29
30	05:49 20:16	06:28 (3) 26 06:54 (3)	06:20 19:34	06:51 18:41	06:24 16:56	38 07:27 (4) 16:29
31	05:50 20:15	06:29 (3) 25 06:54 (3)	06:21 19:32		06:25 16:54	37 07:26 (4) 16:28
Potential sun hours	459	428		375	345	298
Total, worst case	382	168		741		302

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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## SHADOW - Calendar

Calculation: ombra Shadow receptor: B - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (91)

### Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June
1	07:21 16:38	07:08 17:12		06:32 17:46	06:51 (5) 06:41	05:55 20:21
2	07:21 16:39	07:07 17:13	07:30 (4) 07:36 (4)	06:30 17:47	06:49 (5) 06:40	05:54 20:22
3	07:21 16:39	07:06 17:14	6 07:36 (4)	06:29 17:48	06:48 (5) 06:38	05:53 06:28 (3)
4	07:22 16:40	07:05 17:16	15 07:41 (4)	06:27 17:49	06:46 (5) 06:36	05:52 06:25 (3)
5	07:22 16:41	07:04 17:17	18 07:43 (4)	06:26 17:51	06:45 (5) 06:35	05:50 06:23 (3)
6	07:21 16:42	07:03 17:18	21 07:45 (4)	06:24 17:52	06:45 (5) 06:33	05:49 06:22 (3)
7	07:21 16:43	07:02 17:19	24 07:47 (4)	06:23 17:53	06:45 (5) 06:31	05:48 06:20 (3)
8	07:21 16:44	07:01 17:21	26 07:47 (4)	06:21 17:54	06:47 (5) 06:30	05:47 06:19 (3)
9	07:21 16:45	06:59 17:22	29 07:49 (4)	06:19 17:55	06:48 (5) 06:28	05:46 06:19 (3)
10	07:21 16:46	06:58 17:23	31 07:50 (4)	06:18 17:56	07:00 (5) 19:29	20:00 23
11	07:21 16:47	06:57 17:24	33 07:51 (4)	06:16 17:57	06:55 (5) 19:30	20:01 24
12	07:21 16:48	06:56 17:26	35 07:52 (4)	06:14 17:58	06:25 05:43	05:43 06:18 (3)
13	07:20 16:49	06:55 17:27	35 07:51 (4)	06:13 18:00	19:31 20:02	24 06:42 (3)
14	07:20 16:50	06:53 17:28	37 07:53 (4)	06:11 18:01	06:23 05:42	24 06:18 (3)
15	07:20 16:51	06:52 17:29	37 07:52 (4)	06:10 18:02	06:23 05:42	25 06:43 (3)
16	07:19 16:53	06:51 17:31	36 07:52 (4)	06:08 18:03	06:22 05:41	25 06:43 (3)
17	07:19 16:54	06:49 17:32	36 07:52 (4)	06:06 18:04	19:33 20:04	25 06:18 (3)
18	07:18 16:55	06:48 17:33	36 07:52 (4)	06:05 18:05	06:20 05:40	25 06:43 (3)
19	07:18 16:56	06:47 17:34	37 07:52 (4)	06:03 18:06	19:34 20:05	25 06:43 (3)
20	07:17 16:57	06:45 17:35	37 07:52 (4)	06:01 18:07	06:19 05:39	24 06:42 (3)
21	07:17 16:58	06:44 17:37	37 07:52 (4)	06:00 18:08	19:35 20:06	24 06:42 (3)
22	07:16 17:00	06:42 17:38	37 07:53 (4)	05:58 18:09	06:17 05:38	24 06:18 (3)
23	07:15 17:01	06:41 17:39	36 07:52 (4)	05:56 18:10	19:36 20:07	24 06:42 (3)
24	07:15 17:02	06:39 17:40	37 07:53 (4)	05:55 18:12	06:15 05:37	24 06:19 (3)
25	07:14 17:03	06:38 17:41	37 07:52 (4)	05:53 18:13	19:37 20:08	24 06:43 (3)
26	07:13 17:04	06:36 17:43	37 07:52 (4)	05:51 18:14	06:14 05:36	24 06:19 (3)
27	07:12 17:06	06:35 17:44	37 07:52 (4)	05:50 18:15	19:38 20:09	24 06:43 (3)
28	07:11 17:07	06:33 17:45	36 07:52 (4)	05:48 18:16	06:12 05:35	23 06:19 (3)
29	07:11 17:08		36 07:52 (4)	05:46 18:17	19:39 20:10	23 06:42 (3)
30	07:10 17:09		35 07:51 (4)	05:44 18:18	06:11 05:35	23 06:19 (3)
31	07:09 17:11		35 07:51 (4)	05:43 19:19	19:40 20:11	22 06:41 (3)
Potential sun hours	297	297	369	399	448	452
Total, worst case		794	158		502	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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## SHADOW - Calendar

Calculation: ombra Shadow receptor: B - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (91)

### Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	July	August	September	October	November	December
1	05:27 20:32	05:51 20:13	06:29 (3) 19:30	06:22 18:40	06:52 18:40	06:26 16:53
2	05:27 20:32	05:52 20:12	06:29 (3) 19:29	06:23 18:38	06:53 18:38	06:27 16:52
3	05:28 20:32	05:53 20:11	06:29 (3) 19:27	06:24 18:36	06:54 18:36	06:28 16:51
4	05:28 20:32	05:54 20:10	06:30 (3) 19:25	06:25 18:35	06:55 18:35	06:29 16:49
5	05:29 20:32	05:55 20:09	06:30 (3) 19:24	06:26 18:33	06:56 18:33	06:31 16:48
6	05:30 20:31	05:56 20:08	06:31 (3) 19:22	06:27 18:31	06:57 18:31	06:32 16:47
7	05:30 20:31	05:57 20:07	06:32 (3) 19:20	06:28 18:30	06:58 18:30	06:33 16:46
8	05:31 20:31	05:58 20:05	06:34 (3) 19:19	06:29 18:28	06:59 18:28	06:34 16:45
9	05:32 20:31	05:59 20:04	06:36 (3) 19:17	06:30 18:27	07:00 18:27	06:35 16:44
10	05:32 20:30	06:00 20:03	06:31 19:15	07:01 18:25	07:21 (5) 18:25	06:37 16:43
11	05:33 20:30	06:01 20:01	06:32 19:14	07:02 18:23	07:22 (5) 18:23	06:38 16:42
12	05:34 20:29	06:02 20:00	06:33 19:12	07:03 18:22	07:24 (5) 18:22	06:39 16:41
13	05:34 20:29	06:03 19:59	06:34 19:10	07:04 18:20	07:25 (5) 18:20	06:40 16:40
14	05:35 20:28	06:04 19:57	06:35 19:09	07:05 18:19	07:26 (5) 18:19	06:41 16:39
15	05:36 20:28	06:39 (3) 19:56	06:05 19:07	07:07 18:17	07:27 (5) 18:17	06:43 16:38
16	05:37 20:27	06:40 (3) 19:55	06:06 19:05	07:08 18:15	07:28 (5) 18:15	06:44 16:37
17	05:37 20:26	06:44 (3) 19:53	06:07 19:04	07:09 18:14	07:29 (5) 18:14	06:45 16:36
18	05:38 20:26	06:34 (3) 19:52	06:08 19:02	07:10 18:12	07:50 (4) 18:12	06:46 16:36
19	05:39 20:25	06:47 (3) 19:50	06:09 19:00	07:11 18:11	08:19 (4) 18:11	16:36 16:35
20	05:40 20:24	06:33 (3) 19:49	06:10 18:58	07:12 18:09	07:49 (4) 18:09	06:47 16:34
21	05:41 20:24	06:49 (3) 19:47	06:11 18:57	07:13 18:08	07:47 (4) 18:08	06:50 16:34
22	05:42 20:23	06:31 (3) 19:46	06:12 18:55	07:14 18:07	07:46 (4) 18:07	06:51 16:33
23	05:43 20:22	06:30 (3) 19:44	06:13 18:53	07:15 18:05	07:46 (4) 18:05	06:52 16:32
24	05:43 20:21	06:52 (3) 19:43	06:14 18:52	07:17 18:04	08:22 (4) 18:04	16:32 16:32
25	05:44 20:20	06:34 (3) 19:41	06:15 18:50	06:18 17:02	06:46 (4) 17:02	06:54 16:31
26	05:45 20:19	06:29 (3) 19:40	06:16 18:48	06:19 17:01	06:45 (4) 17:01	06:55 16:31
27	05:46 20:18	06:53 (3) 19:38	06:17 18:46	06:20 17:00	06:45 (4) 17:00	06:56 16:30
28	05:47 20:18	06:28 (3) 19:37	06:18 18:45	06:21 16:58	06:45 (4) 16:58	06:58 16:30
29	05:48 20:17	06:53 (3) 19:35	06:19 18:43	06:22 16:57	06:46 (4) 16:57	06:59 16:29
30	05:49 20:16	06:28 (3) 19:34	06:20 18:41	06:24 16:56	06:46 (4) 16:56	07:00 16:29
31	05:50 20:15	06:53 (3) 19:32	06:21 18:41	06:25 16:54	06:46 (4) 16:54	07:01 16:28
Potential sun hours	459	428	375	345	298	288
Total, worst case	325	176		765	198	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

IR\_Minervino

Licensed user:

Vega sas
Via delli Carri, 48
IT-71100 Foggia
+39 0881 756251
Vega / info@studiovega.org
Calculated:
27/05/2024 16:20/4.0.531

SHADOW - Calendar

Calculation: ombra Shadow receptor: C - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (92)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
The rotor plane is always perpendicular to the line from the WTG to the sun
The WTG is always operating

Table with columns for months (January to December) and rows for days of the month. Includes sunrise/sunset times and 'Potential sun hours' at the bottom.

Table layout: For each day in each month the following matrix apply

Day in month Sun rise (hh:mm) Sun set (hh:mm) Minutes with flicker First time (hh:mm) with flicker Last time (hh:mm) with flicker (WTG causing flicker first time) (WTG causing flicker last time)



SHADOW - Calendar

Calculation: ombra Shadow receptor: D - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (93)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December		
1	07:21 16:38	07:08 17:12	06:32 17:46	06:41 19:20	18:04 (1) 18:19 (1)	05:55 19:52	05:26 20:21	05:27 20:32	05:51 20:13	06:22 19:30	06:52 18:40	17:36 (1) 18:16 (1)	06:26 16:53	07:01 16:29
2	07:21 16:38	07:07 17:13	06:30 17:47	06:39 19:21		05:54 19:53	05:26 20:22	05:27 20:32	05:52 20:12	06:23 19:29	06:53 18:38	17:37 (1) 18:15 (1)	06:27 16:52	07:02 16:28
3	07:21 16:39	07:06 17:14	06:29 17:48	06:38 19:22		05:53 19:54	05:25 20:23	05:28 20:32	05:53 20:11	06:24 19:27	06:54 18:36	17:37 (1) 18:13 (1)	06:28 16:51	07:03 16:28
4	07:21 16:40	07:05 17:16	06:27 17:49	06:36 19:23		05:51 19:55	05:25 20:24	05:28 20:32	05:54 20:10	06:25 19:25	06:55 18:35	17:38 (1) 18:11 (1)	06:29 16:49	07:04 16:28
5	07:21 16:41	07:04 17:17	06:26 17:51	06:34 19:24	17:13 (1)	05:50 19:56	05:25 20:24	05:29 20:32	05:55 20:09	06:26 19:24	06:56 18:33	17:39 (1) 18:10 (1)	06:31 16:48	07:05 16:28
6	07:21 16:42	07:03 17:18	06:24 17:52	06:33 19:25	17:08 (1)	05:49 19:57	05:24 20:25	05:30 20:31	05:56 20:08	06:27 19:22	06:57 18:31	17:41 (1) 18:07 (1)	06:32 16:47	07:06 16:28
7	07:21 16:43	07:02 17:19	06:22 17:53	06:31 19:26	17:05 (1)	05:48 19:58	05:24 20:26	05:30 20:31	05:57 20:06	06:28 19:20	06:58 18:30	17:43 (1) 18:05 (1)	06:33 16:46	07:07 16:27
8	07:21 16:44	07:00 17:21	06:21 17:54	06:30 19:27	17:03 (1)	05:47 19:59	05:24 20:26	05:31 20:31	05:58 20:05	06:29 19:19	06:59 18:28	17:46 (1) 18:01 (1)	06:34 16:45	07:08 16:27
9	07:21 16:45	06:59 17:22	06:19 17:55	06:28 19:29	17:01 (1)	05:45 20:00	05:24 20:27	05:31 20:30	05:59 20:04	06:30 19:17	07:00 18:26	18:02 (1) 18:17 (1)	06:35 16:44	07:09 16:27
10	07:21 16:46	06:58 17:23	06:18 17:56	06:26 19:30	16:59 (1)	05:44 20:01	05:23 20:27	05:32 20:30	06:00 20:03	06:31 19:15	07:01 18:25	18:01 (1) 18:16 (1)	06:36 16:43	07:10 16:27
11	07:21 16:47	06:57 17:24	06:16 17:57	06:25 19:31	16:58 (1)	05:43 20:02	05:23 20:28	05:33 20:30	06:01 20:01	06:31 19:14	07:02 18:11 (1)	18:14 (1) 18:29 (1)	06:37 16:42	07:11 16:27
12	07:20 16:48	06:56 17:26	06:14 17:58	06:23 19:32	16:57 (1)	05:42 20:03	05:23 20:28	05:33 20:29	06:02 20:00	06:32 19:12	07:03 18:14 (1)	18:15 (1) 18:30 (1)	06:39 16:41	07:12 16:28
13	07:20 16:49	06:54 17:27	06:13 18:00	06:22 19:33	16:55 (1)	05:41 20:04	05:23 20:29	05:34 20:29	06:03 19:59	06:33 19:10	07:04 18:16 (1)	18:16 (1) 18:31 (1)	06:40 16:40	07:13 16:28
14	07:20 16:50	06:53 17:28	06:11 18:01	06:20 19:34	16:53 (1)	05:40 20:05	05:23 20:29	05:35 20:28	06:04 19:57	06:34 19:09	07:05 18:17 (1)	18:17 (1) 18:32 (1)	06:41 16:39	07:14 16:28
15	07:19 16:51	06:52 17:29	06:09 18:02	06:18 19:35	16:54 (1)	05:39 20:06	05:23 20:30	05:36 20:28	06:05 19:56	06:35 19:07	07:06 18:18 (1)	18:18 (1) 18:33 (1)	06:43 16:38	07:15 16:28
16	07:19 16:52	06:51 17:30	06:08 18:03	06:17 19:36	16:53 (1)	05:38 20:07	05:23 20:30	05:37 20:27	06:06 19:55	06:36 19:05	07:07 18:19 (1)	18:19 (1) 18:34 (1)	06:44 16:37	07:16 16:28
17	07:19 16:54	06:49 17:32	06:06 18:04	06:15 19:37	16:53 (1)	05:37 20:08	05:23 20:31	05:37 20:26	06:07 19:53	06:37 19:03	07:09 18:20 (1)	18:14 (1) 18:29 (1)	06:45 16:36	07:17 16:29
18	07:18 16:55	06:48 17:33	06:04 18:05	06:14 19:38	16:53 (1)	05:36 20:09	05:23 20:31	05:38 20:26	06:08 19:52	06:38 19:02	07:10 18:21 (1)	18:15 (1) 18:30 (1)	06:46 16:36	07:18 16:29
19	07:18 16:56	06:47 17:34	06:03 18:06	06:12 19:39	16:52 (1)	05:35 20:10	05:23 20:31	05:39 20:25	06:09 19:50	06:39 19:00	07:11 18:21 (1)	18:16 (1) 18:31 (1)	06:47 16:35	07:19 16:29
20	07:17 16:57	06:45 17:35	06:01 18:07	06:11 19:40	16:53 (1)	05:34 20:11	05:23 20:31	05:40 20:24	06:10 19:49	06:40 18:58	07:12 18:21 (1)	18:17 (1) 18:32 (1)	06:48 16:34	07:20 16:30
21	07:16 16:58	06:44 17:36	05:59 18:08	06:09 19:41	16:52 (1)	05:34 20:12	05:23 20:32	05:41 20:24	06:11 19:47	06:41 18:57	07:13 18:21 (1)	18:18 (1) 18:33 (1)	06:50 16:33	07:21 16:30
22	07:16 16:59	06:42 17:38	05:58 18:09	06:08 19:42	16:52 (1)	05:33 20:13	05:24 20:32	05:42 20:23	06:12 19:46	06:42 18:55	07:14 18:21 (1)	18:19 (1) 18:34 (1)	06:51 16:33	07:22 16:31
23	07:15 17:01	06:41 17:39	05:56 18:10	06:06 19:43	16:53 (1)	05:32 20:14	05:24 20:32	05:42 20:22	06:13 19:44	06:43 18:53	07:15 18:21 (1)	18:05 (1) 18:30 (1)	06:52 16:32	07:23 16:31
24	07:15 17:02	06:39 17:40	05:54 18:11	06:05 19:44	16:53 (1)	05:31 20:15	05:24 20:32	05:43 20:21	06:14 19:43	06:44 18:52	07:17 18:21 (1)	18:04 (1) 18:29 (1)	06:53 16:32	07:24 16:32
25	07:14 17:03	06:38 17:41	05:53 18:13	06:03 19:46	16:53 (1)	05:30 20:16	05:24 20:32	05:44 20:20	06:15 19:41	06:45 18:50	07:18 18:20 (1)	18:06 (1) 18:31 (1)	06:54 16:31	07:25 16:32
26	07:13 17:04	06:36 17:42	05:51 18:14	06:02 19:47	16:54 (1)	05:30 20:17	05:25 20:32	05:45 20:19	06:16 19:40	06:46 18:48	07:19 18:20 (1)	18:07 (1) 18:32 (1)	06:55 16:31	07:26 16:33
27	07:12 17:06	06:35 17:44	05:49 18:15	06:01 19:48	16:55 (1)	05:29 20:17	05:25 20:33	05:46 20:18	06:17 19:38	06:47 18:46	07:20 18:19 (1)	18:08 (1) 18:33 (1)	06:56 16:30	07:27 16:34
28	07:11 17:07	06:33 17:45	05:48 18:16	05:59 19:49	16:55 (1)	05:29 20:18	05:26 20:33	05:47 20:17	06:18 19:37	06:49 18:45	07:21 18:19 (1)	18:09 (1) 18:34 (1)	06:58 16:30	07:28 16:34
29	07:11 17:08		06:46 19:17	05:58 19:50	17:57 (1)	05:28 20:19	05:26 20:33	05:48 20:17	06:19 19:35	06:50 18:43	07:22 18:18 (1)	18:10 (1) 18:35 (1)	06:59 16:29	07:29 16:35
30	07:10 17:09		06:44 19:18	05:57 19:51	17:59 (1)	05:27 20:20	05:26 20:32	05:49 20:15	06:20 19:33	06:51 18:41	07:23 18:17 (1)	18:11 (1) 18:36 (1)	07:00 16:55	07:30 16:29
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Potential sun hours	297	297	369	399	399	448	452	459	428	375	345	345	298	288
Total, worst case			968		15					747		241		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

IR\_Minervino

Licensed user:

Vega sas
Via delli Carri, 48
IT-71100 Foggia
+39 0881 756251
Vega / info@studiovega.org
Calculated:
27/05/2024 16:20/4.0.531

SHADOW - Calendar

Calculation: ombra Shadow receptor: E - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (94)
Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
The rotor plane is always perpendicular to the line from the WTG to the sun
The WTG is always operating

Table with 13 columns representing months (January to December) and 31 rows representing days. Each cell contains a 2x2 matrix of sun rise/set times and minutes with flicker. Summary rows at the bottom show 'Potential sun hours' and 'Total, worst case' for each month.

Table layout: For each day in each month the following matrix apply

Day in month Sun rise (hh:mm) Sun set (hh:mm) Minutes with flicker First time (hh:mm) with flicker Last time (hh:mm) with flicker (WTG causing flicker first time) (WTG causing flicker last time)



### SHADOW - Calendar

Calculation: ombr Shadow receptor: F - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (95)  
Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:  
The sun is shining all the day, from sunrise to sunset  
The rotor plane is always perpendicular to the line from the WTG to the sun  
The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December		
1	07:21 16:38	07:08 17:12	06:32 17:46	06:41 19:20	05:55 19:52	05:26 20:21	05:57 (5) 20:32	05:51 20:13	06:13 (5) 20:22	06:22 20:23	06:52 18:40	06:26 16:53	07:01 16:29	
2	07:21 16:39	07:07 17:13	06:30 17:47	06:39 19:21	05:54 19:53	05:26 20:22	05:57 (5) 20:32	05:52 20:12	06:14 (5) 20:21	06:23 20:22	06:53 18:38	06:27 16:52	07:02 16:28	
3	07:21 16:39	07:06 17:14	06:29 17:48	06:38 19:22	05:53 19:54	05:26 20:23	05:57 (5) 20:32	05:53 20:11	06:15 (5) 20:22	06:24 20:23	06:54 18:36	06:28 16:51	07:03 16:28	
4	07:21 16:40	07:05 17:16	06:27 17:49	06:36 19:23	05:51 19:55	05:25 20:24	05:58 (5) 20:32	05:54 20:10	06:17 (5) 20:19	06:25 20:20	06:55 18:35	06:29 16:49	07:04 16:28	
5	07:21 16:41	07:04 17:17	06:26 17:51	06:35 19:24	05:50 19:56	05:25 20:24	05:58 (5) 20:32	05:55 20:09	06:05 (5) 20:18	06:26 20:21	06:56 18:33	06:31 16:48	07:05 16:28	
6	07:21 16:42	07:03 17:18	06:24 17:52	06:33 19:25	05:49 19:57	05:25 20:25	05:58 (5) 20:31	05:56 20:08	06:04 (5) 20:17	06:27 20:22	06:57 18:31	06:32 16:47	07:06 16:28	
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9	07:21 16:45	06:59 17:22	06:19 17:55	06:28 19:29	05:46 20:00	06:05 (5) 20:27	06:00 (5) 20:30	05:59 20:04	06:04 (5) 20:11	06:30 20:16	07:00 18:27	06:35 16:44	07:09 16:27	
10	07:21 16:46	06:58 17:23	06:18 17:56	06:26 19:30	05:44 20:01	06:04 (5) 20:27	06:00 (5) 20:30	06:05 (5) 20:03	06:04 (5) 20:10	06:31 20:15	07:01 18:25	06:37 16:43	07:09 16:28	
11	07:21 16:47	06:57 17:24	06:16 17:57	06:25 19:31	05:43 20:02	06:03 (5) 20:28	06:00 (5) 20:30	06:06 (5) 20:01	06:04 (5) 20:10	06:32 20:14	07:02 18:23	06:38 16:42	07:10 16:28	
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19	07:18 16:56	06:47 17:34	06:03 18:06	06:12 19:39	05:35 20:10	05:56 (5) 20:31	06:03 (5) 20:25	06:03 (6) 20:00	06:04 (5) 19:50	06:39 20:11	07:11 18:11	06:47 16:35	07:16 16:29	
20	07:17 16:57	06:45 17:35	06:01 18:07	06:11 19:40	05:35 20:11	05:55 (6) 20:31	06:03 (5) 20:24	06:02 (6) 20:00	06:04 (5) 19:49	06:40 20:12	07:12 18:10	06:48 16:34	07:17 16:30	
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25	07:14 17:03	06:38 17:41	05:53 18:13	06:04 19:46	05:31 20:16	05:53 (6) 20:32	06:04 (5) 20:20	06:07 (5) 20:00	06:04 (5) 19:41	06:46 20:17	07:18 18:03	06:54 16:31	07:19 16:32	
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Potential sun hours	297	297	369	399	448	716	452	459	428	68	375	345	298	288
Total, worst case														

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)



### SHADOW - Calendar

Calculation: ombra Shadow receptor: H - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (97)  
Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:  
The sun is shining all the day, from sunrise to sunset  
The rotor plane is always perpendicular to the line from the WTG to the sun  
The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:21 16:38	07:08 17:12	06:32 17:46	06:41 19:20	05:55 19:52	05:26 20:21	19:48 (5) 05:27	19:53 (5) 05:51	06:22 19:30	06:52 18:40	06:26 16:53	07:01 16:29
2	07:21 16:38	07:07 17:13	06:30 17:47	06:39 19:21	05:54 19:53	05:26 20:22	19:48 (5) 05:27	19:53 (5) 05:52	06:23 19:30	06:53 18:38	06:27 16:52	07:02 16:28
3	07:21 16:39	07:06 17:14	06:29 17:48	06:38 19:22	05:53 19:54	05:25 20:23	19:48 (5) 05:28	19:53 (5) 05:53	06:24 19:27	06:54 18:36	06:28 16:50	07:03 16:28
4	07:21 16:40	07:05 17:16	06:27 17:49	06:36 19:23	05:51 19:55	05:25 20:23	19:48 (5) 05:28	19:54 (5) 05:54	06:25 19:25	06:55 18:35	06:29 16:49	07:04 16:28
5	07:21 16:41	07:04 17:17	06:26 17:50	06:34 19:24	05:50 19:56	05:25 20:24	19:48 (5) 05:29	19:54 (5) 05:55	06:26 19:24	06:56 18:33	06:30 16:48	07:05 16:28
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10	07:21 16:46	06:58 17:23	06:18 17:56	06:26 19:29	05:44 20:01	05:23 20:27	19:48 (5) 05:32	19:56 (5) 06:00	06:30 19:15	07:01 18:25	06:36 16:43	07:09 16:27
11	07:21 16:47	06:57 17:24	06:16 17:57	06:25 19:31	05:43 20:02	05:23 20:28	19:48 (5) 05:33	19:56 (5) 06:01	06:31 19:14	07:02 18:23	06:38 16:42	07:10 16:27
12	07:20 16:48	06:56 17:26	06:14 17:58	06:23 19:32	05:42 20:03	05:23 20:28	19:49 (5) 05:33	19:56 (5) 06:02	06:32 19:12	07:03 18:22	06:39 16:41	07:11 16:28
13	07:20 16:49	06:54 17:27	06:13 17:59	06:22 19:33	05:41 20:04	05:23 20:29	19:49 (5) 05:34	19:57 (5) 06:03	06:33 19:10	07:04 18:20	06:40 16:40	07:12 16:28
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16	07:19 16:52	06:50 17:30	06:08 18:03	06:17 19:36	05:38 20:07	05:23 20:30	19:50 (5) 05:37	19:59 (5) 06:06	06:36 19:05	07:07 18:15	06:44 16:37	07:14 16:28
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27	07:12 17:06	06:35 17:44	05:49 18:15	06:01 19:48	05:29 20:17	05:25 20:32	19:50 (5) 05:46	19:38 (5) 06:17	06:47 18:46	06:20 16:59	06:56 16:30	07:20 16:34
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Potential sun hours	297	297	369	399	448	452	459	428	375	345	298	288
Total, worst case					25	403	156					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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## SHADOW - Calendar

Calculation: ombra Shadow receptor: I - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (98)

### Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:21 16:38	07:08 17:12	06:32 17:46	06:41 19:20	05:55 19:52	05:26 20:21	19:52 (5) 20:32	05:51 20:13	06:22 19:30	06:52 18:40	06:26 16:53	07:01 16:29
2	07:21 16:38	07:07 17:13	06:30 17:47	06:39 19:21	05:54 19:53	05:26 20:22	19:51 (5) 20:32	05:52 20:12	06:23 19:29	06:53 18:38	06:27 16:52	07:02 16:28
3	07:21 16:39	07:06 17:14	06:29 17:48	06:38 19:22	05:53 19:54	05:25 20:23	19:51 (5) 20:32	05:53 20:11	06:24 19:27	06:54 18:36	06:52 16:50	07:03 16:28
4	07:21 16:40	07:05 17:16	06:27 17:49	06:36 19:23	05:51 19:55	05:25 20:23	19:52 (5) 20:32	05:54 20:10	06:25 19:25	06:55 18:35	06:29 16:49	07:04 16:28
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Potential sun hours	297	297	369	399	448	452	459	428	375	345	298	288
Total, worst case					5	326	102					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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## SHADOW - Calendar

Calculation: ombra Shadow receptor: J - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (99)

### Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:21 16:38	07:08 17:12	06:32 17:46	06:41 19:20	05:55 19:52	05:26 20:21	05:27 20:32	05:51 20:13	06:22 19:30	06:51 18:40	06:26 16:53	07:01 16:29
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Potential sun hours	297	297	369	399	448	452	459	428	375	345	298	288
Total, worst case												

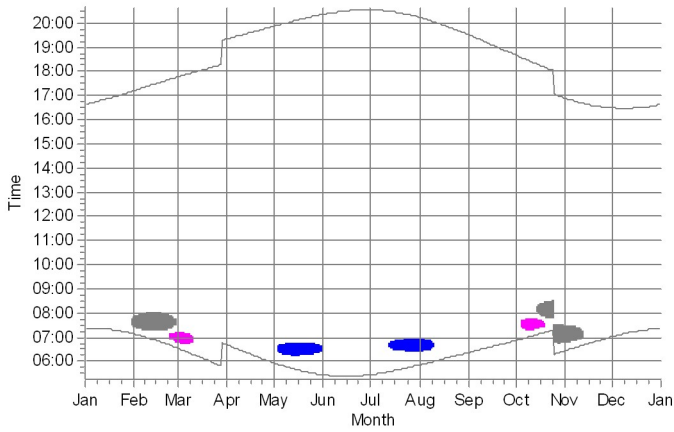
Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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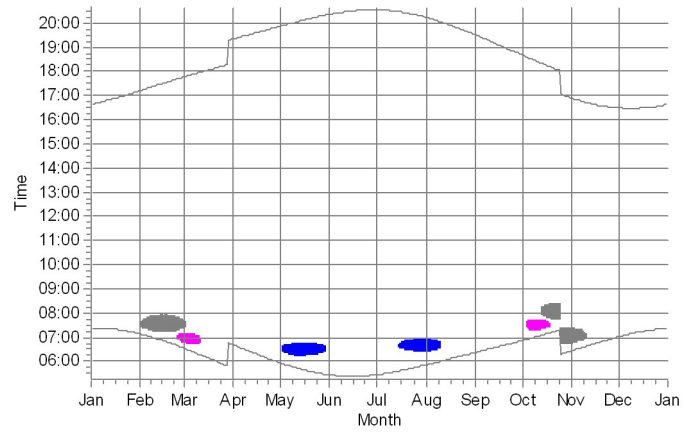
## SHADOW - Calendar, graphical

Calculation: ombra

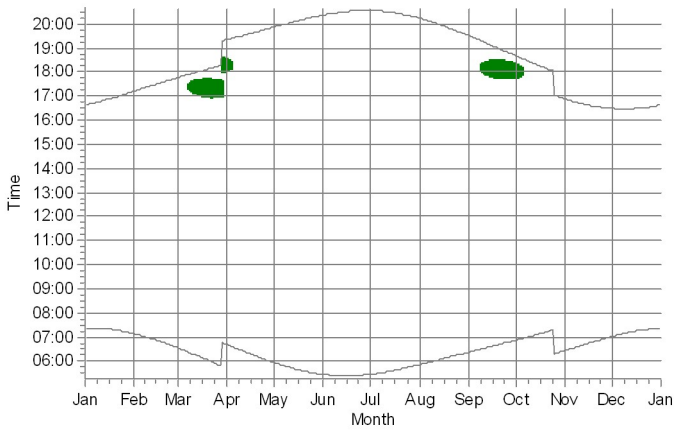
A: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (90)



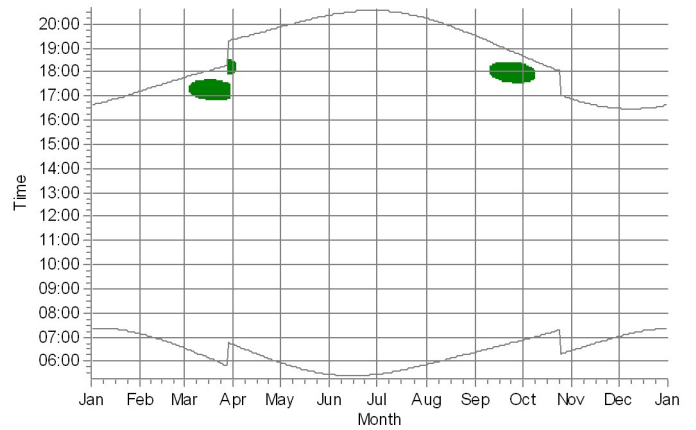
B: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (91)



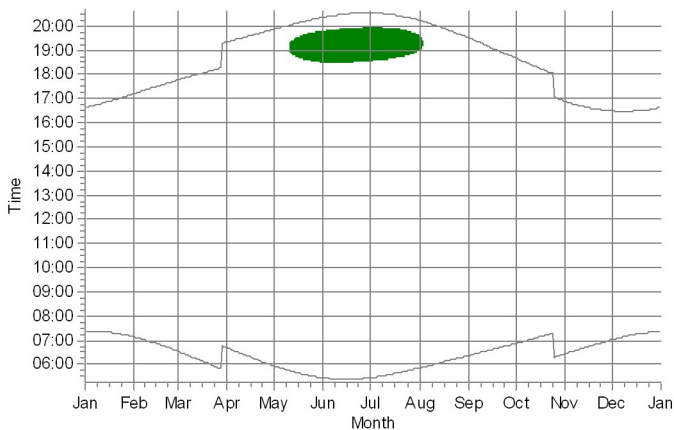
C: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (92)



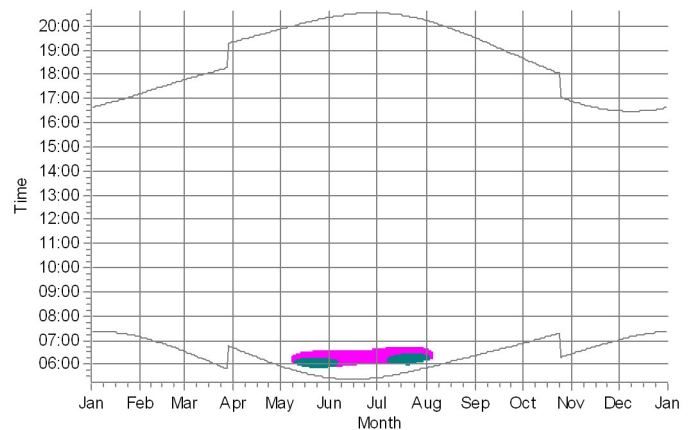
D: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (93)



E: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (94)



F: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (95)



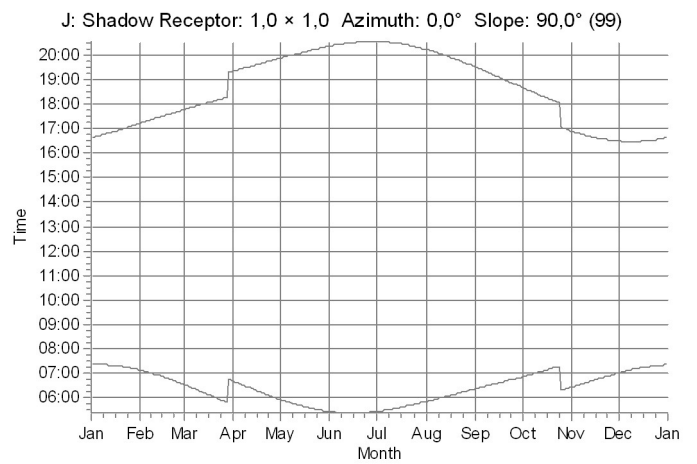
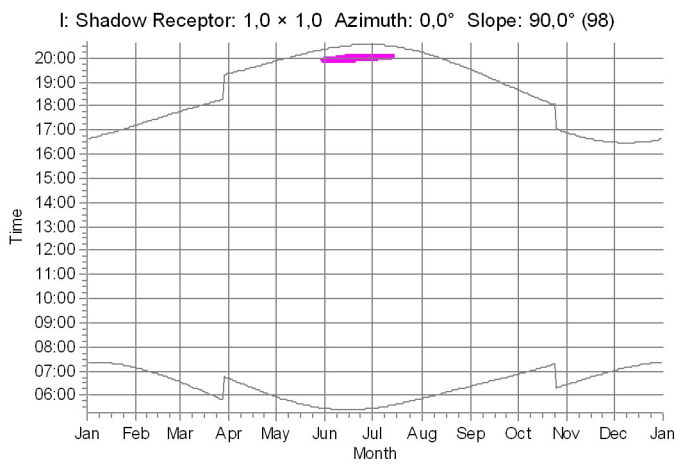
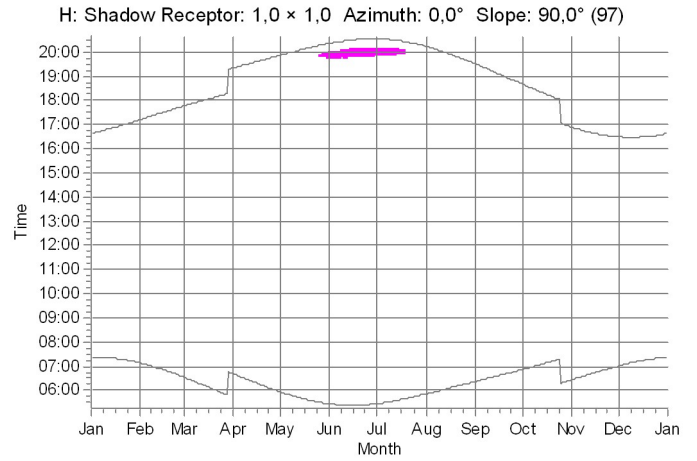
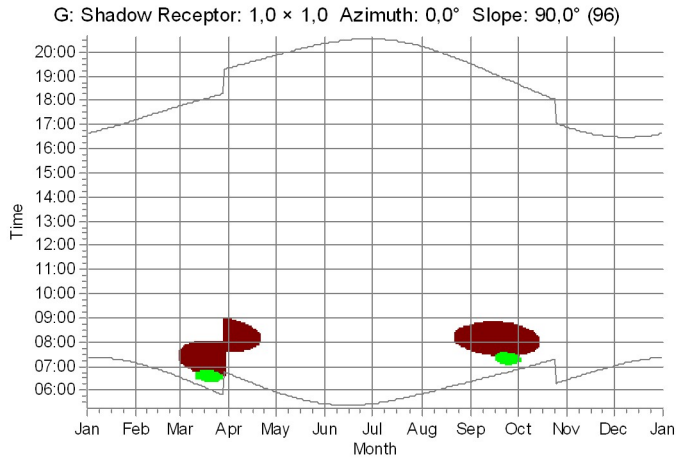
### WTGs

- 1: Siemens Gamesa SG 6.6-155 6600 155.0 IO! hub: 125,0 m (TOT: 202,5 m) (1)
- 3: Siemens Gamesa SG 6.6-155 6600 155.0 IO! hub: 125,0 m (TOT: 202,5 m) (3)
- 4: Siemens Gamesa SG 6.6-155 6600 155.0 IO! hub: 125,0 m (TOT: 202,5 m) (4)

- 5: Siemens Gamesa SG 6.6-155 6600 155.0 IO! hub: 125,0 m (TOT: 202,5 m) (5)
- 6: Siemens Gamesa SG 6.6-155 6600 155.0 IO! hub: 125,0 m (TOT: 202,5 m) (6)

## SHADOW - Calendar, graphical

Calculation: ombra



### WTGs

- 5: Siemens Gamesa SG 6.6-155 6600 155.0 IO! hub: 125,0 m (TOT: 202,5 m) (5)
- 8: Siemens Gamesa SG 6.6-155 6600 155.0 IO! hub: 125,0 m (TOT: 202,5 m) (8)

- 9: Siemens Gamesa SG 6.6-155 6600 155.0 IO! hub: 125,0 m (TOT: 202,5 m) (9)

## SHADOW - Calendar per WTG

Calculation: ombra WTG: 1 - Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (1)  
Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June		
1	07:21 16:38	07:08 17:12	06:32 17:46	06:41 19:20	18:04-18:29/25 19:20	05:55 19:52	05:26 20:21	18:33-19:44/71
2	07:21 16:38	07:07 17:13	06:30 17:47	06:39 19:21	18:07-18:26/19 19:21	05:54 19:53	05:26 20:22	18:33-19:44/71
3	07:21 16:39	07:06 17:14	06:29 17:48	06:38 19:22	18:10-18:22/12 19:22	05:53 19:54	05:26 20:23	18:33-19:45/72
4	07:22 16:40	07:05 17:16	06:27 17:49	06:36 19:23	06:36 19:23	05:51 19:55	05:25 20:24	18:33-19:46/73
5	07:22 16:41	07:04 17:17	06:26 17:51	17:13-17:24/11 19:24	06:35 19:24	05:50 19:56	05:25 20:24	18:32-19:46/74
6	07:21 16:42	07:03 17:18	06:24 17:52	17:08-17:28/20 19:25	06:33 19:25	05:49 19:57	05:24 20:25	18:32-19:46/74
7	07:21 16:43	07:02 17:19	06:23 17:53	17:05-17:30/25 19:26	06:31 19:26	05:48 19:58	05:24 20:26	18:32-19:47/75
8	07:21 16:44	07:01 17:21	06:21 17:54	17:03-17:32/29 19:27	06:30 19:27	05:47 19:59	05:24 20:26	18:33-19:48/75
9	07:21 16:45	06:59 17:22	06:19 17:55	17:01-17:33/32 19:29	06:28 19:29	05:45 20:00	05:24 20:27	18:33-19:48/75
10	07:21 16:46	06:58 17:23	06:18 17:56	16:59-17:34/35 19:30	06:26 19:30	05:44 20:01	05:23 20:27	18:32-19:48/76
11	07:21 16:47	06:57 17:24	06:16 17:57	16:58-17:36/38 19:31	06:25 19:31	05:43 20:02	05:23 20:28	18:32-19:48/76
12	07:21 16:48	06:56 17:26	06:14 17:58	16:57-17:37/40 19:32	06:23 19:32	05:42 20:03	05:23 20:28	18:32-19:49/77
13	07:20 16:49	06:54 17:27	06:13 18:00	16:55-17:38/43 19:33	06:22 19:33	05:41 20:04	05:23 20:29	18:32-19:49/77
14	07:20 16:50	06:53 17:28	06:11 18:01	16:55-17:40/45 19:34	06:20 19:34	05:40 20:05	05:23 20:29	18:32-19:49/77
15	07:20 16:51	06:52 17:29	06:09 18:02	16:54-17:40/46 19:35	06:18 19:35	05:39 20:06	05:23 20:30	18:33-19:50/77
16	07:19 16:53	06:51 17:30	06:08 18:03	16:53-17:40/47 19:36	06:17 19:36	05:38 20:07	05:23 20:30	18:33-19:50/77
17	07:19 16:54	06:49 17:32	06:06 18:04	16:53-17:41/48 19:37	06:15 19:37	05:37 20:08	05:23 20:31	18:33-19:50/77
18	07:18 16:55	06:48 17:33	06:05 18:05	16:53-17:41/48 19:38	06:14 19:38	05:36 20:09	05:23 20:31	18:33-19:50/77
19	07:18 16:56	06:47 17:34	06:03 18:06	16:52-17:41/49 19:39	06:12 19:39	05:35 20:10	05:23 20:31	18:34-19:51/77
20	07:17 16:57	06:45 17:35	06:01 18:07	16:53-17:41/48 19:40	06:11 19:40	05:34 20:11	05:23 20:32	18:34-19:51/77
21	07:17 16:58	06:44 17:37	06:00 18:08	16:52-17:41/49 19:41	06:09 19:41	05:34 20:12	05:24 20:32	18:34-19:51/77
22	07:16 17:00	06:42 17:38	05:58 18:09	16:52-17:40/48 19:42	06:08 19:42	05:33 20:13	05:24 20:32	18:34-19:51/77
23	07:15 17:01	06:41 17:39	05:56 18:10	16:53-17:40/47 19:43	06:06 19:43	05:32 20:14	05:24 20:32	18:34-19:51/77
24	07:15 17:02	06:39 17:40	05:54 18:11	16:53-17:39/46 19:45	06:05 19:45	05:31 20:15	05:24 20:32	18:35-19:52/77
25	07:14 17:03	06:38 17:41	05:53 18:13	16:53-17:38/45 19:46	06:04 19:46	05:31 20:16	05:24 20:32	18:35-19:52/77
26	07:13 17:04	06:36 17:42	05:51 18:14	16:54-17:38/44 19:47	06:02 19:47	05:30 20:17	05:25 20:32	18:35-19:52/77
27	07:12 17:06	06:35 17:44	05:49 18:15	16:55-17:37/42 19:48	06:01 19:48	05:29 20:17	05:25 20:33	18:36-19:53/77
28	07:11 17:07	06:33 17:45	05:48 18:16	16:55-17:35/40 19:49	05:59 19:49	05:29 20:18	05:26 20:33	18:36-19:52/76
29	07:11 17:08		06:46 19:17	17:57-18:35/38 19:50	05:58 19:50	05:28 20:19	05:26 20:33	18:36-19:53/77
30	07:10 17:09		06:44 19:18	17:59-18:33/34 19:51	05:57 19:51	05:27 20:20	05:26 20:33	18:36-19:53/77
31	07:09 17:11		06:43 19:19	18:00-18:31/31 19:21		05:27 20:21		
Potential sun hours	297	297	369	399	448	452		
Sum of minutes with flicker	0	0	1068	56	1092	2274		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

## SHADOW - Calendar per WTG

Calculation: ombra WTG: 1 - Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (1)

### Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	July	August	September	October	November	December
1	05:27 18:36-19:52/76 20:32	05:51 19:07-19:28/21 20:13	06:22 19:30	06:52 17:36-18:17/41 18:40	06:26 16:53	07:01 16:29
2	05:27 18:37-19:53/76 20:32	05:52 19:13-19:22/9 20:12	06:23 19:29	06:53 17:37-18:16/39 18:38	06:27 16:52	07:02 16:28
3	05:28 18:37-19:52/75 20:32	05:53 20:11	06:24 19:27	06:54 17:37-18:14/37 18:36	06:28 16:51	07:03 16:28
4	05:28 18:38-19:53/75 20:32	05:54 20:10	06:25 19:25	06:55 17:38-18:11/33 18:35	06:29 16:49	07:04 16:28
5	05:29 18:38-19:53/75 20:32	05:55 20:09	06:26 19:24	06:56 17:39-18:10/31 18:33	06:31 16:48	07:05 16:28
6	05:30 18:38-19:53/75 20:31	05:56 20:08	06:27 19:22	06:57 17:41-18:07/26 18:31	06:32 16:47	07:06 16:28
7	05:30 18:39-19:53/74 20:31	05:57 20:07	06:28 19:20	06:58 17:43-18:05/22 18:30	06:33 16:46	07:07 16:27
8	05:31 18:39-19:52/73 20:31	05:58 20:05	06:29 19:19	06:59 17:46-18:01/15 18:28	06:34 16:45	07:08 16:27
9	05:31 18:40-19:52/72 20:31	05:59 20:04	06:30 18:05-18:16/11 19:17	07:00 18:26	06:35 16:44	07:09 16:27
10	05:32 18:41-19:52/71 20:30	06:00 20:03	06:31 18:00-18:19/19 19:15	07:01 18:25	06:37 16:43	07:09 16:27
11	05:33 18:40-19:52/72 20:30	06:01 20:01	06:32 17:57-18:21/24 19:14	07:02 18:23	06:38 16:42	07:10 16:27
12	05:34 18:41-19:52/71 20:29	06:02 20:00	06:33 17:53-18:23/30 19:12	07:03 18:22	06:39 16:41	07:11 16:28
13	05:34 18:42-19:52/70 20:29	06:03 19:59	06:34 17:50-18:24/34 19:10	07:04 18:20	06:40 16:40	07:12 16:28
14	05:35 18:43-19:51/68 20:28	06:04 19:57	06:35 17:48-18:25/37 19:09	07:05 18:19	06:41 16:39	07:13 16:28
15	05:36 18:43-19:50/67 20:28	06:05 19:56	06:35 17:46-18:26/40 19:07	07:06 18:17	06:43 16:38	07:13 16:28
16	05:37 18:44-19:50/66 20:27	06:06 19:55	06:36 17:44-18:26/42 19:05	07:08 18:15	06:44 16:37	07:14 16:28
17	05:37 18:45-19:50/65 20:26	06:07 19:53	06:37 17:43-18:26/43 19:04	07:09 18:14	06:45 16:36	07:15 16:29
18	05:38 18:46-19:49/63 20:26	06:08 19:52	06:38 17:42-18:27/45 19:02	07:10 18:12	06:46 16:36	07:15 16:29
19	05:39 18:46-19:48/62 20:25	06:09 19:50	06:39 17:40-18:27/47 19:00	07:11 18:11	06:47 16:35	07:16 16:29
20	05:40 18:47-19:47/60 20:24	06:10 19:49	06:40 17:39-18:27/48 18:58	07:12 18:09	06:48 16:34	07:17 16:30
21	05:41 18:48-19:47/59 20:24	06:11 19:47	06:41 17:38-18:27/49 18:57	07:13 18:08	06:50 16:33	07:17 16:30
22	05:42 18:49-19:46/57 20:23	06:12 19:46	06:42 17:38-18:26/48 18:55	07:14 18:06	06:51 16:33	07:18 16:31
23	05:42 18:50-19:45/55 20:22	06:13 19:44	06:43 17:37-18:26/49 18:53	07:15 18:05	06:52 16:32	07:18 16:31
24	05:43 18:51-19:44/53 20:21	06:14 19:43	06:44 17:37-18:25/48 18:52	07:17 18:04	06:53 16:32	07:19 16:32
25	05:44 18:53-19:43/50 20:20	06:15 19:41	06:45 17:36-18:25/49 18:50	07:18 17:02	06:54 16:31	07:19 16:32
26	05:45 18:53-19:41/48 20:19	06:16 19:40	06:47 17:36-18:24/48 18:48	07:19 17:01	06:55 16:31	07:20 16:33
27	05:46 18:55-19:40/45 20:18	06:17 19:38	06:48 17:36-18:23/47 18:46	07:20 16:59	06:56 16:30	07:20 16:34
28	05:47 18:56-19:38/42 20:18	06:18 19:37	06:49 17:36-18:22/46 18:45	07:21 16:58	06:58 16:30	07:20 16:34
29	05:48 18:58-19:37/39 20:17	06:19 19:35	06:50 17:36-18:21/45 18:43	07:22 16:57	06:59 16:29	07:21 16:35
30	05:49 19:01-19:34/33 20:16	06:20 19:34	06:51 17:36-18:19/43 18:41	07:24 16:56	07:00 16:29	07:21 16:36
31	05:50 19:03-19:32/29 20:14	06:21 19:32		06:25 16:54		07:21 16:37
Potential sun hours	459	428	375	345	298	288
Sum of minutes with flicker	1916	30	892	244	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

## SHADOW - Calendar per WTG

Calculation: ombra WTG: 2 - Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (2)

### Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:21 16:38	07:08 17:12	06:32 17:46	06:41 19:20	05:55 19:52	05:26 20:21	05:27 20:32	05:51 20:13	06:22 19:30	06:52 18:40	06:26 16:53	07:01 16:29
2	07:21 16:38	07:07 17:13	06:30 17:47	06:39 19:21	05:54 19:53	05:26 20:22	05:27 20:32	05:52 20:12	06:23 19:29	06:53 18:38	06:27 16:52	07:02 16:28
3	07:21 16:39	07:06 17:14	06:29 17:48	06:38 19:22	05:53 19:54	05:25 20:23	05:28 20:32	05:53 20:11	06:24 19:27	06:54 18:36	06:28 16:50	07:03 16:28
4	07:21 16:40	07:05 17:16	06:27 17:49	06:36 19:23	05:51 19:55	05:25 20:24	05:28 20:32	05:54 20:10	06:25 19:25	06:55 18:35	06:29 16:49	07:04 16:28
5	07:21 16:41	07:04 17:17	06:26 17:50	06:34 19:24	05:50 19:56	05:25 20:24	05:29 20:32	05:55 20:09	06:26 19:24	06:56 18:33	06:31 16:48	07:05 16:28
6	07:21 16:42	07:03 17:18	06:24 17:52	06:33 19:25	05:49 19:57	05:24 20:25	05:29 20:31	05:56 20:08	06:26 19:22	06:57 18:31	06:32 16:47	07:06 16:27
7	07:21 16:43	07:02 17:19	06:22 17:53	06:31 19:26	05:48 19:58	05:24 20:26	05:30 20:31	05:57 20:06	06:27 19:20	06:58 18:30	06:33 16:46	07:07 16:27
8	07:21 16:44	07:00 17:21	06:21 17:54	06:30 19:27	05:47 19:59	05:24 20:26	05:31 20:31	05:58 20:05	06:28 19:19	06:59 18:28	06:34 16:45	07:08 16:27
9	07:21 16:45	06:59 17:22	06:19 17:55	06:28 19:28	05:45 20:00	05:24 20:27	05:31 20:30	05:59 20:04	06:29 19:17	07:00 18:26	06:35 16:44	07:08 16:27
10	07:21 16:46	06:58 17:23	06:18 17:56	06:26 19:30	05:44 20:01	05:23 20:27	05:32 20:30	06:00 20:03	06:30 19:15	07:01 18:25	06:37 16:43	07:09 16:27
11	07:21 16:47	06:57 17:24	06:16 17:57	06:25 19:31	05:43 20:02	05:23 20:28	05:33 20:30	06:01 20:01	06:31 19:14	07:02 18:23	06:38 16:42	07:10 16:27
12	07:20 16:48	06:56 17:25	06:14 17:58	06:23 19:32	05:42 20:03	05:23 20:28	05:33 20:29	06:02 20:00	06:32 19:12	07:03 18:22	06:39 16:41	07:11 16:28
13	07:20 16:49	06:54 17:27	06:13 17:59	06:22 19:33	05:41 20:04	05:23 20:29	05:34 20:29	06:03 19:59	06:33 19:10	07:04 18:20	06:40 16:40	07:12 16:28
14	07:20 16:50	06:53 17:28	06:11 18:01	06:20 19:34	05:40 20:05	05:23 20:29	05:35 20:28	06:04 19:57	06:34 19:09	07:05 18:18	06:41 16:39	07:13 16:28
15	07:19 16:51	06:52 17:29	06:09 18:02	06:18 19:35	05:39 20:06	05:23 20:30	05:36 20:28	06:05 19:56	06:35 19:07	07:06 18:17	06:42 16:38	07:13 16:28
16	07:19 16:52	06:51 17:30	06:08 18:03	06:17 19:36	05:38 20:07	05:23 20:30	05:36 20:27	06:06 19:55	06:36 19:05	07:07 18:15	06:44 16:37	07:14 16:28
17	07:19 16:54	06:49 17:32	06:06 18:04	06:15 19:37	05:37 20:08	05:23 20:30	05:37 20:26	06:07 19:53	06:37 19:03	07:09 18:14	06:45 16:36	07:15 16:29
18	07:18 16:55	06:48 17:33	06:04 18:05	06:14 19:38	05:36 20:09	05:23 20:31	05:38 20:26	06:08 19:52	06:38 19:02	07:10 18:12	06:46 16:36	07:15 16:29
19	07:18 16:56	06:46 17:34	06:03 18:06	06:12 19:39	05:35 20:10	05:23 20:31	05:39 20:25	06:09 19:50	06:39 19:00	07:11 18:11	06:47 16:35	07:16 16:29
20	07:17 16:57	06:45 17:35	06:01 18:07	06:11 19:40	05:34 20:11	05:23 20:31	05:40 20:24	06:10 19:49	06:40 18:58	07:12 18:09	06:48 16:34	07:17 16:30
21	07:16 16:58	06:44 17:36	05:59 18:08	06:09 19:41	05:34 20:12	05:23 20:32	05:41 20:24	06:11 19:47	06:41 18:57	07:13 18:08	06:50 16:33	07:17 16:30
22	07:16 16:59	06:42 17:38	05:58 18:09	06:08 19:42	05:33 20:13	05:24 20:32	05:41 20:23	06:12 19:46	06:42 18:55	07:14 18:06	06:51 16:33	07:18 16:31
23	07:15 17:01	06:41 17:39	05:56 18:10	06:06 19:43	05:32 20:14	05:24 20:32	05:42 20:22	06:13 19:44	06:43 18:53	07:15 18:05	06:52 16:32	07:18 16:31
24	07:14 17:02	06:39 17:40	05:54 18:11	06:05 19:44	05:31 20:15	05:24 20:32	05:43 20:21	06:14 19:43	06:44 18:51	07:16 18:04	06:53 16:32	07:19 16:32
25	07:14 17:03	06:38 17:41	05:53 18:12	06:03 19:45	05:30 20:16	05:24 20:32	05:44 20:20	06:15 19:41	06:45 18:50	06:18 17:02	06:54 16:31	07:19 16:32
26	07:13 17:04	06:36 17:42	05:51 18:14	06:02 19:47	05:30 20:16	05:25 20:32	05:45 20:19	06:16 19:40	06:46 18:48	06:19 17:01	06:55 16:30	07:19 16:33
27	07:12 17:06	06:35 17:44	05:49 18:15	06:01 19:48	05:29 20:17	05:25 20:32	05:46 20:18	06:17 19:38	06:47 18:46	06:20 16:59	06:56 16:30	07:20 16:34
28	07:11 17:07	06:33 17:45	05:48 18:16	05:59 19:49	05:28 20:18	05:25 20:32	05:47 20:17	06:18 19:37	06:48 18:45	06:21 16:58	06:57 16:30	07:20 16:34
29	07:11 17:08		06:46 19:17	05:58 19:50	05:28 20:19	05:26 20:32	05:48 20:16	06:19 19:35	06:49 18:43	06:22 16:57	06:59 16:29	07:20 16:35
30	07:10 17:09		06:44 19:18	05:57 19:51	05:27 20:20	05:26 20:32	05:49 20:15	06:20 19:33	06:51 18:41	06:23 16:55	07:00 16:29	07:21 16:36
31	07:09 17:11		06:43 19:19		05:27 20:21		05:50 20:14	06:21 19:32		06:25 16:54		07:21 16:36
Potential sun hours	297	297	369	399	448	452	459	428	375	345	298	288
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

### SHADOW - Calendar per WTG

Calculation: ombra WTG: 3 - Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (3)

#### Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:21 16:38	07:08 17:12	06:32 17:46	06:41 19:20	05:55 19:52	05:26 20:21	05:27 20:32	05:51 06:29-06:54/25 20:13	06:22 19:30	06:52 18:40	06:26 16:53	07:01 16:29
2	07:21 16:38	07:07 17:13	06:30 17:47	06:39 19:21	05:54 19:53	05:26 20:22	05:27 20:32	05:52 06:29-06:53/24 20:12	06:23 19:29	06:53 18:38	06:27 16:52	07:02 16:28
3	07:21 16:39	07:06 17:14	06:29 17:48	06:38 19:22	05:53 06:28-06:34/6 19:54	05:26 20:23	05:28 20:32	05:53 06:29-06:53/24 20:11	06:24 19:27	06:54 18:36	06:28 16:51	07:03 16:28
4	07:21 16:40	07:05 17:16	06:27 17:49	06:36 19:23	05:51 06:25-06:37/12 19:55	05:25 20:24	05:28 20:32	05:54 06:30-06:52/22 20:10	06:25 19:25	06:55 18:35	06:29 16:49	07:04 16:28
5	07:21 16:41	07:04 17:17	06:26 17:51	06:34 19:24	05:50 06:23-06:39/16 19:56	05:25 20:24	05:29 20:32	05:55 06:30-06:52/22 20:09	06:26 19:24	06:56 18:33	06:31 16:48	07:05 16:28
6	07:21 16:42	07:03 17:18	06:24 17:52	06:33 19:25	05:49 06:22-06:40/18 19:57	05:24 20:25	05:30 20:31	05:56 06:31-06:51/20 20:08	06:27 19:22	06:57 18:31	06:32 16:47	07:06 16:28
7	07:21 16:43	07:02 17:19	06:22 17:53	06:31 19:26	05:48 06:20-06:40/20 19:58	05:24 20:26	05:30 20:31	05:57 06:32-06:49/17 20:06	06:28 19:20	06:58 18:30	06:33 16:46	07:07 16:27
8	07:21 16:44	07:00 17:21	06:21 17:54	06:30 19:27	05:47 06:19-06:41/22 19:59	05:24 20:26	05:31 20:31	05:58 06:34-06:48/14 20:05	06:29 19:19	06:59 18:28	06:34 16:45	07:08 16:27
9	07:21 16:45	06:59 17:22	06:19 17:55	06:28 19:29	05:45 06:19-06:42/23 20:00	05:24 20:27	05:31 20:30	05:59 06:36-06:46/10 20:04	06:30 19:17	07:00 18:26	06:35 16:44	07:09 16:27
10	07:21 16:46	06:58 17:23	06:18 17:56	06:26 19:30	05:44 06:18-06:43/25 20:01	05:23 20:27	05:32 20:30	06:00 20:03	06:31 19:15	07:01 18:25	06:37 16:43	07:09 16:27
11	07:21 16:47	06:57 17:24	06:16 17:57	06:25 19:31	05:43 06:18-06:43/25 20:02	05:23 20:28	05:33 20:30	06:01 20:01	06:32 19:14	07:02 18:23	06:38 16:42	07:10 16:28
12	07:20 16:48	06:56 17:26	06:14 17:58	06:23 19:32	05:42 06:18-06:43/25 20:03	05:23 20:28	05:34 20:29	06:02 20:00	06:33 19:12	07:03 18:22	06:39 16:41	07:11 16:28
13	07:20 16:49	06:54 17:27	06:13 18:00	06:22 19:33	05:41 06:18-06:43/25 20:04	05:23 20:29	05:34 06:39-06:42/3 20:29	06:03 19:59	06:34 19:10	07:04 18:20	06:40 16:40	07:12 16:28
14	07:20 16:50	06:53 17:28	06:11 18:01	06:20 19:34	05:40 06:18-06:43/25 20:05	05:23 20:29	05:35 06:36-06:45/9 20:28	06:04 19:57	06:34 19:09	07:05 18:19	06:41 16:39	07:13 16:28
15	07:19 16:51	06:52 17:29	06:09 18:02	06:18 19:35	05:39 06:18-06:43/25 20:06	05:23 20:30	05:36 06:34-06:46/12 20:28	06:05 19:56	06:35 19:07	07:06 18:17	06:43 16:38	07:13 16:28
16	07:19 16:53	06:51 17:30	06:08 18:03	06:17 19:36	05:38 06:18-06:43/25 20:07	05:23 20:30	05:37 06:33-06:47/14 20:27	06:06 19:55	06:36 19:05	07:07 18:15	06:44 16:37	07:14 16:28
17	07:19 16:54	06:49 17:32	06:06 18:04	06:15 19:37	05:37 06:19-06:44/25 20:08	05:23 20:31	05:37 06:33-06:49/16 20:26	06:07 19:53	06:37 19:03	07:09 18:14	06:45 16:36	07:15 16:29
18	07:18 16:55	06:48 17:33	06:05 18:05	06:14 19:38	05:36 06:19-06:44/25 20:09	05:23 20:31	05:38 06:32-06:50/18 20:26	06:08 19:52	06:38 19:02	07:10 18:12	06:46 16:36	07:15 16:29
19	07:18 16:56	06:47 17:34	06:03 18:06	06:12 19:39	05:35 06:19-06:43/24 20:10	05:23 20:31	05:39 06:32-06:51/19 20:25	06:09 19:50	06:39 19:00	07:11 18:11	06:47 16:35	07:16 16:29
20	07:17 16:57	06:45 17:35	06:01 18:07	06:11 19:40	05:34 06:19-06:43/24 20:11	05:23 20:31	05:40 06:30-06:51/21 20:24	06:10 19:49	06:40 18:58	07:12 18:09	06:48 16:34	07:17 16:30
21	07:16 16:58	06:44 17:37	05:59 18:08	06:09 19:41	05:34 06:19-06:42/23 20:12	05:24 20:32	05:41 06:30-06:52/22 20:24	06:11 19:47	06:41 18:57	07:13 18:08	06:50 16:33	07:17 16:30
22	07:16 17:00	06:42 17:38	05:58 18:09	06:08 19:42	05:33 06:20-06:42/22 20:13	05:24 20:32	05:42 06:30-06:52/22 20:23	06:12 19:46	06:42 18:55	07:14 18:06	06:51 16:33	07:18 16:31
23	07:15 17:01	06:41 17:39	05:56 18:10	06:06 19:43	05:32 06:21-06:42/21 20:14	05:24 20:32	05:42 06:30-06:53/23 20:22	06:13 19:44	06:43 18:53	07:15 18:05	06:52 16:32	07:18 16:31
24	07:15 17:02	06:39 17:40	05:54 18:11	06:05 19:44	05:31 06:21-06:41/20 20:15	05:24 20:32	05:43 06:29-06:53/24 20:21	06:14 19:43	06:44 18:52	07:17 18:04	06:53 16:32	07:19 16:32
25	07:14 17:03	06:38 17:41	05:53 18:13	06:04 19:46	05:31 06:22-06:41/19 20:16	05:25 20:32	05:44 06:29-06:54/25 20:20	06:15 19:41	06:45 18:50	06:18 17:02	06:54 16:31	07:19 16:32
26	07:13 17:04	06:36 17:42	05:51 18:14	06:02 19:47	05:30 06:23-06:40/17 20:17	05:25 20:32	05:45 06:29-06:54/25 20:19	06:16 19:40	06:46 18:48	06:19 17:01	06:55 16:31	07:20 16:33
27	07:12 17:06	06:35 17:44	05:49 18:15	06:01 19:48	05:29 06:24-06:38/14 20:17	05:25 20:32	05:46 06:28-06:54/26 20:18	06:17 19:38	06:48 18:46	06:20 16:59	06:56 16:30	07:20 16:34
28	07:11 17:07	06:33 17:45	05:48 18:16	05:59 19:49	05:29 06:25-06:38/13 20:18	05:26 20:33	05:47 06:28-06:54/26 20:17	06:18 19:37	06:49 18:45	06:21 16:58	06:58 16:30	07:20 16:34
29	07:11 17:08	06:46 19:17	05:58 19:50	05:58 20:19	05:28 06:26-06:36/10 20:19	05:26 20:32	05:48 06:28-06:54/26 20:16	06:19 19:35	06:50 18:43	06:22 16:57	06:59 16:29	07:20 16:35
30	07:10 17:09	06:44 19:18	05:57 19:51	05:57 20:20	05:27 06:29-06:35/6 20:20	05:26 20:32	05:49 06:28-06:54/26 20:15	06:20 19:33	06:51 18:41	06:23 16:56	07:00 16:29	07:21 16:36
31	07:09 17:11	06:43 19:19	05:57 19:51	05:57 20:21	05:27 20:21	05:26 20:32	05:50 06:28-06:54/26 20:14	06:21 19:32	06:25 16:54	06:25 16:54	06:59 16:29	07:21 16:37
Potential sun hours	297	297	369	399	448	452	459	428	375	345	298	288
Sum of minutes with flicker	0	0	0	0	555	0	383	178	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker



## SHADOW - Calendar per WTG

Calculation: ombra WTG: 4 - Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (4)

### Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:21 16:38	07:08 07:28-07:47/19 17:12	06:32 17:46	06:41 19:20	05:55 19:52	05:26 20:21	05:27 20:32	05:51 20:13	06:22 19:30	06:52 18:40	06:26 06:47-07:26/39 16:53	07:01 16:29	
2	07:21 16:38	07:07 07:27-07:49/22 17:13	06:30 17:47	06:39 19:21	05:54 19:53	05:26 20:22	05:27 20:32	05:52 20:12	06:23 19:29	06:53 18:38	06:27 06:49-07:26/37 16:52	07:02 16:28	
3	07:21 16:39	07:06 07:26-07:50/24 17:14	06:29 17:48	06:38 19:22	05:53 19:54	05:26 20:23	05:28 20:32	05:53 20:11	06:24 19:27	06:54 18:36	06:28 06:50-07:25/35 16:51	07:03 16:28	
4	07:21 16:40	07:05 07:25-07:52/27 17:16	06:27 17:49	06:36 19:23	05:51 19:55	05:25 20:24	05:28 20:32	05:54 20:10	06:25 19:25	06:55 18:35	06:29 06:51-07:24/33 16:49	07:04 16:28	
5	07:21 16:41	07:04 07:24-07:53/29 17:17	06:26 17:51	06:35 19:24	05:50 19:56	05:25 20:24	05:29 20:32	05:55 20:09	06:26 19:24	06:56 18:33	06:31 06:53-07:24/31 16:48	07:05 16:28	
6	07:21 16:42	07:03 07:23-07:54/31 17:18	06:24 17:52	06:33 19:25	05:49 19:57	05:25 20:25	05:30 20:31	05:56 20:08	06:27 19:22	06:57 18:31	06:32 06:54-07:23/29 16:47	07:06 16:28	
7	07:21 16:43	07:02 07:21-07:54/33 17:19	06:23 17:53	06:31 19:26	05:48 19:58	05:24 20:26	05:30 20:31	05:57 20:06	06:28 19:20	06:58 18:30	06:33 06:55-07:22/27 16:46	07:07 16:28	
8	07:21 16:44	07:00 07:20-07:55/35 17:21	06:21 17:54	06:30 19:27	05:47 19:59	05:24 20:26	05:31 20:31	05:58 20:05	06:29 19:19	06:59 18:28	06:34 06:56-07:20/24 16:45	07:08 16:27	
9	07:21 16:45	06:59 07:19-07:56/37 17:22	06:19 17:55	06:28 19:29	05:45 20:00	05:24 20:27	05:32 20:30	05:59 20:04	06:30 19:17	07:00 18:27	06:35 06:58-07:19/21 16:44	07:09 16:27	
10	07:21 16:46	06:58 07:18-07:57/39 17:23	06:18 17:56	06:26 19:30	05:44 20:01	05:24 20:27	05:32 20:30	06:04 20:03	06:31 19:15	07:01 18:25	06:37 06:59-07:17/18 16:43	07:09 16:27	
11	07:21 16:47	06:57 07:17-07:57/40 17:24	06:16 17:57	06:25 19:31	05:43 20:02	05:23 20:28	05:33 20:30	06:01 20:01	06:32 19:14	07:02 18:23	06:38 07:02-07:14/12 16:42	07:10 16:28	
12	07:20 16:48	06:56 07:16-07:57/41 17:26	06:14 17:58	06:23 19:32	05:42 20:03	05:23 20:28	05:34 20:29	06:02 20:00	06:33 19:12	07:03 18:22	06:39 16:41	07:11 16:28	
13	07:20 16:49	06:54 07:16-07:57/41 17:27	06:13 18:00	06:22 19:33	05:41 20:04	05:23 20:29	05:34 20:29	06:03 19:59	06:34 19:10	07:04 18:20	06:40 16:40	07:12 16:28	
14	07:20 16:50	06:53 07:16-07:58/42 17:28	06:11 18:01	06:20 19:34	05:40 20:05	05:23 20:29	05:35 20:28	06:04 19:57	06:35 19:09	07:05 07:59-08:12/13 18:19	06:41 16:39	07:13 16:28	
15	07:19 16:51	06:52 07:15-07:57/42 17:29	06:10 18:02	06:18 19:35	05:39 20:06	05:23 20:30	05:36 20:28	06:05 19:56	06:36 19:07	07:06 07:56-08:14/18 18:17	06:43 16:38	07:13 16:28	
16	07:19 16:53	06:51 07:16-07:57/41 17:31	06:08 18:03	06:17 19:36	05:38 20:07	05:23 20:30	05:37 20:27	06:06 19:55	06:37 19:05	07:08 07:53-08:17/24 18:15	06:44 16:37	07:14 16:28	
17	07:19 16:54	06:49 07:16-07:57/41 17:32	06:06 18:04	06:15 19:37	05:37 20:08	05:23 20:31	05:37 20:26	06:07 19:53	06:37 19:04	07:09 07:51-08:20/29 18:14	06:45 16:36	07:15 16:29	
18	07:18 16:55	06:48 07:15-07:56/41 17:33	06:05 18:05	06:14 19:38	05:36 20:09	05:23 20:31	05:38 20:26	06:08 19:52	06:38 19:02	07:10 07:50-08:21/31 18:12	06:46 16:36	07:15 16:29	
19	07:18 16:56	06:47 07:16-07:56/40 17:34	06:03 18:06	06:12 19:39	05:35 20:10	05:23 20:31	05:39 20:25	06:09 19:50	06:39 19:00	07:11 07:49-08:23/34 18:11	06:47 16:35	07:16 16:29	
20	07:17 16:57	06:45 07:16-07:54/38 17:35	06:01 18:07	06:11 19:40	05:34 20:11	05:23 20:31	05:40 20:24	06:10 19:49	06:40 18:58	07:12 07:48-08:24/36 18:09	06:48 16:34	07:17 16:30	
21	07:16 16:58	06:44 07:17-07:54/37 17:37	06:00 18:08	06:09 19:41	05:34 20:12	05:24 20:32	05:41 20:24	06:11 19:47	06:41 18:57	07:13 07:47-08:25/38 18:08	06:50 16:34	07:17 16:30	
22	07:16 17:00	06:42 07:18-07:53/35 17:38	05:58 18:09	06:08 19:42	05:33 20:13	05:24 20:32	05:42 20:23	06:12 19:46	06:42 18:55	07:14 07:46-08:25/39 18:07	06:51 16:33	07:18 16:31	
23	07:15 17:01	06:41 07:18-07:51/33 17:39	05:56 18:10	06:06 19:43	05:32 20:14	05:24 20:32	05:42 20:22	06:13 19:44	06:43 18:53	07:15 07:46-08:26/40 18:05	06:52 16:32	07:18 16:31	
24	07:15 17:02	06:39 07:20-07:50/30 17:40	05:54 18:12	06:05 19:44	05:31 20:15	05:24 20:32	05:43 20:21	06:14 19:43	06:44 18:52	07:17 07:46-08:27/41 18:04	06:53 16:32	07:19 16:32	
25	07:14 17:03	06:38 07:21-07:47/26 17:41	05:53 18:13	06:04 19:46	05:31 20:16	05:25 20:32	05:44 20:20	06:15 19:41	06:46 18:50	06:18 06:46-07:27/41 17:02	06:54 16:31	07:19 16:32	
26	07:13 17:04	06:36 07:23-07:45/22 17:42	05:51 18:14	06:02 19:47	05:30 20:17	05:25 20:32	05:45 20:19	06:16 19:40	06:47 18:48	06:19 06:45-07:27/42 17:01	06:55 16:31	07:20 16:33	
27	07:12 17:06	06:35 07:24-07:41/17 17:44	05:49 18:15	06:01 19:48	05:29 20:17	05:25 20:32	05:46 20:18	06:17 19:38	06:48 18:46	06:20 06:45-07:27/42 17:00	06:56 16:30	07:20 16:34	
28	07:11 17:07	06:33 07:28-07:36/8 17:45	05:48 18:16	05:59 19:49	05:29 20:18	05:26 20:33	05:47 20:17	06:18 19:37	06:49 18:45	06:21 06:45-07:26/41 16:58	06:58 16:30	07:20 16:34	
29	07:11 17:08	06:32 07:29-07:34/1 17:46	05:47 18:17	05:58 19:50	05:28 20:19	05:26 20:32	05:48 20:17	06:19 19:35	06:50 18:43	06:22 06:46-07:27/41 16:57	06:59 16:29	07:20 16:35	
30	07:10 17:09	06:31 07:30-07:31/1 17:47	05:46 18:18	05:57 19:51	05:27 20:20	05:26 20:32	05:49 20:15	06:20 19:34	06:51 18:41	06:23 06:46-07:27/41 16:56	07:00 16:29	07:21 16:36	
31	07:09 17:11	07:31-07:44/13 17:11	06:43 19:19	06:43 19:19	05:27 20:21	05:27 20:21	05:50 20:14	06:21 19:32	06:52 16:54	06:25 06:46-07:26/40 16:54	07:01 16:29	07:21 16:37	
	Potential sun hours	297	297	369	399	448	452	459	428	375	345	298	288
	Sum of minutes with flicker	13	911	0	0	0	0	0	0	0	631	306	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

## SHADOW - Calendar per WTG

Calculation: ombra WTG: 5 - Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (5)  
Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June
1	07:21 16:38	07:08 17:12	06:32 06:51-07:08/17 17:46	06:41 19:20	05:55 19:52	05:26 19:48-19:57/9 20:21 05:57-06:31/34
2	07:21 16:38	07:07 17:13	06:30 06:49-07:08/19 17:47	06:39 19:21	05:54 19:53	05:26 19:48-19:57/9 20:22 05:57-06:31/34
3	07:21 16:39	07:06 17:14	06:29 06:48-07:08/20 17:48	06:38 19:22	05:53 19:54	05:26 19:48-19:58/10 20:23 05:57-06:30/33
4	07:21 16:40	07:05 17:16	06:27 06:46-07:07/21 17:49	06:36 19:23	05:51 19:55	05:25 19:48-19:59/11 20:24 05:58-06:31/33
5	07:21 16:41	07:04 17:17	06:26 06:45-07:07/22 17:51	06:34 19:24	05:50 19:56	05:25 19:48-19:59/11 20:24 05:58-06:31/33
6	07:21 16:42	07:03 17:18	06:24 06:45-07:06/21 17:52	06:33 19:25	05:49 19:57	05:24 19:48-19:59/11 20:25 05:58-06:30/32
7	07:21 16:43	07:02 17:19	06:22 06:45-07:04/19 17:53	06:31 19:26	05:48 19:58	05:24 19:48-20:00/12 20:26 05:59-06:30/31
8	07:21 16:44	07:00 17:21	06:21 06:47-07:03/16 17:54	06:30 19:27	05:47 06:09-06:16/7 19:59	05:24 19:49-20:01/12 20:26 05:59-06:30/31
9	07:21 16:45	06:59 17:22	06:19 06:48-07:00/12 17:55	06:28 19:29	05:45 06:05-06:19/14 20:00	05:24 19:49-20:02/13 20:27 06:00-06:31/31
10	07:21 16:46	06:58 17:23	06:18 06:52-06:55/3 17:56	06:26 19:30	05:44 06:04-06:21/17 20:01	05:23 19:48-20:01/13 20:27 06:00-06:31/31
11	07:21 16:47	06:57 17:24	06:16 17:57	06:25 19:31	05:43 06:03-06:23/20 20:02	05:23 19:48-20:02/14 20:28 06:00-06:30/30
12	07:20 16:48	06:56 17:26	06:14 17:58	06:23 19:32	05:42 06:02-06:24/22 20:03	05:23 19:49-20:03/14 20:28 06:00-06:30/30
13	07:20 16:49	06:54 17:27	06:13 18:00	06:22 19:33	05:41 06:01-06:25/24 20:04	05:23 19:49-20:03/14 20:29 06:01-06:30/29
14	07:20 16:50	06:53 17:28	06:11 18:01	06:20 19:34	05:40 06:00-06:26/26 20:05	05:23 19:49-20:04/15 20:29 06:01-06:30/29
15	07:19 16:51	06:52 17:29	06:09 18:02	06:18 19:35	05:39 05:59-06:27/28 20:06	05:23 19:49-20:04/15 20:30 06:01-06:30/29
16	07:19 16:53	06:51 17:30	06:08 18:03	06:17 19:36	05:38 05:58-06:27/29 20:07	05:23 19:50-20:04/14 20:30 06:02-06:30/28
17	07:19 16:54	06:49 17:32	06:06 18:04	06:15 19:37	05:37 05:58-06:28/30 20:08	05:23 19:50-20:05/15 20:30 06:02-06:30/28
18	07:18 16:55	06:48 17:33	06:04 18:05	06:14 19:38	05:36 05:57-06:29/32 20:09	05:23 19:50-20:05/15 20:31 06:03-06:31/28
19	07:18 16:56	06:46 17:34	06:03 18:06	06:12 19:39	05:35 05:56-06:29/33 20:10	05:23 19:51-20:06/15 20:31 06:03-06:31/28
20	07:17 16:57	06:45 17:35	06:01 18:07	06:11 19:40	05:34 05:56-06:29/33 20:11	05:23 19:51-20:06/15 20:31 06:03-06:31/28
21	07:16 16:58	06:44 17:37	05:59 18:08	06:09 19:41	05:34 05:55-06:29/34 20:12	05:24 19:51-20:06/15 20:32 06:03-06:31/28
22	07:16 17:00	06:42 17:38	05:58 18:09	06:08 19:42	05:33 05:56-06:30/34 20:13	05:24 19:51-20:06/15 20:32 06:03-06:31/28
23	07:15 17:01	06:41 17:39	05:56 18:10	06:06 19:43	05:32 05:56-06:30/34 20:14	05:24 19:51-20:06/15 20:32 06:04-06:32/28
24	07:14 17:02	06:39 06:59-07:04/5 17:40	05:54 18:11	06:05 19:44	05:31 05:55-06:30/35 20:15	05:24 19:52-20:07/15 20:32 06:04-06:32/28
25	07:14 17:03	06:38 06:57-07:05/8 17:41	05:53 18:13	06:04 19:46	05:31 05:56-06:31/35 20:16	05:25 19:52-20:07/15 20:32 06:04-06:32/28
26	07:13 17:04	06:36 06:56-07:07/11 17:42	05:51 18:14	06:02 19:47	05:30 19:51-19:52/1 20:17	05:25 19:52-20:06/14 20:32 06:04-06:32/28
27	07:12 17:06	06:35 06:54-07:07/13 17:44	05:49 18:15	06:01 19:48	05:29 19:50-19:52/2 20:17	05:25 19:53-20:07/14 20:32 06:04-06:33/29
28	07:11 17:07	06:33 06:52-07:08/16 17:45	05:48 18:16	05:59 19:49	05:29 19:50-19:54/4 20:18	05:26 19:52-20:07/15 20:32 06:04-06:33/29
29	07:11 17:08		06:46 19:17	05:58 19:50	05:28 19:49-19:54/5 20:19	05:26 19:53-20:07/14 20:32 06:05-06:34/29
30	07:10 17:09		06:44 19:18	05:57 19:51	05:27 19:49-19:55/6 20:20	05:26 19:53-20:07/14 20:32 06:04-06:34/30
31	07:09 17:11		06:43 19:19		05:27 19:48-19:55/7 20:21	
Potential sun hours	297	297	369	399	448	452
Sum of minutes with flicker	0	53	170	0	719	1298

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

## SHADOW - Calendar per WTG

Calculation: ombra WTG: 5 - Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (5)

### Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	July	August	September	October	November	December
1	05:27 19:53-20:06/13 20:32 06:05-06:35/30	05:51 06:13-06:34/21 20:13	06:22 19:30	06:52 18:40	06:26 16:53	07:01 16:29
2	05:27 19:53-20:07/14 20:32 06:05-06:35/30	05:52 06:14-06:33/19 20:12	06:23 19:29	06:53 18:38	06:27 16:52	07:02 16:28
3	05:28 19:53-20:06/13 20:32 06:05-06:36/31	05:53 06:15-06:31/16 20:11	06:24 19:27	06:54 18:36	06:28 16:51	07:03 16:28
4	05:28 19:54-20:06/12 20:32 06:05-06:36/31	05:54 06:17-06:29/12 20:10	06:25 19:25	06:55 07:27-07:36/9 18:35	06:29 16:49	07:04 16:28
5	05:29 19:54-20:07/13 20:32 06:05-06:36/31	05:55 20:09	06:26 19:24	06:56 07:24-07:38/14 18:33	06:31 16:48	07:05 16:28
6	05:30 19:54-20:06/12 20:31 06:04-06:36/32	05:56 20:08	06:27 19:22	06:57 07:22-07:40/18 18:31	06:32 16:47	07:06 16:28
7	05:30 19:55-20:06/11 20:31 06:05-06:37/32	05:57 20:06	06:28 19:20	06:58 07:21-07:41/20 18:30	06:33 16:46	07:07 16:27
8	05:31 19:54-20:05/11 20:31 06:04-06:37/33	05:58 20:05	06:29 19:19	06:59 07:20-07:42/22 18:28	06:34 16:45	07:08 16:27
9	05:31 19:55-20:05/10 20:30 06:04-06:37/33	05:59 20:04	06:30 19:17	07:00 07:20-07:42/22 18:26	06:35 16:44	07:08 16:27
10	05:32 19:56-20:05/9 20:30 06:05-06:38/33	06:00 20:03	06:31 19:15	07:01 07:21-07:42/21 18:25	06:37 16:43	07:09 16:27
11	05:33 19:56-20:04/8 20:30 06:04-06:38/34	06:01 20:01	06:32 19:14	07:02 07:22-07:42/20 18:23	06:38 16:42	07:10 16:28
12	05:34 19:56-20:04/8 20:29 06:04-06:38/34	06:02 20:00	06:33 19:12	07:03 07:24-07:42/18 18:22	06:39 16:41	07:11 16:28
13	05:34 19:57-20:04/7 20:29 06:05-06:39/34	06:03 19:59	06:33 19:10	07:04 07:25-07:42/17 18:20	06:40 16:40	07:12 16:28
14	05:35 19:58-20:04/6 20:28 06:05-06:39/34	06:04 19:57	06:34 19:09	07:05 07:26-07:41/15 18:19	06:41 16:39	07:13 16:28
15	05:36 19:58-20:02/4 20:28 06:04-06:39/35	06:05 19:56	06:35 19:07	07:06 07:27-07:40/13 18:17	06:43 16:38	07:13 16:28
16	05:37 19:59-20:02/3 20:27 06:05-06:39/34	06:06 19:55	06:36 19:05	07:08 07:28-07:38/10 18:15	06:44 16:37	07:14 16:28
17	05:37 20:00-20:02/2 20:26 06:05-06:40/35	06:07 19:53	06:37 19:03	07:09 07:29-07:36/7 18:14	06:45 16:36	07:15 16:29
18	05:38 06:05-06:40/35 20:26	06:08 19:52	06:38 19:02	07:10 07:30-07:33/3 18:12	06:46 16:36	07:15 16:29
19	05:39 06:06-06:40/34 20:25	06:09 19:50	06:39 19:00	07:11 18:11	06:47 16:35	07:16 16:29
20	05:40 06:05-06:39/34 20:24	06:10 19:49	06:40 18:58	07:12 18:09	06:48 16:34	07:17 16:30
21	05:41 06:05-06:40/35 20:24	06:11 19:47	06:41 18:57	07:13 18:08	06:50 16:33	07:17 16:30
22	05:42 06:06-06:40/34 20:23	06:12 19:46	06:42 18:55	07:14 18:06	06:51 16:33	07:18 16:31
23	05:42 06:06-06:40/34 20:22	06:13 19:44	06:43 18:53	07:15 18:05	06:52 16:32	07:18 16:31
24	05:43 06:06-06:40/34 20:21	06:14 19:43	06:44 18:52	07:17 18:04	06:53 16:32	07:19 16:32
25	05:44 06:07-06:39/32 20:20	06:15 19:41	06:45 18:50	06:18 17:02	06:54 16:31	07:19 16:32
26	05:45 06:08-06:39/31 20:19	06:16 19:40	06:46 18:48	06:19 17:01	06:55 16:31	07:19 16:33
27	05:46 06:08-06:38/30 20:18	06:17 19:38	06:48 18:46	06:20 16:59	06:56 16:30	07:20 16:34
28	05:47 06:09-06:37/28 20:17	06:18 19:37	06:49 18:45	06:21 16:58	06:57 16:30	07:20 16:34
29	05:48 06:10-06:37/27 20:16	06:19 19:35	06:50 18:43	06:22 16:57	06:59 16:29	07:20 16:35
30	05:49 06:11-06:36/25 20:15	06:20 19:33	06:51 18:41	06:23 16:56	07:00 16:29	07:21 16:36
31	05:50 06:12-06:35/23 20:14	06:21 19:32		06:25 16:54		07:21 16:37
Potential sun hours	459	428	375	345	298	288
Sum of minutes with flicker	1148	68	0	229	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

## SHADOW - Calendar per WTG

Calculation: ombra WTG: 6 - Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (6)

### Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:21 16:38	07:08 17:12	06:32 17:46	06:41 19:20	05:55 19:52	05:26 20:21	05:57-06:10/13 20:32	05:27 20:13	06:13-06:19/6 19:30	06:22 18:40	06:52 16:53	06:26 16:29
2	07:21 16:38	07:07 17:13	06:30 17:47	06:39 19:21	05:54 19:53	05:26 20:22	05:58-06:10/12 20:32	05:27 20:12	06:14-06:18/4 19:29	06:23 18:38	06:53 16:52	06:27 16:28
3	07:21 16:39	07:06 17:14	06:29 17:48	06:38 19:22	05:53 19:54	05:26 20:23	05:59-06:08/9 20:32	05:28 20:11	06:24 19:27	06:54 18:36	06:28 16:51	07:03 16:28
4	07:21 16:40	07:05 17:16	06:27 17:49	06:36 19:23	05:51 19:55	05:25 20:24	06:01-06:08/7 20:32	05:28 20:10	06:25 19:25	06:55 18:35	06:29 16:49	07:04 16:28
5	07:21 16:41	07:04 17:17	06:26 17:51	06:34 19:24	05:50 19:56	05:25 20:24	06:03-06:06/3 20:32	05:29 20:09	06:26 19:24	06:56 18:33	06:31 16:48	07:05 16:28
6	07:21 16:42	07:03 17:18	06:24 17:52	06:33 19:25	05:49 19:57	05:24 20:25	06:01-06:08/7 20:32	05:29 20:08	06:27 19:22	06:57 18:31	06:32 16:47	07:06 16:28
7	07:21 16:43	07:02 17:19	06:22 17:53	06:31 19:26	05:48 19:58	05:24 20:26	06:01-06:08/7 20:32	05:30 20:06	06:28 19:20	06:58 18:30	06:33 16:46	07:07 16:27
8	07:21 16:44	07:00 17:21	06:21 17:54	06:30 19:27	05:47 19:59	05:24 20:26	06:01-06:08/7 20:32	05:31 20:05	06:29 19:19	06:59 18:28	06:34 16:45	07:08 16:27
9	07:21 16:45	06:59 17:22	06:19 17:55	06:28 19:28	05:45 20:00	05:24 20:27	06:01-06:08/7 20:32	05:31 20:04	06:30 19:17	07:00 18:26	06:35 16:44	07:08 16:27
10	07:21 16:46	06:58 17:23	06:18 17:56	06:26 19:30	05:44 20:01	06:04-06:05/1 20:27	06:01-06:08/7 20:32	05:32 20:03	06:06-06:17/11 20:04	06:30 19:17	07:01 18:26	06:37 16:44
11	07:21 16:47	06:57 17:24	06:16 17:57	06:25 19:31	05:43 20:02	06:03-06:08/5 20:28	06:01-06:08/7 20:32	05:33 20:30	06:05-06:17/12 20:01	06:31 19:14	07:02 18:23	06:38 16:42
12	07:20 16:48	06:56 17:26	06:14 17:58	06:23 19:32	05:42 20:03	06:02-06:09/7 20:28	06:01-06:08/7 20:32	05:34 20:29	06:04-06:18/14 20:00	06:32 19:12	07:03 18:22	06:39 16:41
13	07:20 16:49	06:54 17:27	06:13 17:59	06:22 19:33	05:41 20:04	06:01-06:10/9 20:29	06:01-06:08/7 20:32	05:34 20:29	06:04-06:19/15 19:59	06:33 19:10	07:04 18:20	06:40 16:40
14	07:20 16:50	06:53 17:28	06:11 18:01	06:20 19:34	05:40 20:05	06:00-06:11/11 20:29	06:01-06:08/7 20:32	05:35 20:28	06:04-06:20/16 19:57	06:34 19:09	07:05 18:18	06:41 16:39
15	07:19 16:51	06:52 17:29	06:09 18:02	06:18 19:35	05:39 20:06	05:59-06:11/12 20:30	06:01-06:08/7 20:32	05:36 20:28	06:03-06:20/17 19:56	06:35 19:07	07:06 18:17	06:42 16:38
16	07:19 16:53	06:51 17:30	06:08 18:03	06:17 19:36	05:38 20:07	05:58-06:12/14 20:30	06:01-06:08/7 20:32	05:37 20:27	06:03-06:21/18 19:55	06:36 19:05	07:08 18:15	06:44 16:37
17	07:19 16:54	06:49 17:32	06:06 18:04	06:15 19:37	05:37 20:08	05:58-06:13/15 20:30	06:01-06:08/7 20:32	05:37 20:26	06:03-06:22/19 19:53	06:37 19:03	07:09 18:14	06:45 16:36
18	07:18 16:55	06:48 17:33	06:04 18:05	06:14 19:38	05:36 20:09	05:57-06:13/16 20:31	06:01-06:08/7 20:32	05:38 20:26	06:03-06:22/19 19:52	06:38 19:02	07:10 18:12	06:46 16:36
19	07:18 16:56	06:46 17:34	06:03 18:06	06:12 19:39	05:35 20:10	05:56-06:13/17 20:31	06:01-06:08/7 20:32	05:39 20:25	06:03-06:23/20 19:50	06:39 19:00	07:11 18:11	06:47 16:35
20	07:17 16:57	06:45 17:35	06:01 18:07	06:11 19:40	05:34 20:11	05:55-06:13/18 20:31	06:01-06:08/7 20:32	05:40 20:24	06:02-06:22/20 19:49	06:40 18:58	07:12 18:09	06:48 16:34
21	07:16 16:58	06:44 17:36	05:59 18:08	06:09 19:41	05:34 20:12	05:54-06:13/19 20:32	06:01-06:08/7 20:32	05:41 20:24	06:03-06:23/20 19:47	06:41 18:57	07:13 18:08	06:50 16:33
22	07:16 17:00	06:42 17:38	05:58 18:09	06:08 19:42	05:33 20:13	05:54-06:14/20 20:32	06:01-06:08/7 20:32	05:42 20:23	06:04-06:23/19 19:46	06:42 18:55	07:14 18:06	06:51 16:33
23	07:15 17:01	06:41 17:39	05:56 18:10	06:06 19:43	05:32 20:14	05:53-06:13/20 20:32	06:01-06:08/7 20:32	05:42 20:22	06:05-06:23/18 19:44	06:43 18:53	07:15 18:05	06:52 16:32
24	07:14 17:02	06:39 17:40	05:54 18:11	06:05 19:44	05:31 20:15	05:52-06:13/21 20:32	06:01-06:08/7 20:32	05:43 20:21	06:06-06:24/18 19:43	06:44 18:51	07:16 18:04	06:53 16:32
25	07:14 17:03	06:38 17:41	05:53 18:13	06:03 19:45	05:31 20:16	05:53-06:13/20 20:32	06:01-06:08/7 20:32	05:44 20:20	06:07-06:24/17 19:41	06:45 18:50	06:18 17:02	06:54 16:31
26	07:13 17:04	06:36 17:42	05:51 18:14	06:02 19:47	05:30 20:16	05:53-06:13/20 20:32	06:01-06:08/7 20:32	05:45 20:19	06:08-06:24/16 19:40	06:46 18:48	06:19 17:01	06:55 16:31
27	07:12 17:06	06:35 17:44	05:49 18:15	06:01 19:48	05:29 20:17	05:53-06:12/19 20:32	06:01-06:08/7 20:32	05:46 20:18	06:08-06:23/15 19:38	06:47 18:46	06:20 16:59	06:56 16:30
28	07:11 17:07	06:33 17:45	05:48 18:16	05:59 19:49	05:29 20:18	05:54-06:12/18 20:32	06:01-06:08/7 20:32	05:47 20:17	06:09-06:22/13 19:37	06:48 18:45	06:21 16:58	06:57 16:30
29	07:11 17:08	06:32 17:46	05:47 18:17	05:58 19:50	05:28 20:19	05:54-06:11/17 20:32	06:01-06:08/7 20:32	05:48 20:16	06:10-06:22/12 19:35	06:50 18:43	06:22 16:57	06:59 16:29
30	07:10 17:09	06:31 17:47	05:46 18:18	05:57 19:51	05:27 20:20	05:56-06:11/15 20:32	06:01-06:08/7 20:32	05:49 20:15	06:11-06:21/10 19:33	06:51 18:41	06:23 16:55	07:00 16:29
31	07:09 17:11	06:30 17:48	05:45 18:19	05:56 19:52	05:26 20:21	05:56-06:10/14 20:32	06:01-06:08/7 20:32	05:50 20:14	06:12-06:20/8 19:32	06:52 16:54	06:25 16:54	07:21 16:37
Potential sun hours	297	297	369	399	448	452	459	428	375	345	298	288
Sum of minutes with flicker	0	0	0	0	328	44	361	10	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

## SHADOW - Calendar per WTG

Calculation: ombra WTG: 7 - Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (7)

### Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:21 16:38	07:08 17:12	06:32 17:46	06:41 19:20	05:55 19:52	05:26 20:21	05:27 20:32	05:51 20:13	06:22 19:30	06:52 18:40	06:26 16:53	07:01 16:29
2	07:21 16:38	07:07 17:13	06:30 17:47	06:39 19:21	05:54 19:53	05:26 20:22	05:27 20:32	05:52 20:12	06:23 19:29	06:53 18:38	06:27 16:52	07:02 16:28
3	07:21 16:39	07:06 17:14	06:29 17:48	06:38 19:22	05:53 19:54	05:25 20:23	05:28 20:32	05:53 20:11	06:24 19:27	06:54 18:36	06:28 16:50	07:03 16:28
4	07:21 16:40	07:05 17:16	06:27 17:49	06:36 19:23	05:51 19:55	05:25 20:24	05:28 20:32	05:54 20:10	06:25 19:25	06:55 18:35	06:29 16:49	07:04 16:28
5	07:21 16:41	07:04 17:17	06:26 17:50	06:34 19:24	05:50 19:56	05:25 20:24	05:29 20:32	05:55 20:09	06:26 19:24	06:56 18:33	06:31 16:48	07:05 16:28
6	07:21 16:42	07:03 17:18	06:24 17:52	06:33 19:25	05:49 19:57	05:24 20:25	05:30 20:31	05:56 20:08	06:27 19:22	06:57 18:31	06:32 16:47	07:06 16:28
7	07:21 16:43	07:02 17:19	06:22 17:53	06:31 19:26	05:48 19:58	05:24 20:26	05:30 20:31	05:57 20:06	06:28 19:20	06:58 18:30	06:33 16:46	07:07 16:27
8	07:21 16:44	07:00 17:21	06:21 17:54	06:30 19:27	05:47 19:59	05:24 20:26	05:31 20:31	05:58 20:05	06:29 19:19	06:59 18:28	06:34 16:45	07:08 16:27
9	07:21 16:45	06:59 17:22	06:19 17:55	06:28 19:28	05:45 20:00	05:24 20:27	05:31 20:30	05:59 20:04	06:29 19:17	07:00 18:26	06:35 16:44	07:08 16:27
10	07:21 16:46	06:58 17:23	06:18 17:56	06:26 19:30	05:44 20:01	05:23 20:27	05:32 20:30	06:00 20:03	06:30 19:15	07:01 18:25	06:37 16:43	07:09 16:27
11	07:21 16:47	06:57 17:24	06:16 17:57	06:25 19:31	05:43 20:02	05:23 20:28	05:33 20:30	06:01 20:01	06:31 19:14	07:02 18:23	06:38 16:42	07:10 16:27
12	07:20 16:48	06:56 17:26	06:14 17:58	06:23 19:32	05:42 20:03	05:23 20:28	05:33 20:29	06:02 20:00	06:32 19:12	07:03 18:22	06:39 16:41	07:11 16:28
13	07:20 16:49	06:54 17:27	06:13 17:59	06:22 19:33	05:41 20:04	05:23 20:29	05:34 20:29	06:03 19:59	06:33 19:10	07:04 18:20	06:40 16:40	07:12 16:28
14	07:20 16:50	06:53 17:28	06:11 18:01	06:20 19:34	05:40 20:05	05:23 20:29	05:35 20:28	06:04 19:57	06:34 19:09	07:05 18:18	06:41 16:39	07:13 16:28
15	07:19 16:51	06:52 17:29	06:09 18:02	06:18 19:35	05:39 20:06	05:23 20:30	05:36 20:28	06:05 19:56	06:35 19:07	07:06 18:17	06:42 16:38	07:13 16:28
16	07:19 16:52	06:51 17:30	06:08 18:03	06:17 19:36	05:38 20:07	05:23 20:30	05:37 20:27	06:06 19:55	06:36 19:05	07:08 18:15	06:44 16:37	07:14 16:28
17	07:19 16:54	06:49 17:32	06:06 18:04	06:15 19:37	05:37 20:08	05:23 20:30	05:37 20:26	06:07 19:53	06:37 19:03	07:09 18:14	06:45 16:36	07:15 16:29
18	07:18 16:55	06:48 17:33	06:04 18:05	06:14 19:38	05:36 20:09	05:23 20:31	05:38 20:26	06:08 19:52	06:38 19:02	07:10 18:12	06:46 16:36	07:15 16:29
19	07:18 16:56	06:46 17:34	06:03 18:06	06:12 19:39	05:35 20:10	05:23 20:31	05:39 20:25	06:09 19:50	06:39 19:00	07:11 18:11	06:47 16:35	07:16 16:29
20	07:17 16:57	06:45 17:35	06:01 18:07	06:11 19:40	05:34 20:11	05:23 20:31	05:40 20:24	06:10 19:49	06:40 18:58	07:12 18:09	06:48 16:34	07:17 16:30
21	07:16 16:58	06:44 17:36	05:59 18:08	06:09 19:41	05:34 20:12	05:23 20:32	05:41 20:24	06:11 19:47	06:41 18:57	07:13 18:08	06:50 16:33	07:17 16:30
22	07:16 16:59	06:42 17:38	05:58 18:09	06:08 19:42	05:33 20:13	05:24 20:32	05:42 20:23	06:12 19:46	06:42 18:55	07:14 18:06	06:51 16:33	07:18 16:31
23	07:15 17:01	06:41 17:39	05:56 18:10	06:06 19:43	05:32 20:14	05:24 20:32	05:42 20:22	06:13 19:44	06:43 18:53	07:15 18:05	06:52 16:32	07:18 16:31
24	07:14 17:02	06:39 17:40	05:54 18:11	06:05 19:44	05:31 20:15	05:24 20:32	05:43 20:21	06:14 19:43	06:44 18:51	07:16 18:04	06:53 16:32	07:19 16:32
25	07:14 17:03	06:38 17:41	05:53 18:13	06:03 19:45	05:30 20:16	05:24 20:32	05:44 20:20	06:15 19:41	06:45 18:50	07:17 18:02	06:54 16:31	07:19 16:32
26	07:13 17:04	06:36 17:42	05:51 18:14	06:02 19:47	05:30 20:16	05:25 20:32	05:45 20:19	06:16 19:40	06:46 18:48	07:18 17:01	06:55 16:31	07:19 16:33
27	07:12 17:06	06:35 17:44	05:49 18:15	06:01 19:48	05:29 20:17	05:25 20:32	05:46 20:18	06:17 19:38	06:47 18:46	07:19 16:59	06:56 16:30	07:20 16:34
28	07:11 17:07	06:33 17:45	05:48 18:16	05:59 19:49	05:29 20:18	05:26 20:32	05:47 20:17	06:18 19:37	06:48 18:45	07:20 16:58	06:57 16:30	07:20 16:34
29	07:11 17:08		06:46 19:17	05:58 19:50	05:28 20:19	05:26 20:32	05:48 20:16	06:19 19:35	06:50 18:43	07:21 16:57	06:59 16:29	07:20 16:35
30	07:10 17:09		06:44 19:18	05:57 19:51	05:27 20:20	05:26 20:32	05:49 20:15	06:20 19:33	06:51 18:41	07:22 16:55	07:00 16:29	07:21 16:36
31	07:09 17:11		06:43 19:19		05:27 20:21		05:50 20:14	06:21 19:32		06:25 16:54		07:21 16:37
Potential sun hours	297	297	369	399	448	452	459	428	375	345	298	288
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

## SHADOW - Calendar per WTG

Calculation: ombra WTG: 8 - Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (8)  
Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December					
1	07:21	07:08	06:32	07:16-07:37/21	06:41	07:39-08:54/75	05:55	05:26	05:27	05:51	06:22	07:42-08:39/57	06:52	07:29-08:37/68	06:26	07:01	
	16:38	17:12	17:46		19:20	19:52	20:21	20:32	20:13	19:30	18:40	16:53	16:29				
2	07:21	07:07	06:30	07:10-07:41/31	06:39	07:39-08:53/74	05:54	05:26	05:27	05:52	06:23	07:41-08:41/60	06:53	07:30-08:36/66	06:27	07:02	
	16:38	17:13	17:47		19:21	19:53	20:22	20:32	20:12	19:29	18:38	16:52	16:28				
3	07:21	07:06	06:29	07:08-07:45/37	06:38	07:39-08:51/72	05:53	05:25	05:28	05:53	06:24	07:39-08:41/62	06:54	07:30-08:35/65	06:28	07:03	
	16:39	17:14	17:48		19:22	19:54	20:23	20:32	20:11	19:27	18:36	16:50	16:28				
4	07:21	07:05	06:27	07:04-07:47/43	06:36	07:40-08:51/71	05:51	05:25	05:28	05:54	06:25	07:38-08:42/64	06:55	07:31-08:33/62	06:29	07:04	
	16:40	17:16	17:49		19:23	19:55	20:23	20:32	20:10	19:25	18:35	16:49	16:28				
5	07:21	07:04	06:26	07:01-07:49/48	06:34	07:40-08:49/69	05:50	05:25	05:29	05:55	06:26	07:37-08:43/66	06:56	07:32-08:31/59	06:31	07:05	
	16:41	17:17	17:50		19:24	19:56	20:24	20:32	20:09	19:24	18:33	16:48	16:28				
6	07:21	07:03	06:24	07:00-07:51/51	06:33	07:40-08:48/68	05:49	05:24	05:30	05:56	06:27	07:36-08:44/68	06:57	07:33-08:29/56	06:32	07:06	
	16:42	17:18	17:52		19:25	19:57	20:25	20:31	20:08	19:22	18:31	16:47	16:28				
7	07:21	07:02	06:22	06:57-07:52/55	06:31	07:41-08:47/66	05:48	05:24	05:30	05:57	06:27	07:35-08:44/69	06:58	07:35-08:27/52	06:33	07:07	
	16:43	17:19	17:53		19:26	19:58	20:25	20:31	20:06	19:20	18:30	16:46	16:27				
8	07:21	07:00	06:21	06:56-07:54/58	06:30	07:41-08:45/64	05:47	05:24	05:31	05:58	06:28	07:34-08:45/71	06:59	07:36-08:25/49	06:34	07:08	
	16:44	17:21	17:54		19:27	19:59	20:26	20:31	20:05	19:19	18:28	16:45	16:27				
9	07:21	06:59	06:19	06:54-07:55/61	06:28	07:41-08:43/62	05:45	05:24	05:31	05:59	06:29	07:33-08:45/72	07:00	07:38-08:23/45	06:35	07:08	
	16:45	17:22	17:55		19:28	20:00	20:27	20:30	20:04	19:17	18:26	16:44	16:27				
10	07:21	06:58	06:18	06:52-07:55/63	06:26	07:43-08:43/60	05:44	05:23	05:32	06:00	06:30	07:32-08:46/74	07:01	07:40-08:20/40	06:36	07:09	
	16:46	17:23	17:56		19:30	20:01	20:27	20:30	20:03	19:15	18:25	16:43	16:27				
11	07:21	06:57	06:16	06:52-07:57/65	06:25	07:43-08:40/57	05:43	05:23	05:33	06:01	06:31	07:32-08:46/74	07:02	07:42-08:17/35	06:38	07:10	
	16:47	17:24	17:57		19:31	20:02	20:28	20:30	20:01	19:14	18:23	16:42	16:27				
12	07:20	06:56	06:14	06:50-07:57/67	06:23	07:45-08:39/54	05:42	05:23	05:33	06:02	06:32	07:31-08:46/75	07:03	07:46-08:13/27	06:39	07:11	
	16:48	17:26	17:58		19:32	20:03	20:28	20:29	20:00	19:12	18:22	16:41	16:28				
13	07:20	06:54	06:13	06:48-07:58/70	06:22	07:45-08:37/52	05:41	05:23	05:34	06:03	06:33	07:30-08:46/76	07:04	07:52-08:08/16	06:40	07:12	
	16:49	17:27	17:59		19:33	20:04	20:29	20:29	19:59	19:10	18:20	16:40	16:28				
14	07:20	06:53	06:11	06:48-07:59/71	06:20	07:47-08:36/49	05:40	05:23	05:35	06:04	06:34	07:30-08:47/77	07:05	06:41	07:13		
	16:50	17:28	18:01		19:34	20:05	20:29	20:28	19:57	19:09	18:18	16:39	16:28				
15	07:19	06:52	06:09	06:47-07:59/72	06:18	07:48-08:33/45	05:39	05:23	05:36	06:05	06:35	07:29-08:47/78	07:06	06:42	07:13		
	16:51	17:29	18:02		19:35	20:06	20:30	20:27	19:56	19:07	18:17	16:38	16:28				
16	07:19	06:50	06:08	06:45-07:59/74	06:17	07:49-08:30/41	05:38	05:23	05:37	06:06	06:36	07:29-08:47/78	07:07	06:44	07:14		
	16:52	17:30	18:03		19:36	20:07	20:30	20:27	19:55	19:05	18:15	16:37	16:28				
17	07:19	06:49	06:06	06:45-08:00/75	06:15	07:51-08:28/37	05:37	05:23	05:37	06:07	06:37	07:28-08:46/78	07:09	06:45	07:15		
	16:54	17:32	18:04		19:37	20:08	20:30	20:26	19:53	19:03	18:14	16:36	16:29				
18	07:18	06:48	06:04	06:44-08:00/76	06:14	07:53-08:25/32	05:36	05:23	05:38	06:08	06:38	07:28-08:46/78	07:10	06:46	07:15		
	16:55	17:33	18:05		19:38	20:09	20:31	20:26	19:52	19:02	18:12	16:36	16:29				
19	07:18	06:46	06:03	06:43-07:59/76	06:12	07:56-08:22/26	05:35	05:23	05:39	06:09	06:39	07:28-08:46/78	07:11	06:47	07:16		
	16:56	17:34	18:06		19:39	20:10	20:31	20:25	19:50	19:00	18:11	16:35	16:29				
20	07:17	06:45	06:01	06:43-08:00/77	06:11	08:01-08:17/16	05:34	05:23	05:40	06:10	06:40	07:27-08:46/79	07:12	06:48	07:17		
	16:57	17:35	18:07		19:40	20:11	20:31	20:24	19:49	18:58	18:09	16:34	16:30				
21	07:16	06:44	05:59	06:42-08:00/78	06:09		05:34	05:24	05:41	06:11	06:41	07:27-08:45/78	07:13	06:50	07:17		
	16:58	17:36	18:08		19:41	20:12	20:32	20:23	19:47	18:57	18:08	16:33	16:30				
22	07:16	06:42	05:58	06:41-07:59/78	06:08		05:33	05:24	05:42	06:12	06:42	07:27-08:45/78	07:14	06:51	07:18		
	16:59	17:38	18:09		19:42	20:13	20:32	20:23	19:46	18:55	18:06	16:33	16:31				
23	07:15	06:41	05:56	06:41-07:59/78	06:06		05:32	05:24	05:42	06:13	08:04-08:22/18	06:43	07:27-08:44/77	07:15	06:52	07:18	
	17:01	17:39	18:10		19:43	20:14	20:32	20:22	19:44	18:53	18:05	16:32	16:31				
24	07:14	06:39	05:54	06:40-07:59/79	06:05		05:31	05:24	05:43	06:14	08:00-08:26/26	06:44	07:26-08:43/77	07:16	06:53	07:19	
	17:02	17:40	18:11		19:44	20:15	20:32	20:21	19:43	18:51	18:04	16:32	16:32				
25	07:14	06:38	05:53	06:40-07:58/78	06:03		05:31	05:24	05:44	06:15	07:57-08:29/32	06:45	07:26-08:42/76	06:18	06:54	07:19	
	17:03	17:41	18:12		19:45	20:16	20:32	20:20	19:41	18:50	18:02	16:31	16:32				
26	07:13	06:36	05:51	06:40-07:58/78	06:02		05:30	05:25	05:45	06:16	07:54-08:31/37	06:46	07:27-08:42/75	06:19	06:55	07:19	
	17:04	17:42	18:14		19:46	20:16	20:32	20:19	19:40	18:48	17:01	16:31	16:33				
27	07:12	06:35	05:49	06:39-07:57/78	06:01		05:29	05:25	05:46	06:17	07:52-08:33/41	06:47	07:27-08:42/75	06:20	06:56	07:20	
	17:06	17:44	18:15		19:48	20:17	20:32	20:18	19:38	18:46	16:59	16:30	16:34				
28	07:11	06:33	05:48	06:39-07:56/77	05:59		05:29	05:26	05:47	06:18	07:50-08:35/45	06:48	07:28-08:41/73	06:21	06:57	07:20	
	17:07	17:45	18:16		19:49	20:18	20:32	20:17	19:37	18:45	16:58	16:30	16:34				
29	07:10		06:46	07:39-08:56/77	05:58		05:28	05:26	05:48	06:19	07:48-08:37/49	06:49	07:28-08:40/72	06:22	06:59	07:20	
	17:08		19:17		19:50	20:19	20:32	20:16	19:35	18:43	16:57	16:29	16:35				
30	07:10		06:44	07:39-08:55/76	05:57		05:27	05:26	05:49	06:20	07:45-08:37/52	06:51	07:29-08:39/70	06:23	07:00	07:21	
	17:09		19:18		19:51	20:20	20:32	20:15	19:33	18:41	16:55	16:29	16:36				
31	07:09		06:43	07:39-08:54/75			05:27		05:50	06:21	07:43-08:38/55			06:25		07:21	
	17:11		19:19			20:21	20:31	20:14	19:32		16:54			16:37		16:37	
Potential sun hours	297	297	369	399	448	452	459	428	375	2185	640	298	288				
Sum of minutes with flicker	0	0	2043	1090	0	0	0	355	2185	640	0	0	0				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

## SHADOW - Calendar per WTG

Calculation: ombra WTG: 9 - Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (9)

### Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:21 16:38	07:08 17:12	06:32 17:46	06:41 19:20	05:55 19:52	05:26 20:21	05:27 20:32	05:51 20:13	06:21 19:30	06:51 07:12-07:22/10 18:40	06:26 16:53	07:01 16:29	
2	07:21 16:38	07:07 17:13	06:30 17:47	06:39 19:21	05:54 19:53	05:26 20:22	05:27 20:32	05:52 20:12	06:22 19:29	06:53 07:13-07:18/5 18:38	06:27 16:52	07:02 16:28	
3	07:21 16:39	07:06 17:14	06:29 17:48	06:38 19:22	05:53 19:54	05:25 20:23	05:28 20:32	05:53 20:11	06:23 19:27	06:54 18:36	06:28 16:50	07:03 16:28	
4	07:21 16:40	07:05 17:15	06:27 17:49	06:36 19:23	05:51 19:55	05:25 20:23	05:28 20:32	05:54 20:10	06:24 19:25	06:55 18:35	06:29 16:49	07:04 16:28	
5	07:21 16:41	07:04 17:17	06:26 17:50	06:34 19:24	05:50 19:56	05:25 20:24	05:29 20:32	05:55 20:09	06:25 19:24	06:56 18:33	06:30 16:48	07:05 16:28	
6	07:21 16:42	07:03 17:18	06:24 17:52	06:33 19:25	05:49 19:57	05:24 20:25	05:29 20:31	05:56 20:08	06:26 19:22	06:57 18:31	06:32 16:47	07:06 16:27	
7	07:21 16:43	07:01 17:19	06:22 17:53	06:31 19:26	05:48 19:58	05:24 20:25	05:30 20:31	05:57 20:06	06:27 19:20	06:58 18:30	06:33 16:46	07:07 16:27	
8	07:21 16:44	07:00 17:20	06:21 17:54	06:29 19:27	05:47 19:59	05:24 20:26	05:31 20:31	05:58 20:05	06:28 19:19	06:59 18:28	06:34 16:45	07:07 16:27	
9	07:21 16:45	06:59 17:22	06:19 17:55	06:28 19:28	05:45 20:00	05:24 20:27	05:31 20:30	05:59 20:04	06:29 19:17	07:00 18:26	06:35 16:44	07:08 16:27	
10	07:21 16:46	06:58 17:23	06:18 17:56	06:26 19:29	05:44 20:01	05:23 20:27	05:32 20:30	06:00 20:03	06:30 19:15	07:01 18:25	06:36 16:43	07:09 16:27	
11	07:21 16:47	06:57 17:24	06:16 17:57	06:25 19:31	05:43 20:02	05:23 20:28	05:33 20:29	06:01 20:01	06:31 19:14	07:02 18:23	06:38 16:42	07:10 16:27	
12	07:20 16:48	06:56 17:25	06:14 06:33-06:42/9 17:58	06:23 19:32	05:42 20:03	05:23 20:28	05:33 20:29	06:02 20:00	06:32 19:12	07:03 18:22	06:39 16:41	07:11 16:28	
13	07:20 16:49	06:54 17:27	06:13 06:31-06:43/12 17:59	06:21 19:33	05:41 20:04	05:23 20:29	05:34 20:29	06:03 19:59	06:33 19:10	07:04 18:20	06:40 16:40	07:12 16:28	
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15	07:19 16:51	06:52 17:29	06:09 06:28-06:46/18 18:02	06:18 19:35	05:39 20:06	05:23 20:30	05:36 20:27	06:05 19:56	06:35 19:07	07:06 18:17	06:42 16:38	07:13 16:28	
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17	07:18 16:54	06:49 17:32	06:06 06:25-06:47/22 18:04	06:15 19:37	05:37 20:08	05:23 20:30	05:37 20:26	06:07 19:53	06:37 19:03	07:09 18:14	06:45 16:36	07:15 16:29	
18	07:18 16:55	06:48 17:33	06:04 06:23-06:47/24 18:05	06:14 19:38	05:36 20:09	05:23 20:31	05:38 20:26	06:08 19:52	06:38 07:15-07:26/11 19:02	07:10 18:12	06:46 16:36	07:15 16:29	
19	07:17 16:56	06:46 17:34	06:03 06:23-06:46/23 18:06	06:12 19:39	05:35 20:10	05:23 20:31	05:39 20:25	06:09 19:50	06:39 07:13-07:28/15 19:00	07:11 18:11	06:47 16:35	07:16 16:29	
20	07:17 16:57	06:45 17:35	06:01 06:23-06:46/23 18:07	06:11 19:40	05:34 20:11	05:23 20:31	05:40 20:24	06:10 19:49	06:40 07:11-07:29/18 18:58	07:12 18:09	06:48 16:34	07:16 16:30	
21	07:16 16:58	06:44 17:36	05:59 06:23-06:45/22 18:08	06:09 19:41	05:34 20:12	05:23 20:32	05:41 20:23	06:11 19:47	06:41 07:10-07:30/20 18:57	07:13 18:08	06:49 16:33	07:17 16:30	
22	07:16 16:59	06:42 17:38	05:58 06:23-06:44/21 18:09	06:08 19:42	05:33 20:13	05:24 20:32	05:41 20:23	06:12 19:46	06:42 07:08-07:30/22 18:55	07:14 18:06	06:51 16:33	07:18 16:31	
23	07:15 17:01	06:41 17:39	05:56 06:24-06:43/19 18:10	06:06 19:43	05:32 20:14	05:24 20:32	05:42 20:22	06:13 19:44	06:43 07:08-07:30/22 18:53	07:15 18:05	06:52 16:32	07:18 16:31	
24	07:14 17:02	06:39 17:40	05:54 06:25-06:41/16 18:11	06:05 19:44	05:31 20:15	05:24 20:32	05:43 20:21	06:14 19:43	06:44 07:06-07:29/23 18:51	07:16 18:04	06:53 16:32	07:19 16:32	
25	07:14 17:03	06:38 17:41	05:53 06:27-06:38/11 18:12	06:03 19:45	05:30 20:16	05:24 20:32	05:44 20:20	06:15 19:41	06:45 07:06-07:29/23 18:50	06:18 17:02	06:54 16:31	07:19 16:32	
26	07:13 17:04	06:36 17:42	05:51 06:31-06:34/3 18:13	06:02 19:46	05:30 20:16	05:25 20:32	05:45 20:19	06:16 19:40	06:46 07:07-07:29/22 18:48	06:19 17:01	06:55 16:30	07:19 16:33	
27	07:12 17:06	06:35 17:43	05:49 18:15	06:01 19:48	05:29 20:17	05:25 20:32	05:46 20:18	06:17 19:38	06:47 07:08-07:29/21 18:46	06:20 16:59	06:56 16:30	07:20 16:34	
28	07:11 17:07	06:33 17:45	05:48 18:16	05:59 19:49	05:28 20:18	05:25 20:32	05:47 20:17	06:18 19:37	06:48 07:09-07:28/19 18:45	06:21 16:58	06:57 16:30	07:20 16:34	
29	07:10 17:08	06:32 17:45	05:46 18:17	05:58 19:50	05:28 20:19	05:26 20:32	05:48 20:16	06:18 19:35	06:49 07:10-07:26/16 18:43	06:22 16:57	06:58 16:29	07:20 16:35	
30	07:10 17:09	06:31 17:45	05:44 18:18	05:57 19:51	05:27 20:20	05:26 20:32	05:49 20:15	06:19 19:33	06:50 07:11-07:25/14 18:41	06:23 16:55	07:00 16:29	07:21 16:36	
31	07:09 17:10	06:30 17:45	05:43 18:19	05:56 19:51	05:27 20:20	05:27 20:32	05:50 20:14	06:20 19:32	06:50 07:11-07:25/14 18:41	06:25 16:54	07:21 16:36	07:21 16:36	
	Potential sun hours	297	297	369	399	448	452	459	428	375	345	298	288
	Sum of minutes with flicker	0	0	258	0	0	0	0	0	246	15	0	0

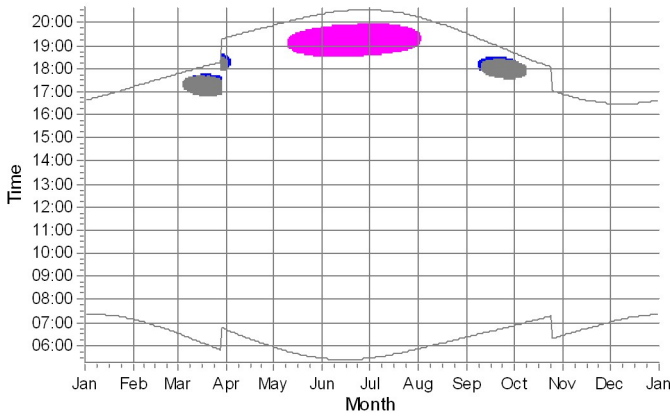
Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

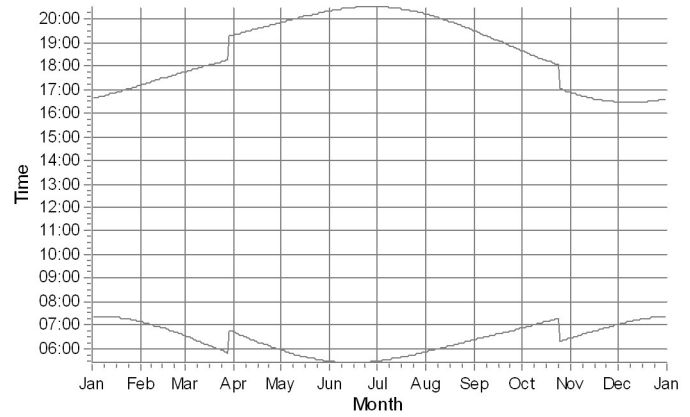
## SHADOW - Calendar per WTG, graphical

Calculation: ombra

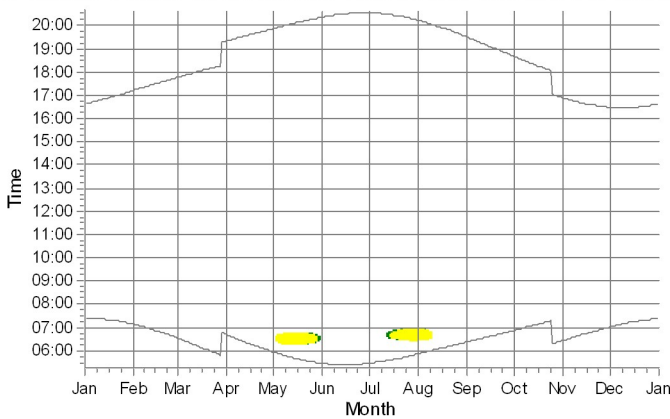
1: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m



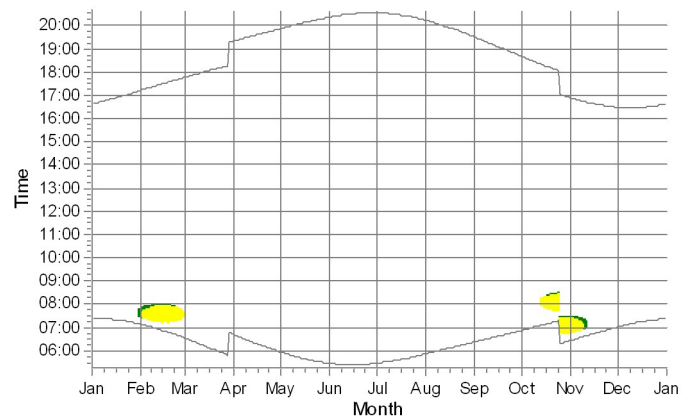
2: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (2)



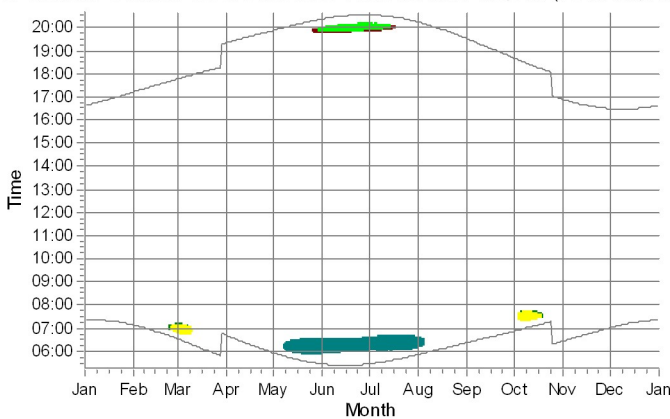
3: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m



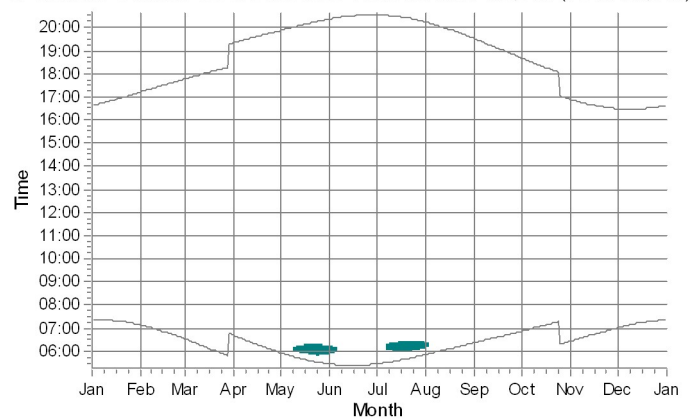
4: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (4)







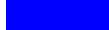



5: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m



6: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (6)



### Shadow receptors

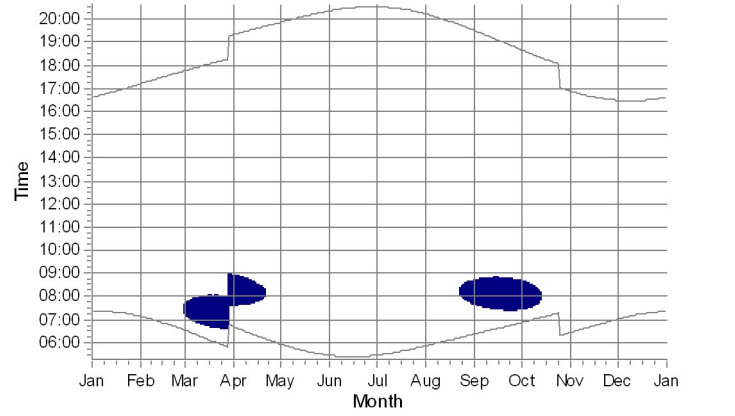
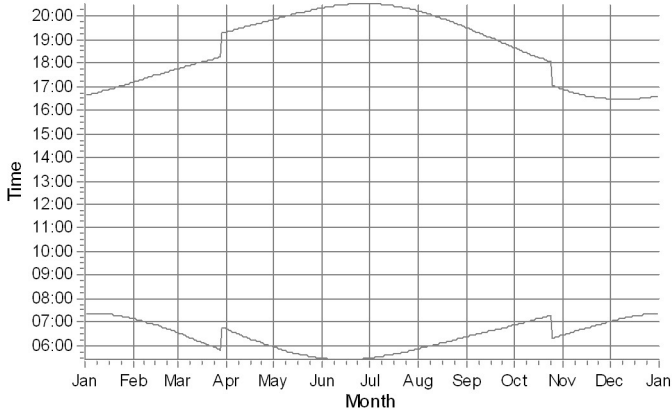
	A: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (90)		E: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (94)
	B: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (91)		F: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (95)
	C: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (92)		H: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (97)
	D: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (93)		I: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (98)



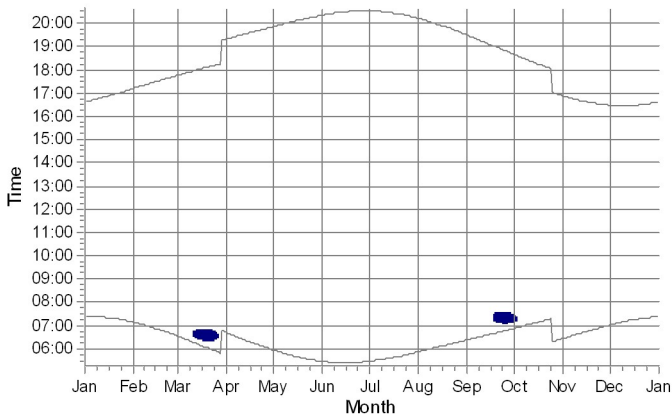
## SHADOW - Calendar per WTG, graphical

Calculation: ombra


7: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) 8: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (8)



9: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 125,0 m (TOT: 202,5 m) (9)

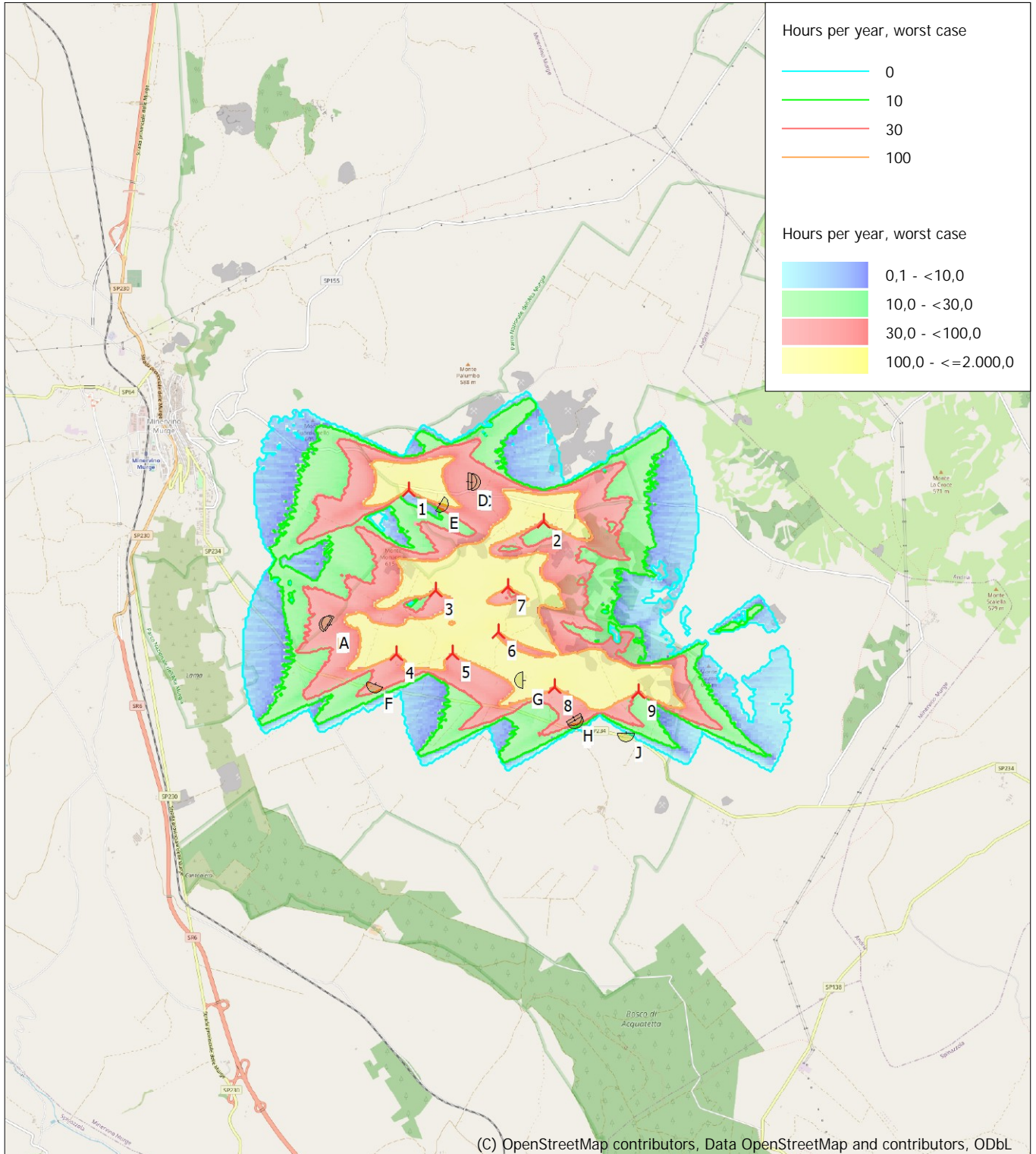


Shadow receptors

 G: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (96)

# SHADOW - Map

Calculation: ombra



Map: EMD OpenStreetMap , Print scale 1:75.000, Map center UTM (north)-WGS84 Zone: 33 East: 595.080 North: 4.546.710

New WTG

Shadow receptor

Flicker map level: Elevation Grid Data Object: IR\_Minervino50volte\_EMDGrid\_0.wpg (6)

Time step: 4 minutes, Day step: 14 days, Map resolution: 30 m, Visibility resolution: 15 m, Eye height: 1,5 m